U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF BIOLOGICAL SURVEY

NORTH AMERICAN FAUNA

No. 28

[Actual date of publication, April 17, 1909]

REVISION OF THE MICE OF THE AMERICAN GENUS PEROMYSCUS

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

DISTRIBUTION OF THE SPECIES AND SUBSPECIES OF THE PEROMYSCUS MANICULATUS GROUP.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BIOLOGICAL SURVEY,
Washington, D. C., July 16, 1908.

SIR: I have the honor to transmit for publication as North American Fauna No. 28 a revision of the mice of the American genus *Peromyscus*, by Wilfred H. Osgood. The work consists of a systematic study of all the members of the genus, and includes keys for the identification of the various forms, together with the necessary illustrations, and maps showing the geographic distribution of the species.

The mice of this group occur in great abundance throughout the United States, particularly in the Western States, but up to the present time the interrelations and ranges of the various forms have not been worked out. Lack of this knowledge has been a source of embarrassment to workers in many parts of the country, particularly to the Biological Survey in its investigations of the geographic distribution and economic relations of American mammals. It is important, therefore, that a revision of the group be made available for general use.

Respectfully,

C. HART MERRIAM,
Chief, Biological Survey.

HON. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Introduction.....	9
Material.....	10
History and nomenclature.....	11
Variation.....	14
Intergradation.....	17
Pelages.....	19
Color descriptions.....	21
Measurements.....	22
Keys.....	23
Records of specimens.....	23
Subgenera.....	24
Habits and economic status.....	26
List of species and subspecies with type localities.....	28
New subspecies.....	32
Genus <i>Peromyscus</i>	32
Subgenus <i>Peromyscus</i>	33
Subgenus <i>Megadontomys</i>	218
Subgenus <i>Ochrotomys</i>	222
Subgenus <i>Podomys</i>	226
Subgenus <i>Haplomylomys</i>	228
Subgenus <i>Baiomys</i>	252
Tables of measurements.....	260
Index.....	281

ILLUSTRATIONS.

PLATES.

Page.

PLATE I. Distribution of the species and subspecies of the <i>Peromyscus maniculatus</i> group.....	Frontispiece.
II. Skulls (dorsal views) of <i>Peromyscus maniculatus</i> , <i>P. m. arcticus</i> , <i>P. m. austerus</i> , <i>P. m. hylarus</i> , <i>P. m. gracilis</i> , <i>P. m. hollisteri</i> , <i>P. sitkensis</i> , <i>P. m. keeni</i> , <i>P. m. pallascens</i> , <i>P. m. bairdi</i> , <i>P. polionotus</i> , and <i>P. m. gambeli</i>	208
III. Skulls (dorsal views) of <i>Peromyscus leucopus tornillo</i> , <i>P. gossypinus</i> , <i>P. l. cozumelte</i> , <i>P. l. mesomelas</i> , <i>P. oaxacensis</i> , <i>P. lotharius</i> , <i>P. simulatus</i> , <i>P. hylocetes</i> , <i>P. crinitus</i> , <i>P. c. stephensi</i> , <i>P. eremicus</i> , and <i>P. l. texanus</i>	270
IV. Skulls (dorsal views) of <i>Peromyscus boylei</i> , <i>P. b. leripes</i> , <i>P. b. spicilegus</i> , <i>P. b. simulus</i> , <i>P. b. aztecus</i> , <i>P. truei</i> , <i>P. pectoralis eremicoides</i> , <i>P. nasutus</i> , <i>P. t. gratus</i> , <i>P. taylori</i> , <i>P. musculus</i> , and <i>P. lepturus</i>	272
V. Skulls (dorsal views) of <i>Peromyscus banderanus</i> , <i>P. guatemalensis</i> , <i>P. melanophrys</i> , <i>P. yucatanicus</i> , <i>P. megalops</i> , <i>P. difficilis</i> , <i>P. furvus</i> , <i>P. mexicanus</i> , and (lateral views) <i>P. l. noveboracensis</i> , <i>P. musculus</i> , <i>P. nuttalli</i> , <i>P. eremicus</i> , <i>P. thomasi</i> , and <i>P. floridanus</i>	274
VI. Skulls (dorsal views) of <i>Peromyscus zarhynchus</i> , <i>P. flavidus</i> , <i>P. thomasi</i> , <i>P. leucopus</i> , <i>P. californicus</i> , <i>P. floridanus</i> , and <i>P. nuttalli</i> . Jaws of <i>Peromyscus nuttalli</i> , <i>P. floridanus</i> , <i>P. californicus</i> , <i>P. l. noveboracensis</i> , <i>P. flavidus</i> , <i>P. l. noveboracensis</i> , <i>P. eremicus</i> , <i>P. thomasi</i> , and <i>P. musculus</i>	276
VII. Skulls (ventral views) of <i>Peromyscus floridanus</i> , <i>P. nuttalli</i> , <i>P. l. noveboracensis</i> , <i>P. eremicus</i> , <i>P. thomasi</i> , <i>P. mexicanus</i> , <i>P. bullatus</i> , <i>P. flavidus</i> , <i>P. boylei</i> , <i>P. truei</i> , <i>P. musculus</i> , and <i>P. m. gracilis</i>	278
VIII. Upper molars (in profile) of <i>Peromyscus thomasi</i> , <i>P. l. noveboracensis</i> , and <i>P. l. eremicus</i> . Upper molars (worn crowns) of <i>P. thomasi</i> , <i>P. californicus</i> , <i>P. nuttalli</i> , and <i>P. l. noveboracensis</i> . Lower molars (worn crowns) of <i>P. thomasi</i> , <i>P. l. noveboracensis</i> , <i>P. m. gracilis</i> , <i>P. musculus</i> , and <i>P. floridanus</i>	280

TEXT FIGURES.

Fig. 1. Distribution of <i>Peromyscus melanotis</i>	110
2. Distribution of <i>Peromyscus leucopus</i> and subspecies.....	114
3. Distribution of <i>Peromyscus gossypinus</i> and subspecies.....	136
4. Distribution of <i>Peromyscus boylei</i> and subspecies.....	143
5. Distribution of <i>Peromyscus pectoralis</i> , <i>P. megalops</i> , <i>P. furvus</i> , and <i>P. guatemalensis</i>	161
6. Distribution of <i>Peromyscus truei</i> and subspecies.....	166
7. Distribution of <i>Peromyscus difficilis</i> and subspecies.....	179
8. Distribution of <i>Peromyscus melanophrys</i> and subspecies.....	184
9. Distribution of <i>Peromyscus nuttalli</i> and <i>P. n. aureolus</i>	224
10. Distribution of <i>Peromyscus crinitus</i> and subspecies.....	230
11. Distribution of <i>Peromyscus eremicus</i> and subspecies.....	240
12. Distribution of the subgenus <i>Baiomys</i>	253

A REVISION OF THE MICE OF THE AMERICAN GENUS PEROMYSCUS.

By WILFRED H. OSGOOD.

INTRODUCTION.

The American rodent genus *Peromyscus*, including the so-called wood mice, deer mice, vesper mice, or white-footed mice, has needed revision for many years. One or more of its numerous species and subspecies inhabit almost every part of North America; moreover, these mice, wherever found, are among the most abundant of small mammals. The group, therefore, is of such importance that it must be dealt with in every work on North American mammals, whether pertaining to classification, geographic distribution, or economic relations.

Although the amount of material examined for the present work is very large and the opportunities for study have been exceptional, not all the conclusions can be claimed to be final. However, the material in most cases has amply sufficed to demonstrate purely zoological problems; the chief difficulty has been to bring within the sharply defined limits of nomenclature and classification natural objects which are not sharply limited. In the study of such a large and widely ranging genus nearly all the moot points of modern systematic zoology are encountered. Most of these have been treated conservatively. Misidentifications, even of decidedly distinct species, hitherto have been the rule rather than the exception. Therefore, very fine discrimination at this time would not conduce to a general understanding of the group, but would tend rather to confusion. The reviser's own idea of the term "conservative" is of course subject to the interpretation of other workers. Describers of slight local or intermediate forms, who find many of their names in synonymy, will doubtless consider the treatment too conservative, while others, noting the long array of subspecies admitted, may think it too radical.

Important but not strictly taxonomic problems have appeared in almost every group; but most of these, however interesting, have been regarded as beyond the scope of the work. They relate especially to details of distribution, variation, evolution, and various questions which can best be treated by special workers with ample time, special data, and limited general obligations. Students of local faunas will find in these problems opportunities for extremely interesting and valuable work.

MATERIAL.

In 1891, Dr. J. A. Allen, after discussing certain species of *Peromyscus*, made the following statement:^a

But the time has not yet come for a satisfactory revision of the group, to attempt which at least 20,000 specimens are requisite, collected so as to fully represent the seasonal phases of pelage obtaining at hundreds of more or less widely separated localities.

These conditions are now realized to the fullest degree, for the number of specimens examined in the present revision exceeds 27,000. The majority of these are contained in the extensive collection of the Biological Survey, which, under the direction of Dr. C. Hart Merriam, has been built up with special reference to the various life areas of North America, and without which no satisfactory study of this group would now be possible.^b In addition, all the material in the more important public and private collections of America has been examined, and also important specimens belonging to European institutions, especially the British Museum. This material includes all the types, both of valid forms and of synonyms, known to be in existence. In almost all cases in which no types exist, good series of topotypes, or specimens from near the type localities, have been available. The American collections which have been thoroughly examined are distributed as follows: Biological Survey (including the collection of C. Hart Merriam, on deposit); U. S. National Museum; American Museum of Natural History, New York; Field Museum of Natural History, Chicago; Museum of Comparative Zoology, Cambridge (now including the collection of E. A. and O. Bangs); and the Academy of Natural Sciences, Philadelphia (now including the collection of S. N. Rhoads). The individuals having charge of these collections have generously allowed the unrestricted use of their material. Special acknowledgments are due Dr. J. A. Allen, of New York; Mr. Outram Bangs, of Boston; Dr. F. W. True, Mr. Gerrit S. Miller, jr., and Dr. M. W. Lyon, jr., of Washington; Mr. Witmer Stone, of Philadelphia; and Drs. D. G. Elliot and S. E.

^a Bull. Am. Mus. Nat. Hist., III, p. 307, 1891.

^b Unless otherwise stated, specimens mentioned by number in the body of this report are in the Biological Survey Collection.

Meek, of Chicago. It is also proper to acknowledge the assistance of various members of the staff of the Biological Survey who have aided greatly by their knowledge of local conditions, especially Vernon Bailey, E. W. Nelson, E. A. Goldman, and E. A. Preble. Occasional specimens from small institutions or private collectors in various parts of the country have been examined, and mention of these has been made in the systematic part of the work.

HISTORY AND NOMENCLATURE.

Early authors, noticing only its superficial resemblance to the European wood mouse (*Mus sylvaticus*), placed the deer mouse of Eastern North America in the genus *Mus*, and for some years nearly all American murines were included in that genus. In 1839, Waterhouse^a drew attention to the dental characters that distinguish American cricetines from the genus *Mus*, and, chiefly on the basis of studies of South American forms, proposed the name *Hesperomys* to include all American rodents having a biserial arrangement of the molar tubercles. This name, although proposed in an irregular way (being antedated by its own subgenera), immediately became current and besides being used for various South American rodents, was pressed into service for the North American cricetines. It then comprised a large number of subgenera, most of which are now recognized as genera, as *Oryzomys*, *Onychomys*, *Eligmodontia*, *Oxymycterus*, *Phyllotis*, and others, and was used as late as 1891, when Allen^b argued that, since it could not be restricted to any particular type, its use should be discontinued. Meanwhile some authors (as Audubon and Bachman 1851-1854) failed to recognize the distinctions of Waterhouse, and continued to use the generic name *Mus*. Previous to Allen, however, Jordan^c had displaced *Hesperomys* and adopted *Calomys*, apparently assuming (not unreasonably) that *Mus bimaculatus*, which formed the chief basis of Waterhouse's characterization of *Hesperomys*, was its type, and that this species being also the type of the earlier *Calomys*, would make the two names absolutely identical in application, thus forcing the use of *Calomys* because of its priority. This action of Jordan was quite in conformity with a statement of the case made by Coues in 1877.^d But Coues, although his own statement showed *Hesperomys* invalid, still retained it, apparently on the ground that it was "firmly established, and as the prior name *Calomys* is by the same author." However, he confined its use "in its strictest subgeneric sense" to South Ameri-

^a Zool. Voy. Beagle, p. 75, 1839.

^b Bull. Am. Mus. Nat. Hist., III. pp. 291-294, June, 1891.

^c Manual of Vertebrates, 5th ed., p. 321, 1888.

^d Monogr. N. Am. Rodent., pp. 43-44, 1877.

can forms, and for the reception of the North American forms adopted the subgeneric name *Vesperimus* previously proposed by him with the *Mus leucopus* of authors as type. When, therefore, in 1891, Allen discarded *Hesperomys* entirely, he adopted Coues's *Vesperimus* for the northern group of cricetines. The currency of *Vesperimus* was brief, for in 1892, Merriam^a showed it to be antedated by *Sitomys* Fitzinger, 1867. This was thereupon adopted and used until 1894, when Thomas^b discovered a still earlier claimant, *Peromyscus* Gloger, 1841. This name has remained unchallenged for nearly fifteen years, and it is to be hoped will never be supplanted.

In the first pretentious work on the mammals of North America, that of Audubon and Bachman (1851-1854), only 3 species of those now recognized as belonging to *Peromyscus* were included, namely, *aureolus*, *leucopus*, and *michiganensis* (= *bairdi*). Previous to 1854, however, several forms unrecognized by Audubon and Bachman had been described. These were *noveboracensis* (1829), *nuttalli* (1832), *maniculatus* (1845), *californicus* (1848), *gossypinus* (1853), *sonoriensis* (1853), and *texanus* (1853). In 1857 Baird's Mammals of North America appeared^c and added greatly to the knowledge of the group. With an acuteness which is the more noteworthy when the scanty and imperfect nature of his material is considered, Baird sensed the distinctness of a number of forms not previously thought worthy, and also gave names to several new ones. Moreover, he reviewed the related South American forms and presented the relationships of the species and minor groups then known much more satisfactorily than any previous writer. Thirteen forms were recognized by Baird under the following names: *leucopus*, *texanus*, *gossypinus*, *gambelii*, *austerus*, *nuttalli*, *cognatus*, *boyllyi*, *myoides*, *sonoriensis*, *michiganensis*, *californicus*, and *eremicus*. Twelve of these are still recognized, *cognatus* being the only one that did not represent at least a valid subspecific form. Under *Hesperomys*, Baird also placed *Onychomys leucogaster* and *Oryzomys palustris* with the rank of separate subgenera. After Baird, followed a period of comparative inactivity in which very few new forms were described, and the concept of the group remained nearly unchanged. Then came the mistaken ultraconservatism of Coues, who, in 1877,^d 'lumped' several of Baird's forms and also synonymized the majority of all names previously proposed for species of *Peromyscus*. Thus under *Hesperomys leucopus* were placed no fewer than 13 names, none of which are now referred to the synonymy of that species. In addition to *Hesperomys leucopus*, however, Coues recognized the

^a Proc. Biol. Soc. Wash., VII, p. 27, footnote, April, 1892.

^b Ann. & Mag. Nat. Hist., Lond., ser. 6, XIV, p. 364, footnote, November, 1894.

^c Pac. R. R. Reports, VII, pp. 1-757, 1857.

^d Monogr. N. Am. Rodentia, pp. 43-105, 1877.

following: *Hesperomys leucopus gossypinus*, *H. l. sonoriensis*, *H. l. eremicus*, *H. auricolus*, *H. michiganensis* (= *bairdi*), *H. californicus*, *H. aztecus*, and *H. melanophrys*. Like Baird, he included *Onychomys* and *Oryzomys* under *Hesperomys* as subgenera. The conclusions of Coues were not seriously challenged for several years, but after 1885 collections began to increase, and from that time until the present many descriptions of new or supposed new forms have been published, and conceptions of the number and relationships of the species within the genus have rapidly changed. Various groups which had long been included as subgenera were eliminated and given independent rank, as *Onychomys*, *Oryzomys*, *Tylomys*, *Rhipidomys*, and various South American groups, until with the removal of *Thomasomys* in 1898 the genus *Peromyscus* became restricted to forms confined to North and Central America. However, scarcely any of this recent work on the genus was of a revisionary nature, or if so it was confined to the limits of some small section. Certain papers of special importance, however, are worthy of mention. In 1890 Mearns published a brief but important synopsis of a number of the short-tailed western forms now included in the *maniculatus* group.^a Another valuable contribution was made in 1893, when Allen,^b in reporting upon some large collections from Lower California, gave an extended discussion of the species of *Peromyscus* concerned. The species inhabiting Florida and all the forms of *P. gossypinus* have been quite thoroughly treated by Bangs.^c Two extensive papers were also published describing new forms from Mexico and Central America, one by Merriam^d containing 20 descriptions, the other by Osgood^e containing 30. Short papers and mere descriptions have been numerous. In fact, no fewer than 167 names for new or supposed new forms of *Peromyscus* have been proposed since 1885. Add to this the 14 contained in the present paper, and the total of 181 is reached.^f

The characters of the species and subspecies of *Peromyscus* are so subtle that even from the same material different persons may form different conclusions. For this reason, and also on account of the lack of even tentative revisionary work, the production of synonyms in this genus has been unusually large. Of the 167 names for sup-

^a Bull. Am. Mus. Nat. Hist. II, pp. 234-287, Feb. 21, 1890.

^b Supra cit., V, pp. 185-197, Aug. 18, 1893.

^c Proc. Bost. Soc. Nat. Hist., XXVIII, pp. 193-203, March, 1898, and Proc. Biol. Soc. Wash., X, pp. 119-125, Nov. 5, 1896.

^d Proc. Biol. Soc. Wash., XII, pp. 115-125, Apr. 30, 1898.

^e Proc. Biol. Soc. Wash., XVII, pp. 55-77, Mar. 21, 1904.

^f The authorship of these is divided as follows: Allen, 26; Allen and Chapman, 4; Bailey, 3; Bangs, 16; Chapman, 3; Copeland and Church, 1; Elliot, 15; Mearns, 13; Merriam, 28; Miller, 4; Osgood, 47; Rhoads, 11; Shufeldt, 1; Thomas, 8.

posed new forms of *Peromyscus* proposed since 1885, 58, practically one-third, are of more than doubtful status and are here treated as synonyms. The descriptions of these supposed new species are often misleading, since it has been usual to compare them with remote and entirely irrelevant forms, while their near relatives were ignored. Much time has been wasted in elaborate descriptions of shades of color common to nearly every species in the genus, while mention of relationships and differential characters has often been omitted. As a result, original descriptions have proved of little value to the reviser, and for determining the applicability of names he has been compelled to depend largely upon type specimens.

VARIATION.

Variation in *Peromyscus* might well form the subject of extended discussion, but here it can be treated only in a general way, space forbidding the numerous tabulations which detailed study would require. Fortuitous individual variation is perhaps no greater than in most other genera of small rodents, but the range of seasonal, polychromatic, and local or geographic variation, is rather wide, so the genus may fairly be said to be more than usually variable. Individual variation is greatest in specimens from localities lying just between the ranges of two well-established forms. In fact, the complete range of difference between two extremes often may be found in series from such localities. In other cases, though obviously intermediate, certain series show variations approaching either or both extremes. Also, variable intermediates may sometimes show tendencies not apparent in either extreme but too unstable to be of subspecific importance. On the other hand, some intermediate series are quite uniform, but this is exceptional. Series typical of well-established forms show comparatively little variation except in size, and this is not often great. In order to ascertain the normal variation in size it is necessary to select carefully for illustration specimens that are unquestionably adult and that have been measured by one person, thus eliminating the personal equation. Below are given measurements of an entire series of *P. s. prevostensis*. These specimens were taken in two nights' trapping at one place and carefully measured in the flesh by myself. Every one is fully adult. From the table it appears that the mean total length is almost exactly halfway between the extremes, and that the passage from one extreme to the other is very gradual, indicating that the mean is not misleading, as it often is when a preponderance of specimens is toward either of the extremes. In total length the greatest variation from the mean is the extreme of 230 mm., which is 14 mm., or about $6\frac{1}{2}$ per cent, in excess of the mean. Without detailing further evidence, it may be stated that this is about the normal percentage of variation in size

throughout the genus. The same range of variation appears in both sexes—additional evidence that the average is reliable. Sexual variation, as appears below, is so slight as to be practically wanting. This seems to hold throughout the genus, for though in a given series the maximum size is usually found among the females, the separate averages of adult males and females are always approximately the same.

Measurements of 45 topotypes of Peromyscus s. prevostensis.

Males.				Females.			
Museum number.	Length.	Tail.	Hind foot.	Museum number.	Length.	Tail.	Hind foot.
100822.....	230	116	27	100842.....	228	108	28
100814.....	229	112	27	100825.....	227	116	26
100819.....	226	108	27	100847.....	222	115	27
100837.....	226	110	26	100849.....	222	108	27
100846.....	222	111	26	100823.....	221	111	27
100828.....	222	108	25	100812.....	221	110	26
100839.....	221	106	27	100848.....	220	106	27
100809.....	221	108	25	100840.....	218	107	25
100830.....	219	107	27	100816.....	216	109	26
100821.....	218	102	26	100850.....	215	106	27
100827.....	217	106	26	100824.....	213	107	26
100836.....	217	107	27	100833.....	213	103	27
100820.....	217	107	27	100811.....	212	104	26
100835.....	214	103	26	100817.....	212	104	26
100806.....	214	103	26	100813.....	211	108	26
100808.....	214	105	26	100844.....	209	99	25
100829.....	214	104	25	100843.....	208	103	25
100826.....	213	106	26	100841.....	206	98	26
100845.....	211	101	27	100832.....	206	98	27
100838.....	210	101	25	100834.....	206	100	26
100807.....	209	102	26	Average of— 20 females..... 25 males..... Entire series (25 males and 20 females).....	215.8	105.7	25.2
100831.....	208	98	26		216.5	105.2	26.2
100805.....	208	102	25				
100815.....	207	99	27		216.0	105.4	26.2
100810.....	206	97	25				
Average of 25 males.....	216.5	105.2	26.2				

There is much variation in cranial characters that must be considered individual. Most of the distinct species are fairly well characterized cranially, but the cranial characters of subspecies, when any are apparent, are exceedingly variable and seldom constant throughout a series. Often, however, they constitute average characters of considerable value. More or less tendency to dolichocephaly is sometimes found in series representing species that are normally brachycephalic, and vice versa, and in such cases, of course, nearly all parts of the skull are affected. The teeth vary chiefly in size and seldom greatly. The pattern of the grinding surfaces of teeth at different stages of wear, however, varies much, and in all comparisons of teeth is to be carefully considered.

Variability of color, while often great, is usually not strictly individual, but in most cases may be explained otherwise. It may be due to season, age, or color phase, and in some cases slight color differences, not considered specific or subspecific, seem obviously due to environmental causes and may be very local. Although there is

only one complete annual molt, the constant change due to wear and its lack of uniformity in different individuals produce great variation, so that comparatively large series seldom contain two individuals absolutely identical in color. Differences due solely to age are quite constant and of much the same character throughout the genus, but they too are complicated with the wear of pelage. (See Pelages, p. 19.)

A sort of dichromatism is found in *P. m. blandus*, one phase being vinaceous gray and the other ochraceous buff. A few other forms, as *sonoriensis* and *coolidgei*, are slightly and less commonly dichromatic. Among western forms, variations of such an extremely local and sporadic nature often occur that one may almost believe them to have been produced in one or at most a very few generations. Such variations, of course, are slight, and doubtless produced immediately upon contact with certain conditions. Thus if the range of a given form includes a few square miles of lava beds, specimens from that area show an appreciably darker color than the normal form occupying the surrounding region. And whenever similar conditions are repeated elsewhere, even on a small scale, the same result seems to follow. Again, specimens from the bottom of a dark wooded canyon may be noticeably darker than those from an open hillside only a few hundred yards away. In the absence of absolute proof, one can scarcely avoid the suspicion that if the progeny of paler individuals were transferred at an early age to the habitat of darker ones, they would, quite regardless of inherent tendencies, develop a darker color, or, similarly, a lighter color if the process were reversed.

Local and geographic variations are great, so great, indeed, that, excepting a few species of very limited range, all the species have developed geographic peculiarities by means of which they have been subdivided into more or less numerous (geographic) races or subspecies. One species, *P. maniculatus*, which in its various forms ranges from sea to sea and from the Arctic Circle to the Isthmus of Tehuantepec, remains constant only where conditions are practically identical; hence it is represented by a definable subspecies in almost every faunal area which it enters. The readiness with which local variation is induced and established appears also from the large number of distinguishable insular forms. Much of the local variation, however, can not be considered subspecific. Certain forms, although preserving the same general characters throughout a definite range, nevertheless show slight and sometimes unique variations in nearly every local series from within the range. In these cases, where no two series of specimens from respective localities are exactly alike, and where no two can be associated except upon the basis of characters common to all, it is necessary to disregard slight variations and treat the entire association under one name.

INTERGRADATION.

Until recent years continuous and perfect intergradation was demonstrable only in relatively few cases. And even now, although proved beyond doubt in group after group, in many cases it is merely taken for granted. That intergradation exists even more widely than is generally supposed appears from the study of groups in which material is abundant. Of *Peromyscus* we have more complete series than of any other genus of American mammals—that is, not only are there more specimens, but many more localities are represented and the gaps in known distribution are usually few. Barriers impassable to many other mammals have little effect on these mice, for they range continuously, although not always without undergoing change, from sea level to great altitudes, and from the very humid to the very arid regions. Moreover, since usually they are so abundant and easily obtained, representatives are available from nearly every locality in North America ever visited by a mammal collector.^a Within the range of one species (*maniculatus*) it is probable that a line, or several lines, could be drawn from Labrador to Alaska and thence to southern Mexico throughout which not a single square mile is not inhabited by some form of this species. They are wanting in the extreme north, but there is scarcely a corner south of the Arctic Circle in which they do not occur. With such wide and continuous distribution perfect intergradation must take place between related forms of different faunal areas, and with such complete collections this intergradation must be plainly evident in nearly all cases.

Classification becomes, then, as has been said,^b like dividing the spectrum and depends largely upon the standards set, for, theoretically at least, the possibilities of subdivision are unlimited. It is not strange, therefore, that hundreds and even thousands of specimens are intergrades almost equally resembling two or more adjacent forms. Many of these intergrades for convenience may be referred with some degree of assurance to the form they most closely resemble, but many specimens fall so near the imaginary line between two or more subspecies that it is practically impossible to classify them other than as intergrades. A particularly troublesome class is one which approximates the color of one form and the cranial characters of another, thus reducing the question to one of relative importance of characters.

^a American collectors of wide experience, in comparing notes, regard as worthy of remark the few occasions on which they have found themselves in localities where they "couldn't catch *Peromyscus*," and in such places, as a rule, they were also unable to catch anything else.

^b Ridgway, *Birds North and Middle America*, pt. I, p. x, 1901.

The description of new forms without a complete canvass of congeneric forms often has the unfortunate result of fixing names to intermediate and unrepresentative types. The same result is effected also by the describer who, though fully cognizant of relationships, does not hesitate to name a slight variation, the characters of which, as exhibited by specimens from a given locality, may prove later to be more fully developed in specimens from elsewhere. The reviser is often confronted with three names representing steps in development from one extreme to another, one of the designated forms thus being intermediate between the other two. If, as often occurs, the recognition of only two forms seems necessary, and the intermediate has been named before either of the extremes, its name, having priority, must stand, and it becomes necessary to decide which of the names representing the extremes shall be considered a synonym. It is well known that certain intermediate specimens so combine the characters of two subspecies that different authors may relegate them to different forms. It is readily seen that when such specimens are chosen as types the names of several forms may thus become as subject to change as are those on the labels of intermediate specimens. A reviser in dealing with such names is compelled first to determine the number of recognizable forms without regard to names. Then the various type specimens are referred according to their degree of resemblance to one or another of the recognizable forms—just as would be done in determining ordinary specimens. The names are then adopted or rejected according to priority and these determinations.

In several instances, particularly in the *maniculatus* group, two bona fide subspecies inhabit the same area and apparently maintain themselves distinct. Each may be traced by a different geographic route through every degree of intergradation to one parent (?) form. Thus, *arcticus* and *algidus* occur together in the upper Yukon Valley as if distinct species; *arcticus* ranges southward and eastward and intergrades with *oreas*; *algidus* follows the coast route and through *hylaëus* and *macrorhinus* also intergrades with *oreas* (see map, frontispiece). Therefore, if natural causes, sudden or gradual, were to eliminate the intergrades with *oreas* the formation of two distinct species (*arcticus* and *algidus*), living side by side, would be complete.

Intergradation has been found quite frequently in unexpected quarters and many forms long supposed to be distinct species are now proved to be subspecies. This is significant of the result to be expected in other genera, specimens of which are less easily obtained, but which may have nearly or quite as continuous range as *Peromyscus*. Everything seems to indicate, however, that few, if any, genera of American mammals show such widely separated differentiations

and at the same time such unbroken series of intergrading forms as *Peromyscus*. Even the species most widely different are connected by forms more or less combining their characters, and the same is true in a large degree of the subgenera.

PELAGES.

Like many other mammals, the mice of the genus *Peromyscus* appear to undergo only one complete annual change of pelage. The normal time for this molt, at least in temperate regions, is late summer or early fall, but from various causes the exact time is extremely variable, so that season is usually of little value for determining the pelage of a given individual. The new pelage may be acquired in regular and obvious manner with the fresh coat well distinguished from the old worn one, the growth proceeding from before backward and the middle of the rump being the last part to be invested, or the change may be quite insidious and apparent only upon careful examination. The regular method is followed in the adults of most species, while the other is more often evident in immature individuals.

The new pelage, when first acquired, is apparently unmixed with any of the preceding worn pelage, which soon entirely disappears, but new hairs continue to come in for some time, making the pelage fuller and thicker until it reaches its prime, usually in late fall and early winter. Besides the normal molt, in some cases, a distinct secondary growth or perhaps a partial molt is shown by specimens which, though apparently in fresh pelage, are, as may be seen by lifting the hairs of the back and sides, largely covered with patches of short incoming hairs of uniform character. The complete new pelage remains much the same for some time (usually during winter), and then begins to show signs of wear. This is usually first evidenced by a general brightening of color, the overlying black or dusky tips of certain hairs fading or being worn off, thus exposing more fully the various underlying shades of buff. The process of fading and abrading continues until the molt, producing various effects in different species. Commonly the dusky soon becomes almost eliminated or altered to brown or pale cinnamon, so that it blends more perfectly with the main color. In species in which dusky predominates on the back this becomes more contrasted with the sides, the dusky having been eliminated on one part sooner than on the other.

In species having comparatively little dusky, the pelage, while still full, long, and apparently little worn, may become almost entirely a bright uniform shade of buff or tawny. This condition has sometimes mistakenly been supposed to represent the very old individual in distinction from the supposed normal adult. It is true that the

very bright rich colors are never assumed by the young and adolescents. But such colors appear to be only features of a stage through which any adult may pass annually, though since largely the result of external influences (abrasion and fading), they necessarily vary greatly in different individuals. Thus it often happens that the pelages of two individuals living side by side are at the end of a season in quite different stages of wear.

Besides the differences due to wear and renewal of the coat, there are three fairly distinct phases due to age—the juvenile (young in first coat), the adolescent, and the adult. The young in first coat is usually a uniform slaty gray or some similar shade.^a The hair is slightly paler terminally than basally and is more or less woolly in appearance—at least not smooth and compact. This stage is succeeded by the adolescent pelage, which first appears on the middle of the sides. Its growth proceeds rapidly upward on each side until union is effected in the middle of the back, and then incloses the rest of the body, the rump and nape usually being the last parts to be covered. In its early stages this adolescent pelage is plainly distinguishable from the adult pelage. The hair is shorter than in the adult, the main color is duller and paler, and the dusky is more uniformly distributed. It varies but little through many species, and the general effect is usually close to broccoli brown. It is difficult to determine how long this pelage is worn, but it is doubtless renewed at latest within a year. The succeeding coat may be somewhat paler and grayer than the fully adult, but as a rule is so similar to it that further distinction is scarcely possible. Except in northern forms, breeding is continued during the greater part or all of the year (see Remarks under *P. californicus*, p. 236), so that specimens of various ages may be taken at almost all seasons.

Consideration of pelages is of the highest importance in making comparisons of closely related forms. Except in large collections, it is very difficult to find specimens of different forms absolutely comparable as to condition of pelage. Indeed, it is sometimes hard to find two absolutely comparable specimens of one form even in a large series collected at one time and place. The fact that a specimen was collected at a certain season does not always warrant assumption that its pelage is the one that is (or ought to be) representative of that season. This is particularly true of southern forms, many of which seem to change pelage regardless of season. The process of change is constant; that is, a new pelage begins to be altered slightly as soon as it is acquired, and before renewal it may pass through various stages of fading and abrading, each more or less different from the others. Add to this the different shades of color distinguishing

^a An exception is found in the subgenus *Ochrotomys*, in which the young are colored like the adults.

juveniles, adolescents, adults, and senescents, and the result is an amount of variation that can be demonstrated only by large series taken at different seasons. Insufficient material, and consequent failure to appreciate these variations, have of course been the chief causes leading to the bestowal of different names upon identical forms.^a

The pelages here described are placed chiefly under two heads—the ‘unworn pelage,’ which indicates the fresh coat in its prime, and the ‘worn pelage,’ which usually is that of the rather decided degree of wear shown just before the molt. The various intermediate stages between the two can be indicated only in a general way. The ‘adolescent pelage’ and that of the ‘young in first coat’ are so similar in most forms that descriptions of them have not been given in all cases.

COLOR DESCRIPTIONS.

The description of the intergrading forms of a genus like *Peromyscus* presents unusual difficulties. Differences apparent enough to any tyro are beyond the powers of description of the practiced professional. Available words constantly signify either too much or too little and in many cases may mislead. Besides differences that can be perceived but not described, others doubtless exist in the living animals that in prepared specimens are rarely even perceptible.

As Bangs says:^b

Most of the closely related forms of white-footed mice look very different from each other when one is trapping and handling them in the flesh. This ‘aspect difference’ as Professor Shaler aptly calls it, is subtle and hard to define, and may disappear almost entirely when the animals are made into the conventional museum skins or preserved in spirits, thus leaving the characters on which species and subspecies are based very slight in comparison with what they were in life.

Since the general color and color pattern are so much the same throughout the genus, comparative descriptions are employed in almost all cases. In addition, although it causes some repetition, complete color descriptions are given for nearly all the forms. In every case, typical specimens have been compared carefully with the plates of Ridgway’s *Nomenclature of Colors for Naturalists*,^c which,

^a However, after examining several comparatively small collections, one can only wonder that so many really correct diagnoses have been made. Forms which appear quite distinct in view of large series of perfect specimens are most difficult to distinguish with only poor material. On the other hand, differences of pelage are often magnified in small collections where two very different pelages may be represented only by series from two widely separated localities, and thus the belief that they represent different forms is easily derived.

^b Proc. Biol. Soc. Wash., X, pp. 120–121, Nov., 1896.

^c Boston, Mass., 1886. Now out of print.

though of smaller scope than is desirable and unfortunately not widely accessible, is yet the only available standard. Since general color terms are so indefinite, they have been supplemented by the terms used by Ridgway, or, if possible, they are used in the sense of the unqualified term as given by Ridgway. Thus the term *rufous* is employed in none of the variable popular senses, but to describe the shade so-called by Ridgway (No. 7, Pl. IV). Nearly every species of *Peromyscus* has two colors independently combined, and the relative amount of each can not be stated in exact terms. An attempt to obviate this difficulty has been made by defining the two colors and also the 'general effect,' that is, the color produced by the blending of the two as seen when the specimen is held in a good light at a short distance from the eyes.

MEASUREMENTS.

All measurements are in millimeters. Unless otherwise stated, the external measurements are those taken in the flesh by the collector, as follows: Total length (tip of nose to tip of tail); tail vertebrae (never measured to end of hairs); and hind foot (to end of longest claw). The measurement of the ear has been taken in most cases from the dry skins of specimens in which the ear has not been distorted in drying. The means and extremes of ten normal adult specimens are given so far as possible. Since there is so little sexual difference in size (see p. 15), the averages, except in special cases, are based upon series containing specimens of both sexes. Cranial measurements have been taken with great care with finely adjusted calipers reading tenths of millimeters by vernier. Although not equally valuable for all forms, the following cranial measurements have been uniformly taken:

Greatest length, the length over all from the tip of the nasals to the posterior bulge of the braincase.

Basilar length, the basilar length of Hensel from the inferior lip of the foramen magnum to the incisor.

Zygomatic width, the greatest distance between the outer sides of the zygomata.

Interorbital constriction, the width of the most constricted part of the interorbital space.

Interparietal, the greatest length and width.

Nasals, the greatest length along the suture between the nasals.

Shelf of bony palate, the distance from the posterior ends of the anterior palatine foramina to the anterior border of the interpterygoid fossa.

Palatine slits, the greatest length of the anterior palatine foramina.

Diastema, anterior base of upper molars to posterior base of incisor.

Postpalatal length, the distance from the anterior border of the interpterygoid fossa to the inferior lip of the foramen magnum.

Maxillary toothrow, the alveolar length of the three upper molariform teeth.

KEYS.

Although at the outset it appeared that a thoroughly satisfactory key to the species of *Peromyscus* was out of the question, still a key of some sort seemed imperative. Effort has been made, therefore, to devise one by means of which normal adults may be identified. In its construction all semblance of natural order is disregarded and in many cases solely geographic divisions are made. This course is objectionable, if for no other reason than that further collecting and study may extend the limits of the ranges of many species. However, the ranges of the species of *Peromyscus* are better known than those of most other mammals, and it is therefore probable that a key based on geographic ranges will be found no more subject to change than one based on natural characters. Owing to the wide variation among the subspecies of many of the species, it has been necessary to introduce the same species in various parts of the key. Keys have been attempted also for the intergrading subspecies of each species, although obviously they must prove more or less unsatisfactory. They are largely geographic and are intended only as slight aids rather than invariable guides to identification.

In revising groups of animals and plants, it is desirable that the results be made useful to as large a class as possible, in addition to professional students. The present group, however, is a subtle one, and the best that can be done will not fully meet the needs of professionals, much less of amateurs. The identification of the species of *Peromyscus* is sufficiently difficult, and that of the subspecies is a subject for experts, or at least for those having access to large collections. In most cases, the best the amateur can hope to do is to identify his specimens as to species; for his subspecific determinations he must depend largely upon the accompanying maps.

RECORDS OF SPECIMENS.

More than 27,000 specimens are recorded in the following pages, being practically all those contained in the principal American collections.

An attempt has been made to refer every specimen examined to a described species or subspecies, but it must be admitted that in the case of many intermediate specimens it makes little difference whether they are called by one or another name. The fact that two forms intergrade may be shown conclusively by specimens, but

on which side of the imaginary dividing line the intergrading specimens belong must often remain largely a matter of individual opinion. Many specimens, therefore, have been referred arbitrarily to one or another of closely related forms. Such arbitrary reference is often necessary, not only in cases of intergrades, but of immature specimens or small series in noncommittal condition of pelage, and may be influenced by geography or by various considerations apart from the specimens themselves. Intermediate specimens are frequently noted as such in the records, but since there is every degree of intergradation, it is impossible to carry this plan out consistently, and therefore it can not safely be assumed that specimens are typical because they are not noted as intermediate.

SUBGENERA.

Although several superspecific groups may be characterized as subgenera within the genus *Peromyscus*, it does not appear necessary to remove any of them as independent genera. Thus the natural and well-known general concept of the genus is retained, while associations of species not formerly segregated are fully recognized by the employment of subgeneric names. Certain authors already have chosen to elevate the subgenera *Megadontomys* and *Baiomys* to generic rank^a and other similar mammalian groups are frequently treated as genera. Some make no attempt to justify their recognition of such groups other than the claim that the characters, however slight, are unmistakable, while others urge it merely as a matter of convenience, because the groups are of "unwieldy proportions,"^b or "as consistent with the finer ultimate divisions."^c So far as *Peromyscus* is concerned, the finer ultimate divisions are mostly intergrading subspecies and the unwieldy proportions are caused by the masquerading of many of these subspecies as full species. The number of bona fide species scarcely exceeds forty, and of these some half dozen eventually may be reduced in rank.

The unwieldiness of a genus is properly to be judged by the number of species it contains, without regard to the subspecies. The constant tendency in taxonomic work seems toward analytic methods at the expense of synthetic. This is shown especially in the multiplication of genera which have the function merely of emphasizing some slight distinction, while the groups which formerly served to indicate resemblances of associated species are unrecognized.

Unanimity in regard to the limits of genera and subgenera is scarcely to be hoped for, but some effort may be made to preserve

^a Cf. Bangs, Bull. Mus. Comp. Zool., XXXIX, p. 27, 1902; Mearns, Mamms. Mexican Boundary, Bull. No. 56, U. S. Nat. Mus., p. 381, 1907.

^b Cf. Bangs, Bull. Mus. Comp. Zool., XXXIX, p. 27, 1902.

^c Allen, Princeton Exped. Patagonia, III, Zool. I, p. 165, 1905.

both the genus and subgenus as classificatory categories. Those who assume that subgenera as such are useless must necessarily recognize more and more groups as genera until the distinction between the genus and the species becomes so slight as to be of little taxonomic value, while at the same time the gap between the genus and the group of next higher rank is correspondingly increased. It is difficult to understand the reason for this attitude, for, while it is held by those who draw very fine distinctions and are only too willing to see generic significance in slight characters, it actually operates to reduce the number of categories of classification between the subfamily and the species, and thus results, not in an improved and more discriminating system of classification, but one with fewer groups and fewer possibilities for the indication of relationships.

The use of subgenera provides a means of adjusting the differences usually existing between the general zoologist and the specialist. The generic name answers all the purposes of the general zoologist while the specialist may use as many subgenera as he desires and meet all the requirements of discriminating classification. This also operates to conciliate the amateur, whose outcries against the continual changing of names by specialists will thereby be lessened. Although these protests are often unreasonable, the specialist should remember that his scheme of nomenclature to be truly successful must answer the purposes of others as well as himself. If the specialist conservatively retains well-known and natural generic groups he may segregate subgenera indefinitely without retarding the progress of exact taxonomy, and, at the same time, without interfering with the less exacting needs of the general zoologist and the amateur. Moreover, further advantage is found in the fact that the percentage of legitimate changes of names that would confront the much-abused amateur would be greatly reduced; for changes of subgeneric names on account of preoccupation and other causes would in most cases concern only the specialist. One author^a advocates the abolition of subgenera in order to remove the temptation to give them the rank of genera—little more than a confession of weakness. It appears to be true, however, that with some systematists the establishment of a subgenus fosters attempts to elevate it to generic rank.

Most of the subgenera of *Peromyscus* are well characterized, usually by a combination of characters; but if a single character becomes pronounced it is merely an extreme development which may be traced back by stages to a widely different condition. Thus the subgenera *Haplomyloms* and *Megadontomys*, although fairly circumscribed and definable, seem to be at opposite ends of an almost continuous series in which the subgenus *Peromyscus* combines most of their characters. The subgenus *Podomys* (including *P. floridanus* only)

^a Hartert, Auk, XXIII, pp. 120-122, Jan. 1906.

seems to have an absolute character in the number of its plantar tubercles, but within the subgenus *Peromyscus* there is much variation in this respect, and specimens of the *maniculatus* group occasionally have the sixth tubercle very small and nearly obsolete. The subgenus *Baiomys* is usually recognizable by small size (*P. m. pallescens*, of the subgenus *Peromyscus*, is scarcely larger), but most of its characters are to be found elsewhere in the genus. *Ochrotomys* is a subgenus based upon a single aberrant form (*P. nuttalli*), which seems to have no very close relatives, although its general characters are obviously those of *Peromyscus*.

HABITS AND ECONOMIC STATUS.

The various species of this genus have widely different local habitats. Some inhabit woodland, others swamps and watercourses, some open upland prairies, and others rocks, cliffs, and arid desert regions. Even single species live under a surprising diversity of conditions. All are habitually nocturnal, though occasionally individuals under unusual circumstances may be seen abroad by day. They wander widely at night, and unlike the meadow mice (*Microtus*) do not form beaten runways. They do not hesitate, however, to freely utilize such runways made by other rodents. Collectors soon learn to recognize the places most frequented by them, but in a region where they abound they may be caught in traps set in almost every conceivable situation. Although sometimes welcomed by the inexperienced collector, to whom they insure a catch of some sort, they are a source of annoyance to the more ambitious trapper, who finds them continually springing traps set for more desirable species.

Many of them doubtless burrow to some extent, but in most cases those that live underground occupy natural openings, or retreats formed by other animals. Crevices in rocks and cliffs are the favorite haunts of many species. The prairie forms, as *P. m. bairdi* and others, are said to make short, simple burrows in the ground in which their nests of soft grass are placed. The woodland forms, as *P. leucopus*, though living largely on the ground, are to some extent arboreal, and *P. nuttalli* is largely so. They build their nests among roots and in old stumps and hollow trees, often occupying the deserted nesting cavities of birds, as woodpeckers, bluebirds, and chickadees. Sometimes also a bird's nest in a small bush is appropriated and temporarily used, or perhaps remodeled and permanently occupied. That they also climb about to some extent in trees not occupied as nesting sites is often evidenced by the presence of their dried droppings in crevices and crotches at some distance from the ground. They do not hibernate, but remain active throughout the winter, even in northern latitudes.

Although the food habits of various species are not quite the same, in general it may safely be said that very few feed extensively upon green and succulent food such as is taken by the meadow mice, but nearly all prefer dry food, especially seeds and small nuts. In captivity they are omnivorous, and, like the house mouse, find everything in man's larder palatable. Sometimes, when confined, they turn cannibals, and even in their natural habitat will often devour the dead bodies of their own kind or of other mice that have been caught in traps. The common form of the northeastern United States (*P. l. noveboracensis*) is especially fond of basswood seeds, pits of wild cherries, beechnuts, and acorns, and often stores them in burrows or in cavities in old stumps. It eats also seeds of many wild shrubs, weeds, and grasses. In wooded regions or on waste land, where it commonly lives, it is not very injurious to agriculture, but when living about the edges of cultivated ground it sometimes devours or carries away grain in considerable quantities. Kennicott records^a that in western New York there was found "within a stump in a clover field, several quarts of clean seed of red clover collected by a family of these mice." It occasionally gnaws the bark of young fruit trees or nursery stock, but such harm is more often due to meadow mice (*Microtus*).

Doubtless more damage is done by western forms than eastern, as many of the former are less confined to woodland. Thus *P. m. bairdi* and other forms of the *maniculatus* group, being naturally inhabitants of open ground, readily betake themselves to cultivated fields under the conditions of advancing civilization. In such cases, although grain and other products form only a small part of their food, they do considerable injury on account of their great numbers. Throughout practically all of the western United States they exist in countless numbers, perhaps exceeding those of the other combined mammalian inhabitants of the region. They are extremely prolific, bearing from 4 to 6 young in a litter and breeding throughout the entire year, at least in temperate regions. Evidently whatever their food habits, these mice must play an important part in maintaining the balance of nature, and no doubt they partially offset some of their damage by consuming the seeds of noxious weeds.

Nearly all the species readily enter buildings in search of food and, finding an easy living, make themselves permanently at home. They do not often live in large cities nor where the house mouse (*Mus musculus*) is established, as that species, though smaller than most species of *Peromyscus*, seems able to drive them away. The domestic depredations are therefore confined to rural districts and small towns

^a Agricultural Report for 1856, U. S. Patent Office, p. 91, 1857.

not yet infested by house mice. In such places, particularly in the north, they are quite as pestiferous as house mice, cutting up fabrics for nest materials, destroying all kinds of foodstuffs, and doing much damage about granaries, straw or hay stacks, and outbuildings. In the interior of Canada they infest trappers' lonely cabins and levy tribute on the provisions, and at trading posts they enter warehouses and damage the merchandise. Under such circumstances they are similar in habits to house mice, and can be destroyed by the same methods—trapping or poisoning—but they can be kept out of premises only by constant vigilance, for those killed are soon replaced from the limitless supply of the neighboring woods and fields.

On the whole they are less injurious to agricultural interests than meadow mice, but nevertheless they are vermin and their undue increase should be checked. This can be accomplished best by trapping and poisoning, as in the case of meadow mice.^a On account of their more decidedly nocturnal habits, they are preyed upon by hawks less than meadow mice, but they are eaten in large numbers by nearly all species of owls. The smaller carnivorous mammals also, especially weasels, are among their enemies, and the larger snakes destroy them to some extent. The continued decrease of these predaceous animals through a mistaken persecution by man must result in a great increase of these and other mice. Owls at least should be protected by law, and a knowledge of the important part played by harmless snakes in destroying these and other noxious rodents should be disseminated as widely as possible, especially among children.

List of species and subspecies of *Peromyscus*, with type localities.

Subgenus PEROMYSCUS.

Name.	Type locality.
<i>Maniculatus</i> group:	
<i>P. maniculatus</i>	Labrador.
<i>P. m. gracilis</i>	Michigan.
<i>P. m. abietorum</i>	James River, Nova Scotia.
<i>P. m. argentatus</i>	Grand Manan Island, New Brunswick.
<i>P. m. cremus</i>	Magdalen Islands, Quebec.
<i>P. m. nubiterræ</i>	Roan Mountain, North Carolina.
<i>P. m. arcticus</i>	Fort Simpson, Mackenzie.
<i>P. m. oreas</i>	Mount Baker Range, British Columbia.
<i>P. m. hylaëus</i>	Prince of Wales Island, Alaska.
<i>P. m. algidus</i>	Lake Bennett, British Columbia.
<i>P. m. keeni</i>	Queen Charlotte Islands, British Columbia.
<i>P. m. macrorhinus</i>	Mouth Skeena River, British Columbia.
<i>P. m. artemisiæ</i>	Ashcroft, British Columbia.
<i>P. m. saturatus</i>	Saturna Island, British Columbia.
<i>P. m. hollisteri</i>	San Juan Island, Washington.

^a See Bailey, N. Am. Fauna No. 17, p. 8, 1898; Lantz, Yearbook U. S. Dept. Agric. for 1905, pp. 363-376, 1906.

Name.

Type locality.

Maniculatus group—Continued.

<i>P. m. austerus</i>	Fort Steilacoom, Washington.
<i>P. m. rubidus</i>	Mendocino, California.
<i>P. m. gambeli</i>	Monterey, California.
<i>P. m. rufinus</i>	San Francisco Mountain, Arizona.
<i>P. m. nebrascensis</i>	Calf Creek, Montana.
<i>P. m. luteus</i>	Kennedy, Nebraska.
<i>P. m. bairdi</i>	Bloomington, Illinois.
<i>P. m. pallidus</i>	San Antonio, Texas.
<i>P. m. blandus</i>	Escalon, Chihuahua.
<i>P. m. fulvus</i>	Oaxaca, Oaxaca.
<i>P. m. labacula</i>	Ocotlan, Jalisco.
<i>P. m. sonoricensis</i>	Santa Cruz, Sonora.
<i>P. m. coolidgei</i>	Santa Anita, Lower California.
<i>P. m. margarita</i>	Margarita Island, Lower California.
<i>P. m. clementis</i>	San Clemente Island, California.
<i>P. m. catalinae</i>	Catalina Island, California.
<i>P. m. dubius</i>	Todos Santos Island, Lower California.
<i>P. m. geronimensis</i>	San Geronimo Island, Lower California.
<i>P. m. cerneritius</i>	San Roque Island, Lower California.
<i>P. m. magdalena</i>	Magdalena Island, Lower California.
<i>P. sitkensis</i>	Sitka, Alaska.
<i>P. s. prevostensis</i>	Queen Charlotte Islands, British Columbia.
<i>P. polionotus</i>	Georgia.
<i>P. p. albifrons</i>	Whitfield, Florida.
<i>P. p. niveiventris</i>	Opposite Micco, Florida.
<i>P. p. phasma</i>	Anastasia Island, Florida.
<i>P. p. rhoadsi</i>	Anclote River, Florida.
<i>P. melanotis</i>	Las Vigas, Veracruz.

Leucopus group:

<i>P. leucopus</i>	Near mouth of Ohio River.
<i>P. l. noveboracensis</i>	New York.
<i>P. l. amodytes</i>	Monomoy Island, Massachusetts.
<i>P. l. fusus</i>	Marthas Vineyard, Massachusetts.
<i>P. l. aridulus</i>	Fort Custer, Montana.
<i>P. l. ochraceus</i>	Winslow, Arizona.
<i>P. l. tornillo</i>	El Paso, Texas.
<i>P. l. arizonae</i>	Fairbank, Arizona.
<i>P. l. tezanus</i>	West central Texas.
<i>P. l. mesomelas</i>	Orizaba, Veracruz.
<i>P. l. castaneus</i>	Yohaltun, Campeche.
<i>P. l. affinis</i>	Barrio, Oaxaca.
<i>P. l. cozumelae</i>	Cozumel Island, Yucatan.
<i>P. gossypinus</i>	Riceboro, Georgia.
<i>P. g. megacephalus</i>	Woodville, Alabama.
<i>P. g. palmarius</i>	Opposite Micco, Florida.
<i>P. g. anastasia</i>	Anastasia Island, Florida.

Boylei group:

<i>P. boylei</i>	Middle Fork American River, California.
<i>P. b. rowleyi</i>	Noland Ranch, Utah.
<i>P. b. attwateri</i>	Kerr County, Texas.
<i>P. b. apicilegus</i>	San Sebastian, Jalisco.

Name.

Type locality.

Boylei group—Continued.

<i>P. b. simulus</i>	San Blas, Tepic.
<i>P. b. madrensis</i>	Tres Marias Islands, Mexico.
<i>P. b. evides</i>	Juquila, Oaxaca.
<i>P. b. levipes</i>	Mount Malinche, Tlaxcala.
<i>P. b. aztecus</i>	Mirador, Veracruz.
<i>P. oaxacensis</i>	Cerro San Felipe, Oaxaca.
<i>P. hylocetes</i>	Patzcuaro, Michoacan.
<i>P. pectoralis</i>	Jalpan, Queretaro.
<i>P. p. eremicoides</i>	Mapimi, Durango.
<i>P. p. laceianus</i>	Kerrville, Texas.

Trueti group:

<i>P. trueti</i>	Fort Wingate, New Mexico.
<i>P. t. gilberti</i>	Bear Valley, California.
<i>P. t. martirensis</i>	San Pedro Martir Mountains, Lower California.
<i>P. t. lagune</i>	Laguna Mountains, Lower California.
<i>P. t. gratus</i>	Tlalpam, Mexico.
<i>P. t. gentilis</i>	Lagos, Jalisco.
<i>P. nasutus</i>	Estes Park, Colorado.
<i>P. polius</i>	Colonia Garcia, Chihuahua.
<i>P. difficilis</i>	Valparaiso Mountains, Zacatecas.
<i>P. d. amplus</i>	Coixtlahuaca, Oaxaca.
<i>P. d. felipensis</i>	Cerro San Felipe, Oaxaca.
<i>P. bullatus</i>	Perote, Veracruz.

Melanophrys group:

<i>P. melanophrys</i>	Santa Efigenia, Oaxaca.
<i>P. m. zamora</i>	Zamora, Michoacan.
<i>P. m. consobrinus</i>	Berrioabai, Zacatecas.
<i>P. xenurus</i>	Durango, Durango.
<i>P. mekisturus</i>	Chalchicomula, Puebla.

Lepturus group:

<i>P. lepturus</i>	Mount Zempoaltepec, Oaxaca.
<i>P. lophurus</i>	Todos Santos, Guatemala.
<i>P. simulatus</i>	Jico, Veracruz.
<i>P. nudipes</i>	La Carpintera, Costa Rica.
<i>P. furvus</i>	Jalapa, Veracruz.
<i>P. guatemalensis</i>	Todos Santos, Guatemala.
<i>P. altitaneus</i>	Todos Santos, Guatemala.

Mexicanus group:

<i>P. mexicanus</i>	Mirador, Veracruz.
<i>P. m. totontepecus</i>	Totontepec, Oaxaca.
<i>P. m. teapensis</i>	Teapa, Tabasco.
<i>P. m. saxatilis</i>	Jacaltenango, Guatemala.
<i>P. m. gymnotis</i>	Guatemala.
<i>P. allophylus</i>	Huehuetan, Chiapas.
<i>P. banderanus</i>	Valle de Banderas, Tepic.
<i>P. b. vicinior</i>	La Salada, Michoacan.
<i>P. b. angelensis</i>	Puerto Angel, Oaxaca.
<i>P. yucatanicus</i>	Chichenitza, Yucatan.
<i>P. y. badius</i>	Apazote, Campeche.

Name.

Type locality.

Megalops group:

<i>P. megalops</i>	Near Ozolotepec, Oaxaca.
<i>P. m. auritus</i>	Near Oaxaca, Oaxaca.
<i>P. m. melanurus</i>	Pluma, Oaxaca.
<i>P. melanocarpus</i>	Mount Zempoaltepec, Oaxaca.
<i>P. zarhynchus</i>	Todos Santos, Guatemala.

Subgenus MEGADONTOMYS.

<i>P. thomasi</i>	Near Chilpancingo, Guerrero.
<i>P. nelsoni</i>	Jico, Veracruz.
<i>P. flavidus</i>	Boquete, Chiriqui.

Subgenus OCHROTOMYS.

<i>P. nuttalli</i>	Norfolk, Virginia.
<i>P. n. aurcolus</i>	South Carolina.

Subgenus PODOMYS.

<i>P. floridanus</i>	Gainesville, Florida.
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Subgenus HAPLOMYLOMYS.

<i>P. crinitus</i>	Shoshone Falls, Idaho.
<i>P. c. auripectus</i>	Bluff City, Utah.
<i>P. c. stephensi</i>	San Diego County, California.
<i>P. californicus</i>	Monterey, California.
<i>P. c. insignis</i>	Dulzura, California.
<i>P. cremiceus</i>	Fort Yuma, California.
<i>P. c. anthonyi</i>	Grant County, New Mexico.
<i>P. e. phaeurus</i>	Hda. La Parada, San Luis Potosi.
<i>P. e. tiburonensis</i>	Tiburon Island, Sonora.
<i>P. e. fraterculus</i>	Dulzura, California.
<i>P. c. cedrosensis</i>	Cedros Island, Lower California.
<i>P. e. eva</i>	San Jose del Cabo, Lower California.
<i>P. c. avius</i>	Cerralbo Island, Lower California.
<i>P. e. insulicola</i>	Espiritu Santo Island, Lower California.
<i>P. e. polypoliuss</i>	Margarita Island, Lower California.
<i>P. goldmani</i>	Alamos, Sonora.

Subgenus BAIOMYS.

<i>P. taylori</i>	San Diego, Texas.
<i>P. t. subater</i>	Near Columbia, Texas.
<i>P. t. paulus</i>	Rio Seston, Durango.
<i>P. t. analogus</i>	Zamora, Michoacan.
<i>P. musculus</i>	Colima, Colima.
<i>P. m. brunneus</i>	Jalapa, Veracruz.
<i>P. m. nigrescens</i>	Valley of Comitán, Chiapas.

New subspecies.

Name.	Type locality.
<i>P. maniculatus eremus</i>	Magdalen Islands, Quebec.
<i>P. maniculatus algidus</i>	Lake Bennett, British Columbia.
<i>P. maniculatus hollisteri</i>	San Juan Island, Washington.
<i>P. maniculatus margaritæ</i> ..	Margarita Island, Lower California.
<i>P. maniculatus magdalenæ</i> ..	Magdalena Island, Lower California.
<i>P. polionotus albifrons</i>	Whitfield, Florida.
<i>P. leucopus aridulus</i> --- --	Fort Custer, Montana.
<i>P. leucopus ochraceus</i>	Winslow, Arizona.
<i>P. trueti lagunæ</i>	La Laguna, Lower California.
<i>P. megalops melanurus</i>	Pluma, Oaxaca.
<i>P. eremicus insulicola</i>	Espritu Santo Island, Lower California.
<i>P. eremicus avius</i>	Cerralbo Island, Lower California.
<i>P. eremicus polypoliis</i>	Margarita Island, Lower California.
<i>P. taylori analogus</i>	Zamora, Michoacan.

Key to subgenera.

a. Plantar tubercles 6.

b. Coronoid process of mandible small and but slightly elevated, or, if not, then hind foot more than 16.

c. Two principal outer angles of $\bar{m}$ 1 and $\bar{m}$ 2 with more or less well-developed accessory tubercles or enamel loops (see Pl. VIII, figs. 2, 2a); mammae $\frac{3}{4}$ (l. $\frac{3}{4}$, a. $\frac{3}{4}$, p. $\frac{3}{4}$).

d. Ears dusky or dusky edged with whitish, in slight contrast to color of body; posterior palatine foramina about midway between interpterygoid fossa and anterior palatine foramina; dentine spaces of molars mostly confluent.

e. Size small to large; hind foot less than 32 (except in *guatemalensis* and *zarynychus*); outer accessory tubercles or loops of $\bar{m}$ 1 and $\bar{m}$ 2 only slightly developed.....*Peromyscus* (p. 32)

ee. Size very large; hind foot always more than 30; outer accessory tubercles or loops of $\bar{m}$ 1 and $\bar{m}$ 2 well developed.

Megadontomys (p. 218)

dd. Ears bright ochraceous, same color as body; posterior palatine foramina nearer to interpterygoid fossa than to anterior palatine foramina; dentine spaces of molars mostly closed.....*Ochrotomys* (p. 222)

cc. Two principal outer angles of $\bar{m}$ 1 and $\bar{m}$ 2 simple, without accessory cusps or enamel loops or with rudimentary ones (see Pl. VIII, figs. 3-4); mammae $\frac{3}{4}$ (l. $\frac{3}{4}$, a. $\frac{3}{4}$, p. $\frac{3}{4}$).....*Haptomylomys* (p. 228)

bb. Coronoid process of mandible well developed; size very small, hind foot not more than 17.....*Batomys* (p. 252)

aa. Plantar tubercles 5.....*Podomys* (p. 226)

Genus PEROMYSCUS Gloger.

Hesperomys Waterhouse, Zool. Voy. H. M. S. *Beagle*, Pt. II, Mamm., pp. 74-77, 1839—in part only.

Peromyscus Gloger, Hand und Hilfsbuch Naturgesch., I, pp. xxx, 95, 1841; Thomas, Ann. and Mag. Nat. Hist., ser. 6, XIV, p. 364, Nov., 1894; XV, pp. 190, 192, Feb., 1895. Type, *Peromyscus arboreus* (= *P. l. noveboracensis*).

Sitomys Fitzinger, Sitzungsber. Math.-Nat. Cl. K. Akad. Wiss., Wien, LVI, p. 97, 1867; Merriam, Proc. Biol. Soc. Wash., VII, p. 27, 1892. Type, *Cricetus myoides* (= *P. l. noveboracensis*).

Vesperimus Coues, Proc. Acad. Nat. Sci. Phila., p. 178, 1874; Allen, Bull. Am. Mus. Nat. Hist., III, p. 224, May 7, 1891. Type, *Hesperomys leucopus* (= *Peromyscus leucopus*).

Batomys True, Proc. U. S. Nat. Mus., XVI, p. 758, Feb. 7, 1894. Type, *Hesperomys* (*Vesperimus*) *taylori* (= *Peromyscus taylori*).

Trinodontomys Rhoads, Proc. Acad. Nat. Sci. Phila., pp. 256-257, Oct., 1894.

Type, *Sitomys insolatus* (= *P. l. sonoriensis*).

Megadontomys Merriam, Proc. Biol. Soc. Wash., XII, pp. 115-116, 125, fig. 20, Apr. 30, 1898. Type, *Peromyscus thomasi*.

Haplomylomys Osgood, Proc. Biol. Soc. Wash., XVII, pp. 53-54, Mar. 21, 1904.

Type, *Hesperomys crenicrus* (= *Peromyscus crenicrus*).

Podomys Osgood, *postea*, p. 226. Type, *Hesperomys floridanus* (= *Peromyscus floridanus*).

Ochrotomys Osgood, *postea*, p. 222. Type, *Arvicola nuttalli* (= *Peromyscus nuttalli*).

Type.—“(*Peromyscus arboreus* [*Cricetus myodes*!! Gapper])” Gloger, 1841 = *Peromyscus leucopus noveboracensis* (Fischer).

Generic characters.—Form murine; tail long, at least more than one-third of total length, often decidedly more than half; tail with scaly annulations more or less concealed by hair; ears relatively large, membranous, and thinly clothed with hair; soles of hind feet 5-6-tuberculate, hairy proximally or naked medially to calcaneum; internal cheek pouches more or less developed; mammae $\frac{2}{3}$ or $\frac{3}{4}$.

Skull with braincase rather thin-walled, smooth, and but little ridged; supraorbital border smoothly rounded, sharp-angled, or beaded; interparietal well developed; zygomatic slender, depressed to level of palate; infraorbital foramen compressed-triangular, bounded on the outside by a broad thin plate; anterior palatine foramina long, slitlike, and separated by a thin bony septum; posterior border of palate squared or rounded, without lateral pits, and situated about even with plane of posterior roots of last molars; audital bullae more or less inflated and obliquely situated. Ramus of mandible relatively long, slender, and straightened; coronoid process (except in *Baiomys*) short and slightly developed; mandible but slightly expanded by base of root of lower incisor. Molars rather weak, brachyodont and tuberculate, the tubercles in two longitudinal series or in four incomplete longitudinal series consisting of two principal median series and two much subordinated lateral series; upper molars 3-rooted, lower 2-rooted; molar series decreasing in size from before backward, the third upper molar subcircular and usually less than half as large as the second; first upper molar with 5 principal tubercles, an anterior median one and two pairs of lateral ones (the anterior one partially divided in *Megadontomys*), with or without subsidiary tubercles in the salient angles; upper incisors without grooves.

Subgenus PEROMYSCUS Gloger.

Subgeneric characters.—Pattern of color usually bicolor, the underparts usually white and sharply distinguished from the upperparts:“ young in first coat differently colored from adults;“ ears more or less

* Distinguishing from *Baiomys* and *Ochrotomys*.

“ Distinguishing from *Ochrotomys*.

dusky, somewhat contrasted with rest of upperparts; ^a plantar tubercles 6; ^b mammae $\frac{3}{4}$ (i. $\frac{3}{4}$, a. $\frac{3}{8}$, p. $\frac{1}{4}$).^c Posterior palatine foramina about midway between interpterygoid fossa and anterior palatine foramina; ^f coronoid process of mandible usually small and only slightly elevated; accessory tubercles present in salient angles of first and second upper molars; ^e outer accessory tubercles of $\overline{m}1$ and $\overline{m}2$ only slightly developed; ^g dentine spaces of worn molars mostly confluent.^g

Key to species of the subgenus *Peromyscus*.^g

Adults.

a. Hind foot 25 or less.

b. Tail less than 150.

c. Tail shorter than head and body.

d. Ears very large, longer than hind foot. Mexico.....*P. bullatus* (p. 183)

dd. Ears moderate, shorter than hind foot. Mexico and northward.

e. Size very small; hind foot 15-19; tail usually less than 60.

1. Habitat Florida and Georgia.....*P. pollonotus* (p. 103)

2. Habitat Texas to Canada.

P. maniculatus (*pallascens*, *bairdi*, etc.) (p. 37)

ee. Size larger; hind foot 19-25; tail usually more than 60.

f. Total length less than 210; hind foot less than 25.

g. Tail usually very sharply bicolor and penicillate; white spot at anterior base of ear present or absent; palatine slits usually long and nearly parallel-sided.

1. Rostrum longer (nasals about 11); no white spot at anterior base of ear. Mountains of Mexico.....*P. melanotis* (p. 109)

2. Rostrum shorter (nasals usually less than 11); white spot at base of ear present or absent.....*P. maniculatus* (p. 37)

gg. Tail less distinctly bicolor, slightly or not at all penicillate; no white spot at anterior base of ear.

1. Size averaging larger. Southern United States.

P. gossypinus (p. 135)

2. Size averaging smaller. United States, southeastern Canada, and Mexico.....*P. leucopus* (p. 112)

fh. Total length more than 210; hind foot about 25.....*P. hylocetes* (p. 159)

cc. Tail equal to or longer than head and body.

d. Tail uniform black or brownish all around.

e. Tail scaly and nearly naked.....*P. allophylus* (p. 206)

ee. Tail soft-haired and penicillate.

1. Size larger; hind foot 23-25.....*P. lophurus* (p. 192)

2. Size smaller; hind foot 21.....*P. simulatus* (p. 193)

dd. Tail more or less bicolor.

e. Skull with supraorbital border more or less beaded or at least elevated; tail usually irregularly blotched below. Tropical Mexico and Guatemala.

f. Habitat Peninsula of Yucatan.....*P. yucatanicus* (p. 211)

fh. Habitat south and east of Yucatan.

1. Supraorbital bead well developed with a distinct sulcus on inner side. Western Mexico.....*P. banderanus* (p. 207)

2. Supraorbital border slightly beaded. Southern Mexico and Guatemala.....*P. mexicanus* (p. 198)

ee. Skull with supraorbital border sometimes sharp-angled but never decidedly beaded nor elevated. Alaska to Guatemala.

f. Habitat highlands of Chiapas and Guatemala.

1. Tail clothed with soft hairs and decidedly pencilled; pelage soft and dull.....*P. lophurus* (p. 192)

^a Distinguishing from *Baiomys* and *Ochrotomys*.

^b Distinguishing from *Podomys*.

^c Distinguishing from *Baiomys* and *Haplomylomys*.

^d Distinguishing from *Haplomylomys*.

^e Distinguishing from *Megadontomys*.

^f Distinguishing from *Ochrotomys*.

^g For explanation of keys see p. 23.

ff. Habitat north of Chihuahua.

g. Ears relatively large; ear from notch in dry skin 18-25.

h. Tarsal joints white like upper side of hind foot.

P. polius (p. 177)

hh. Dusky of hind leg reaching tarsal joint and more or less extended on it, or, if not, then hind foot less than 25.

1. Ears larger; rostrum shorter (nasals about 10); zygomatic more squarely elbowed; audit al bullae larger. Western United States and Mexico.....*P. truci* (p. 165)2. Ears smaller; rostrum longer (nasals about 11); zygomatic more compressed anteriorly; audit al bullae smaller. Western United States.....*P. nasutus* (p. 176)

gg. Ears smaller; ear from notch in dry skin 18 or less.

h. Hind foot 23 or more.

4. Habitat United States, Alaska, and Canada.

j. Tail about equal to or only slightly longer than head and body, usually less than 90. Habitat east of 110th meridian.

1. Size averaging larger; color darker. Habitat chiefly east of the 97th meridian.....*P. gossypinus* (p. 135)2. Size averaging smaller; color paler. Habitat chiefly west of the 97th meridian.....*P. leucopus* (p. 112)

jj. Tail always longer than head and body, usually more than 90. Habitat chiefly west of the 95th meridian.

k. Habitat north of the State of Oregon.

1. Size larger; hind foot at least 25. Habitat islands off coast of Alaska and British Columbia.

P. sitkensis (p. 101)

2. Size smaller; hind foot 23-25. Habitat Alaska, Canada, and Washington.

P. maniculatus (*oreas*, *macrorhinus*, etc.) (p. 37)

kk. Habitat south of the State of Oregon.

P. boylii (p. 141)

44. Habitat Mexico.

j. Tarsal joint white like upper side of hind foot.

P. polius (p. 177)

jj. Dusky of hind leg reaching to and often more or less over tarsal joint.

k. Tail usually less than 90, rather finely haired and slightly or not at all penicillate; principal color ranging from pale fawn to dusky brownish, seldom bright buff or tawny.....*P. leucopus* (p. 112)

kk. Tail not less than 90, usually more than 100, a little more coarsely haired and usually more decidedly penicillate; principal color often brighter buff or tawny.

1. Tail relatively longer; hind foot 23-25.

P. boylii (p. 141)2. Tail relatively shorter; hind foot rarely less than 25.....*P. hylocetes* (p. 159)

AA. Hind foot not more than 23.

4. Tail about equal to or only slightly longer than head and body, usually less than 90.

j. Tail very sharply bicolor and slightly penicillate; with or without a white spot at anterior base of ear.

P. maniculatus (p. 37)

jj. Tail less sharply bicolor and slightly or scarcely penicillate; without a white spot at anterior base of ear.

1. Size averaging larger; color usually darker. Habitat Australo-Asian zone of southern United States.

P. gossypinus (p. 135)

2. Size averaging smaller; color usually paler. South-eastern Canada to southeastern Mexico.

P. leucopus (p. 112)

44. Tail always longer than head and body, usually more than 90.

j. Habitat United States, Canada, Alaska, and Lower California.

- k. Tarsal joints white like upper side of hind foot.
P. pectoralis (p. 160)
- kk. Dusky of hind leg extending to and more or less over tarsal joint.
- l. Proximal half of sole of hind foot hairy; tail closely haired, sharply bicolor, and slightly penicillate; with or without white spot at anterior base of ear. Chiefly northern or coastwise.
P. maniculatus (p. 37)
- ll. Proximal fourth or less of hind foot hairy; tail loosely hairy and penicillate; without white spot at anterior base of ear. Chiefly southern and interior.
1. Size larger; skull heavier; greatest length of skull 27 or more.....*P. boyleyi* (p. 141)
2. Size smaller; skull lighter; greatest length of skull 23 or less.....*P. crinitus* * (p. 229)
- jj. Habitat Mexico (except Lower California).
- k. Dusky of hind leg extending to and more or less over tarsal joint.
1. Size larger; tail relatively shorter; maxillary tooth-row usually 4 or more.....*P. boyleyi* (p. 141)
2. Size smaller; tail relatively longer; maxillary tooth-row usually less than 4.....*P. pectoralis* (p. 160)
- kk. Tarsal joint white like upper side of hind foot.
1. Size large; hind foot more than 23.
P. polius (p. 177)
2. Size smaller; hind foot less than 23.
P. pectoralis (p. 160)
- bb. Tail more than 150.....*P. mekisturus* (p. 189)
- aa. Hind foot 25 or more.
- b. Habitat entirely south of Canada.
- c. Tail rather short, not more than 90.....*P. gossypinus* (p. 135)
- cc. Tail always more than 90.
- d. Forearm and forefoot blackish or partly so to base of digits.
P. melanocarpus (p. 216)
- dd. Dusky of forearm not extending beyond carpal joint.
- e. Size very large; hind foot 30 or more.
- f. Total length more than 300.....*P. sarhynchus* (p. 217)
- ff. Total length less than 300.
- g. Supraorbital border more or less beaded. Habitat Oaxaca and Guerrero.....*P. megalops* (p. 213)
- gg. Supraorbital border not beaded.
1. Larger. Habitat Chiapas and Guatemala.
P. guatemalensis (p. 193)
2. Smaller. Habitat Costa Rica and Panama.....*P. nudipes* (p. 195)
- cc. Size smaller; hind foot less than 30.
- f. Tarsal joint white like upper side of hind foot.....*P. polius* (p. 177)
- ff. Dusky of hind leg extending at least to tarsal joint.
- g. Habitat Costa Rica and Panama.....*P. nudipes* (p. 195)
- gg. Habitat north of Costa Rica.
- h. Ear from notch in dry skin not more than 19.
- i. Dusky of hind leg extending over upper side of hind foot at least halfway to base of toes.
- j. Skull with a slight supraorbital bead.
1. Size smaller; maxillary toothrow less than 5.
P. mexicanus (p. 198)
2. Size larger; maxillary toothrow 5 or more.
P. megalops (p. 213)
- jj. Skull without bead.
- k. Color chiefly dusky; tail blackish all around or at least with basal part of underside somewhat dusky.
1. Smaller; tail less than 120.....*P. lepturus* (p. 190)
2. Larger; tail more than 120.....*P. furrus* (p. 196)

* This species belongs with the subgenus *Haplomylomys*, but as it is somewhat connectant and easily misplaced, it is included in this key as well as in that to *Haplomylomys*.

- kk. Color chiefly tawny or ochraceous; tail sharply and evenly bicolor-----*P. boylei* (p. 141)
44. Dusky of hind leg not extending halfway to base of toes.
- j. Supraorbital border slightly to strongly beaded, or, if not, then tail not evenly bicolor.
- k. Size smaller; hind foot not more than 26. Peninsula of Yucatan-----*P. yucatanicus* (p. 211)
- kk. Size larger; hind foot 26-30.
- l. Tail blackish all around-----*P. megalops* (p. 213)
- ll. Tail blotched with whitish on underside or sometimes evenly bicolor.
- m. Size larger; maxillary tooththrow 5 or more.
P. furrus (p. 196)
- mm. Size smaller; maxillary tooththrow less than 5.
1. Supraorbital border strongly beaded (except in subspecies *angelensis*). Western Mexico north of the Isthmus of Tehuantepec--*P. banderanus* (p. 207)
2. Supraorbital border slightly beaded. Southern and eastern Mexico and Guatemala----*P. mexicanus* (p. 198)
- jj. Supraorbital border often sharp-angled but not beaded; tail evenly and usually sharply bicolor.
- k. Total length 240 or more-----*P. oaxacensis* (p. 158)
- kk. Total length less than 240.
1. Tail relatively longer; hind foot 23-25.
P. boylei (p. 141)
2. Tail relatively shorter; hind foot rarely less than 25-----*P. hylocetes* (p. 159)
- hh. Ear from notch in dry skin more than 19.
- i. Supraorbital border slightly beaded or at least somewhat elevated.
- j. Tail less than 120. Guatemala----*P. attilaneus* (p. 197)
- jj. Tail more than 120, or, if not, then habitat north of Guatemala.
- k. Sides of face chiefly grayish; tail not less than 130, usually more than 140; tail evenly bicolor (except in *P. xenurus*, confined to the State of Durango).
1. Tail evenly (not always sharply) bicolor.
P. melanophrys (p. 184)
2. Tail dusky brownish all around except a poorly defined whitish line on under side.
P. xenurus (p. 188)
- kk. Sides of face chiefly tawny, ochraceous, or dusky; tail entirely dusky, irregularly blotched below, or evenly bicolor.
1. Size larger; maxillary tooththrow 5 or more; braincase broad; pelage usually long.
P. megalops (p. 213)
2. Size smaller; maxillary tooththrow less than 5; braincase usually narrower; pelage usually short-----*P. mexicanus* (p. 198)
44. Supraorbital border not beaded nor elevated.
1. Tail blackish or blotched with whitish below; nasals expanded anteriorly-----*P. furrus* (p. 196)
2. Tail evenly bicolor; audital bullæ rather large.
P. difficilis (p. 178)
- bb. Habitat islands off the coast of Alaska and British Columbia--*P. sitkensis* (p. 101)

Key to subspecies of *Peromyscus maniculatus*:

- a. Habitat Alaska and Canada.
- b. Habitat east of the 100th meridian.
- c. Habitat islands off coast of Nova Scotia and New Brunswick.
1. Color grayer; tail longer. Grand Manan Id-----*P. m. argentatus*
2. Color browner; tail shorter. Magdalen Ids-----*P. m. eremus*

cc. Habitat mainland.

d. Tail shorter, averaging less than 90; hind foot rather large. Hudsonian zone, Labrador to Hudson Bay, etc.-----*P. maniculatus*

dd. Tail longer, averaging more than 90.

1. Color grayer. Nova Scotia, New Brunswick, etc.-----*P. m. abietorum*

2. Color more tawny or buffy. Southern Ontario and Quebec.-----*P. m. gracilis*

bb. Habitat west of the 100th meridian.

c. Tail about equal to or shorter than head and body, usually less than 90.

d. Color darker. Chiefly forested regions north and west of Great Plains.

e. Color very dark. Islands and coast of British Columbia.

1. Size smaller; hind foot 19-21; lateral line less prominent.

P. m. austerus

2. Size larger; hind foot 21-22; lateral line more prominent. Saturna Island.-----*P. m. saturatus*

ee. Color somewhat paler. Chiefly east of the coast ranges.

f. Skull longer; braincase wider. Chiefly southern British Columbia.

P. m. artemisiae

ff. Skull smaller; braincase smaller. Northwest Canada.-----*P. m. arcticus*

dd. Color paler, usually chiefly bright ochraceous buff. Great Plains of Saskatchewan, etc.-----*P. m. nebrascensis*

cc. Tail longer than head and body, usually more than 90, often more than 100.

d. Size larger; hind foot 24-25. Coast of northern British Columbia and Alaska.-----*P. m. macrorhinus*

dd. Size smaller; hind foot 21-24.

e. Tail and ears averaging longer. Southern British Columbia.-----*P. m. oreas*

ee. Tail and ears averaging shorter. Northern British Columbia and Alaska.

f. Color more grayish. Headwaters of Yukon River.-----*P. m. algidus*

ff. Color more brownish. Coastal.

1. Skull lighter; rostrum longer. Alaska.-----*P. m. hylaesus*

2. Skull heavier; rostrum shorter. Queen Charlotte Islands.

P. m. keeni

aa. Habitat United States and Mexico.

b. Habitat United States.

c. Habitat east of the Mississippi River.

d. Tail long, always more than 80, usually more than 90.

e. Color more grayish. Eastern Maine.-----*P. m. abietorum*

ee. Color more brownish or dusky. Northern States and Appalachian Mountains.

1. Size larger; dark dorsal area less distinct. Minnesota to New Hampshire.

P. m. gracilis

2. Size smaller; dark dorsal area more distinct. Western Pennsylvania to northern Georgia.-----*P. m. nubiterrae*

dd. Tail 70 or less. Mississippi Valley.-----*P. m. bairdi*

cc. Habitat west of the Mississippi River.

d. Size smaller; hind foot rarely more than 19; tail rarely more than 60; greatest length of skull 22-25.

e. Size very small; hind foot 15-17. Texas.-----*P. m. pallascens*

ee. Size larger; hind foot 18-20. Chiefly north of Texas.

f. Color chiefly dark brown or blackish.-----*P. m. bairdi*

ff. Color chiefly ochraceous buff.

1. Size smaller.-----*P. m. luteus*

2. Size larger.-----*P. m. nebrascensis*

dd. Size larger; hind foot rarely less than 20; tail 55-120; greatest length of skull rarely less than 25.

e. Tail longer, averaging more than 90, frequently more than 100.

1. Size larger; hind foot 22-24. Cascade Mountains and coast of Washington.-----*P. m. oreas*

2. Size smaller; hind foot 21-22. Coast of Oregon and northern California.-----*P. m. rubidus*

ee. Tail shorter; averaging less than 90, usually less than 80.

f. Color paler, ochraceous buff or vinaceous predominating.

g. Tail averaging shorter. Chiefly east of the Rocky Mountains.

1. Color more buffy. Northern Texas to central Montana.

P. m. nebrascensis

2. Color more vinaceous. Western Texas and southern Mexico.
P. m. blandus
 gg. Tail averaging longer. Great Basin region and southeastern California-----*P. m. sonoriensis*
- f. Color darker; dusky, dark brown, or tawny ochraceous predominating.
 g. Color very dark. Chiefly coast of Puget Sound.
 1. Size larger; tail relatively shorter; skull larger and heavier. San Juan Island-----*P. m. hollisteri*
 2. Size smaller; tail relatively longer; skull small and light.
P. m. austerus
 gg. Color somewhat paler. Chiefly Rocky Mountain region and California (except northwest coast and eastern desert regions).
 h. Size larger; skull broader and heavier; nasals usually 11 or more. Eastern Washington, Idaho, Montana, and Wyoming.
P. m. artemisiae
 hh. Size smaller; skull lighter; nasals usually less than 11.
 4. Color more tawny ochraceous, especially in winter pelage. Southern Rocky Mountains, Colorado, Utah, Arizona, and New Mexico-----*P. m. rufinus*
 ii. Color more dusky, except in worn pelage. California.
 j. Averaging smaller and paler. Mainland of California.
P. m. gambeli
 jj. Averaging larger and darker. Santa Barbara Islands.
 1. Smaller; tail and ears shorter-----*P. m. clementis*
 2. Larger; tail and ears longer-----*P. m. catalinae*
- bb. Habitat Mexico.
 c. Habitat mainland and islands of Lower California.
 d. Size larger; hind foot 20-23; greatest length of skull usually more than 26. Chiefly insular.
 e. Color decidedly grayish, chiefly pale écru drab. San Roque Island.
P. m. cineritius
 ee. Color less grayish, chiefly buffy or ochraceous, more or less mixed with dusky.
 f. Color darker. Coronados and Todos Santos Islands-----*P. m. dubius*
 ff. Color paler.
 1. Size smaller. San Geronimo, Natividad, and San Martin Islands.
P. m. geronimensis
 2. Size larger. Magdalena Island and adjacent mainland.
P. m. magdalenae
 dd. Size smaller; hind foot 19-20; greatest length of skull usually less than 26. Chiefly mainland of Lower California (except *margaritae*.)
 e. Color darker, usually with considerable dusky mixture. Northwestern.
P. m. gambeli
 ee. Color paler, chiefly pinkish buff or ochraceous buff.
 f. Very pale, chiefly pale pinkish buff. Margarita Island.
P. m. margaritae
 ff. Not so pale, chiefly ochraceous buff. Mainland of Lower California.
 1. Paler, usually with buffy shades toned down by whitish. Southern and central Lower California-----*P. m. coolidgei*
 2. Not so pale, usually with buffy shades entirely predominating. Northeastern-----*P. m. sonoriensis*
- cc. Habitat continental Mexico (i. e., all except Lower California).
 d. Color paler, chiefly buffy ochraceous or pale vinaceous; size slightly smaller; hind foot averaging less than 22. Chiefly northern.
 1. Size slightly smaller; tail shorter, averaging less than 70; color more vinaceous. Chiefly east of the Sierra Madre-----*P. m. blandus*
 2. Size slightly larger; tail longer, averaging more than 70; color more buffy. Chiefly west of the Sierra Madre-----*P. m. sonoriensis*
 dd. Color darker, chiefly russet or dusky; size slightly larger; hind foot usually 22 or more. Chiefly southern.
 1. Color more dusky-----*P. m. labecula*
 2. Color more rufescent-----*P. m. fulvus*

PEROMYSCUS MANICULATUS (WAGNER).

(Pl. II, fig. 1.)

Hesperomys maniculatus Wagner, Wieg. Archiv. f. Naturgesch., XI (1), p. 148, 1845.

[*Hesperomys*] *arcticus* Sauss., Coues, Monogr. N. Am. Rod., p. 67, 1877—*nomen nudum*.

Peromyscus canadensis umbrinus Miller. Proc. Bost. Soc. Nat. Hist., XXVIII, p. 23, April, 1897—Peninsula Harbor, Ontario.

Peromyscus maniculatus Bangs, Am. Nat., XXXII, p. 496, 1898.

Type locality.—Labrador; doubtless one of the old Moravian settlements on the northeast coast; specimens from Nain used for present diagnosis.

Geographic distribution.—Hudsonian zone of northeastern Canada, from the northeastern coast of Labrador to the west side of Hudson Bay and south to the border of the Canadian zone to meet the range of *P. m. gracilis*.

Characters.—Size medium; tail moderately long, about half the total length or slightly more; coloration regular, median dorsal region somewhat contrasted; under side of hind feet hairy except on pads and spaces between them; tail well haired, sharply bicolor and distinctly penciled.

Color.—Adult in August: Sides and lateral upperparts dark brown (Mars brown), tinged with fawn; median dorsal region darker (mummy brown), beginning behind shoulders and extending with decreasing width to base of tail; orbital region and base of whiskers blackish; ears dusky with pale edges; preauricular lanuginous tuft with a few white hairs; underparts white, not entirely concealing plumbeous undercolor; feet white; tail sharply bicolor, brownish black above, white below. Adolescent pelage: Head, sides, and lateral upperparts sepia produced by mixture of black and shades of buff; median dorsal region and thence to base of tail black with only slight admixture of lighter; tail intense black above; ears black or blackish outside, whitish inside, edges sharply white; otherwise as in adult. Young in first coat: General color slate gray, overlaid with white on underparts.^a

Skull.—Size larger than in *P. m. gracilis*; braincase rather broad and flattened, shallower than in *gracilis* or *arcticus*; nasals longer and narrower than in *arcticus*; rostrum light; palatine slits rather long and nearly parallel-sided.

^a Description based on series of well-made skins collected by W. E. Clyde Todd in summer of 1901 for the Carnegie Museum of Pittsburg, supplemented by a number of flat and otherwise poorly made skins (now in the Museum of Comparative Zoology) collected by the Moravians for J. D. Sornborger, who kindly loaned them for study.

Measurements.—Average of 9 adults from Nain and Windsor Harbor, Labrador: Total length 179 (174–198); tail vertebrae 84 (75–95); hind foot 21 (19–23). Of 5 adults from Oxford House, Keewatin: 188.8 (185–193); 93 (88–95); 20.

Type specimen.—A specimen having every claim to acknowledgment as the type of this species is in the Zoologischer Staats-Sammlung of Munich, Bavaria, where I was permitted to examine it through the courtesy of Professor Hertwig and his assistant, Doctor Leisewitz. An early label attached to it has the following data: "*Hesperomys maniculatus* Wagn. Dr. Barth det 1844. Labrador." The pelage is considerably faded and the specimen, although now removed from its stand, is still in mounted posture and has the wires and glass eyes of an exhibition specimen. Otherwise it is in good condition and all its general characters are obvious, as sharply bicolor and slightly penicillate tail, white margined ears, soft pelage, and so on. No skull accompanies the skin. The hind foot measures 20.5 mm., and the tail, which is intact but shrunken over the vertebrae, measures 64 mm.

Remarks.—This was the first to be named and almost the last to be recognized of a large group of inosculating forms—the largest and most remarkable of the genus, and perhaps of American mammals. Its distribution is wider and the number of intergrading forms and of individuals is greater than in any similar group of mammals known. From typical *maniculatus*, development may be traced step by step absolutely without break through all the numerous subspecies. Throughout the group many interesting problems of distribution and development are presented; these are discussed so far as space will permit in connection with the descriptions of the forms concerned. Typical *maniculatus* is most similar to subspecies *arcticus*, merely having a slightly longer tail and slight cranial differences. Specimens from the Hudson Bay region, though referable to *maniculatus*, approach *arcticus* and *gracilis*. Typical *maniculatus* differs from *gracilis* in shorter tail, darker color, greater extent of dusky on dorsum, and in cranial characters, notably broader, flatter braincase. From *arcticus*, it is distinguished by longer tail and by average cranial characters, as wider braincase, and longer, narrower nasals. Specimens of *gracilis* from Godbout and Lake Edward, Province of Quebec, are almost typical, showing only slight tendency toward *maniculatus*.

Specimens from the north shore of Lake Superior described under the name *umbrinus* seem best referred to *maniculatus*. A large series from Isle Royale, Michigan, is almost like series from the Hudson Bay region and can scarcely be referred to *gracilis*. Others from immediately south of Lake Superior, however, are longer tailed and lighter colored and are indistinguishable from specimens from

northern New York. These are taken as representing typical *gracilis*. The type of *gracilis*, supposed to have come from Michigan, has such a long tail that presumably it came from the southern or central part of the State.

Specimens examined.—Total number 239, from localities as follows:

Keewatin: ^a Echimamish River, 17; Hayes River, 25 miles above York Factory, 1; Hill River, 9; Norway House, 9; Oxford House, 13; Oxford Lake, 8; Pine Lake, 8; Robinson Portage, 15; Sea River Falls, 4; Shamatawa River, 4; Steele River, 2; Trout Falls, 1; York Factory, 36.

Labrador: Great Whale River, 1; Hopedale, 3; Labrador, 2; Makkovik, 5; Nain, 18; Rama, 2; Windsor Harbor, 18.

Michigan: ^a Isle Royale, 55.

Ontario: ^a Moose Factory, 1; Peninsula Harbor, 7.

PEROMYSCUS MANICULATUS GRACILIS (LE CONTE).

(Pl. II, fig. 5; Pl. VII, fig. 12; Pl. VIII, fig. 6.)

Hesperomys gracilis Le Conte, Proc. Acad. Nat. Sci. Phila., VII, p. 442, 1855.

Sitomys americanus canadensis Miller, Proc. Biol. Soc. Wash., VIII, pp. 55–60, June 20, 1893—Peterboro, N. Y.

Peromyscus gracilis Lyon and Osgood, Bull. No. 62, U. S. Nat. Mus., p. 131, Jan. 27, 1909.

Type locality.—Michigan.^b

Geographic distribution.—Northeastern United States and southern Canada from northern Minnesota east through northern Wisconsin, Michigan, Ontario, Quebec, New York, and western New England. Canadian zone.

Characters.—Similar to *maniculatus*, but color slightly less clouded with dusky; hind foot smaller; tail longer, actually and relatively; skull smaller and narrower. Superficially similar to *noveboracensis*, but tail longer, more distinctly penciled, and more sharply bicolor; pelage softer; skull more slender; molar teeth smaller.

Color.—Unworn pelage (fall and winter): Ground color varying from russet through cinnamon to isabella color, more nearly russet on flanks and posterior part of back, becoming grayer and more nearly isabella color across shoulders and on top of head; dusky mixture moderate throughout, somewhat concentrated in middle of back; general effect on sides nearly raw umber, on dorsum same but strongly blackish, on shoulders rusty hair brown; ears blackish, narrowly edged with whitish, often with a few white hairs at anterior bases; narrow orbital ring and spot at base of whiskers blackish; underparts

^a All approaching *gracilis* and *arcticus*.

^b In the absence of proof to the contrary, Michigan may be taken as the type locality of *gracilis*, in accordance with the statement of the original description and notwithstanding the queries on the labels of the type specimen.

white; feet white, forearm usually slightly dusky, 'ankles' dusky; tail blackish above, white below. Worn pelage (spring and early summer): Similar to unworn pelage, but dusky mixture more or less eliminated or changed to shades of cinnamon which are scarcely contrasted with the ground color; general effect dull cinnamon on sides, shading to russet or Mars brown on dorsum; markings about face, ankles, and upper side of tail brownish instead of blackish. Adolescent pelage: General effect of upperparts broccoli brown, hair brown or nearly isabella color. Young in first coat: General effect of upperparts hair brown to sepia, usually somewhat blackish or slaty in middle of back.

Skull.—Similar to that of *maniculatus*, but smaller and narrower; braincase not so broad nor so flattened. Also similar to that of *arcticus*, but narrower, with zygomata less widely 'elbowed' anteriorly and nasals longer and narrower. Slightly similar to that of *noveboracensis*, but braincase narrower, nasals longer, maxillaries less bulging in front of infraorbital foramen, anterior part of zygomata lighter, palatine slits longer and more nearly parallel-sided; molar teeth smaller.

Measurements.—Two adults from Porcupine Mountains, Ontonagon County, Mich.: Total length, 192, 178; tail vertebrae, 95, 114; hind foot, 22, 20. Average of 9 adults from Tower, Minn., 186 (174–200), 90 (80–104), 19.8 (19–21); of 10 adult males from Peterboro, N. Y., 190 (176–206), 96.8 (85–108), 21.4 (20.8–21.8); of 10 adult females from Peterboro, N. Y., 178 (171–200), 89 (84–100), 20.7 (19.8–21.8).

Type specimen.—No. 14344 U. S. National Museum evidently is the type of *Hesperomys gracilis* Le Conte. It agrees perfectly with the original description and has passed as the type for more than thirty years. It bears several labels, among them, one in the hand of Doctor Coues, as follows: "*Hesp. gracilis*. Le Conte's type specimen. Wisconsin? Ohio? Michigan?" In the Museum catalogue under No. 10292 occurs the remark "*Dry type of gracilis*" (entry made in 1872).

The specimen is in poor condition. The skin consists of the anterior and posterior parts connected by thread and cotton. The left hind foot and the tail are present, and also the ears, which are in fair condition. The tail measures approximately 95 millimeters—the tip has been broken off. The skull has been removed and is sufficiently complete to show important characters. The posterior part has been broken away, including the greater part of the braincase and the sphenoid and occipital regions. The tips of the nasals are slightly broken. The teeth and both mandibles are intact.

Remarks.—Under the name *canadensis*, this form has become well known in recent years. It is the long-tailed mouse of the northeastern United States as opposed to the shorter tailed *noveboracensis* with

which it has often been confused. It is really quite distinct from *noveboracensis*, and adult specimens of the two are readily distinguishable by both external and cranial characters. Immature or poorly prepared specimens, however, are sometimes difficult to determine. Although living in the same general localities, *gracilis* and *noveboracensis* are nearly always confined to different local habitats, *gracilis* showing preference for the colder, more moist places, or deep, mostly coniferous, woods; *noveboracensis* for the warmer, dryer, more open country, or deciduous woods.

Like the other members of the *maniculatus* series, *gracilis* grades into surrounding forms by scarcely perceptible degrees. On the north and east it meets *maniculatus* and *abietorum*; on the northwest, *arcticus*; and on the south, *nubiterræ*. Large series from the Hudson Bay region referred to *maniculatus* plainly approach *arcticus*, being darker and shorter tailed than *gracilis*. They so nearly combine the characters of *maniculatus*, *gracilis*, and *arcticus* that without violence they might be placed with any of the three. In the same way, specimens from New Hampshire approach *abietorum*, and others from Pennsylvania tend toward *nubiterræ*. Even specimens from Peterboro, N. Y., the type locality of '*canadensis*' show slight tendency toward *abietorum*, but they are much nearer to *gracilis*, and as there is scarcely room for three forms in this series, *canadensis* is not recognized.

The application of the name *gracilis* to this form seems incontestable (regardless of the supposed type specimen, which unquestionably belongs to this form), because the measurements given in the original description could not possibly apply to *noveboracensis*. The original description is as follows:

Hair dark slate-color above, a little tipped with brown, cheeks, line above the mouth, chin, throat, and body beneath white, allowing the dark color of the lower part of the hair to shine through in such a manner as to cause these parts to appear grey. Outer side of fore legs brownish, thighs slate colored both above and beneath, feet pale grey, nearly white. Head narrow, nose somewhat pointed, ears large, open, narrowly edged with whitish. Tail longer than head and body.

Length 3.8 in. Tail 4 in. * * *

Inhabits Michigan; Prof. Baird.

Specimens examined.—Total number 234, from localities as follows:

Massachusetts: Mount Graylock, 2.

Michigan: Park Siding, 5; Porcupine Mountains, 4;^a Suny, 4.

Minnesota: Bridgman, 3; Minnesota, 4; Tower, 14; Two Harbors, 2.

New Hampshire: Dublin, 1; Mount Washington, 16; Ossipee, 3.

New York: Alder Creek, 3; Catskill Mountains, 13; Elizabethtown, 2; Lake George, 1; Locust Grove, 16; Mountain View, 3; Peterboro, 68; Piseco, 4.

^a Coll. Univ. of Michigan. Submitted for examination by Prof. C. C. Adams.

Ontario: Algonquin Park, 11; Bracebridge, 1;^a Deer Park, 3;^a Grand Bend, 1; Gravenhurst, 2; Michipicoten Island, Lake Superior, 4; North Shore, Lake Superior (Agassiz), 1; Port Franks, 3; Sand Lake, 1.

Quebec: Godbout, 2; Lac aux Sables, 3; Lake Edward, 6; Murray Bay, 11.

Vermont: Burlington, 1; Mount Mansfield, 9.

Wisconsin: Eagle River, 7 (approaching *maniculatus*).

PEROMYSCUS MANICULATUS ABIETORUM BANGS.

Peromyscus canadensis abietorum Bangs, Proc. Biol. Soc. Wash., X, 49-50, Mar. 9, 1896.

Type locality.—James River, Nova Scotia.

Geographic distribution.—Nova Scotia and neighboring parts of eastern Canada; west to central Maine.

General characters.—Similar to *P. m. gracilis*, but paler and grayer.

Color.—No. 2201 Bangs Collection, in slightly worn summer pelage: Similar to *P. m. gracilis*, but paler and grayer; upperparts and sides almost uniform drab, with very fine dusky grizzling and scarcely any indication of a dark dorsal stripe; orbital region and base of whiskers with weak dusky markings; tail brownish black above, white below; underparts white. Full winter pelage (No. 1473 U. S. National Museum): Almost as in same pelage of *P. m. gracilis*, being not grayer, but slightly browner; general color bister, with a tinge of fawn color, this produced by grizzling of pale fawn color and dusky; back essentially like sides; underparts pure snowy white.

Skull.—Essentially as in *P. m. gracilis*.

Measurements.—Type: Total length, 200; tail vertebræ, 103; hind foot, 20. Average of 10 adults from Third Mopang Lake, Maine: 177 (171-187); 91.6 (82-97); 21 (20-22).

Type specimen.—No. 2205, Museum of Comparative Zoology, Cambridge, Mass. ♀ adult, Aug. 8, 1894. Formerly same number, Collection of E. A. and O. Bangs. Well-made specimen accompanied by full data including flesh measurements taken by the collector, C. H. Goldthwait.

Remarks.—The series upon which this form was named consists largely of immature specimens, most of which are somewhat over-stuffed, causing paleness, which is more apparent than real. It is evident, however, that *abietorum* averages grayer than *gracilis*, as shown by a considerable series from northeastern Maine, which seems to be referable to this form rather than to *gracilis*. Between this form and *arcticus* there is gradual intergradation, *arcticus* being darker and shorter-tailed and *abietorum* paler and longer-tailed. Between the two there seems to be room for the recognition of only one intermediate form. Two names have been proposed, *gracilis*

^a Collection of Canadian Geological Survey.

and *canadensis*, and, although specimens from their respective type localities are not exactly alike, they resemble each other more than they resemble either of the extremes, *arcticus* and *abietorum*. Therefore *gracilis*, the one named earlier, is recognized.

Specimens examined.—Total number 191, from localities as follows:

Maine: Big Deer Isle, 1; Blue Hill, 2; Bucksport, 1; Columbia Falls, 1; Greenville, 1; King and Bartlett Lake, 11; Mount Katahdin, 9; Third Mopang Lake, 25; Sebec Lake, 1; South Twin Lake, Penobscot County, 44; Upton, 2.

New Brunswick: Arthurette, 1; Gulquac Lake, Victoria County, 3; Hampton, 4; Tobique Point, 1; Forks Tobique Point River, 19; Tobique River, 4; Trousers Lake, 24.

Nova Scotia: Digby, 1; Halifax, 1; James River, 17.

Quebec: Port Daniel, 6; Riviere du Loup, 8; Saint Rose du Degele, 1; Salmon Lake, 1.

Prince Edward Island: Kensington, 2.

PEROMYSCUS MANICULATUS ARGENTATUS COPELAND AND CHURCH.

Peromyscus canadensis argentatus M. Copeland and M. L. Church, Proc. Biol. Soc. Wash., XIX, pp. 122-123, Sept. 6, 1906.

Type locality.—Grand Harbor, island of Grand Manan, New Brunswick.

Geographic distribution.—Island of Grand Manan, New Brunswick.

Characters.—Similar to *P. m. abietorum*, but tail averaging slightly shorter, and color more grayish, with dusky mixture more copious and intense; similar to *P. maniculatus*, but color decidedly more grayish.

Color.—Unworn pelage: Similar to that of *abietorum*, but slightly grayer, less buffy; dusky mixture stronger and more intense; sub-terminal zone of hairs of upperparts narrower and paler; general effect of upperparts varying from drab to broccoli brown and hair brown, mid-dorsal region often so mixed with dusky as to produce an effect approaching slate gray; underparts white, quite concealing slaty undercolor; ears blackish, faintly edged with paler; orbital ring and spot at base of whiskers intense blackish; tail sharply bicolor, blackish above, white below.

Skull.—As in *P. maniculatus*.

Measurements.—Average of 23 topotypes: Total length, 180 (171-194); tail vertebrae, 87.8 (82-93); hind foot, 21.2 (20-22).

Type specimen.—No. 168, Collection of Manton Copeland, Taunton, Mass. ♂ adult, Sept. 19, 1905. Manton Copeland and Morton L. Church. Specimen in good condition.

Remarks.—This insular form combines to some extent the characters of typical *maniculatus* and *abietorum*, though grayer than either. It is about the same size as *maniculatus* and in its grayish coloration

approaches *abietorum*. Many adults closely resemble immature examples of *abietorum*.

Specimens examined.—Total number 46, all from the type locality.

PEROMYSCUS MANICULATUS EREMUS subsp. nov.

Type from Pleasant Bay, Grindstone Island, Magdalen Islands, Quebec. No. 150223, U. S. National Museum, Biological Survey Collection. ♀ adult, Aug. 9, 1907. W. H. Osgood.

Characters.—Similar to *P. m. abietorum*, but color darker and tail shorter; similar to *P. maniculatus*, but paler and slightly smaller.

Color.—Similar in general to typical *maniculatus*, but paler throughout, yet darker than *abietorum*. Type in fresh fall pelage: Ground color of upperparts russet, uniformly and rather liberally mixed with dusky, producing a general effect slightly lighter than Prout brown; concentration of dusky mixture in middle of back comparatively slight; a distinct dusky orbital ring and spot at base of whiskers; underparts creamy white; tail sharply bicolor.

Skull.—Practically as in *P. m. abietorum*; somewhat smaller and narrower than in *maniculatus*.

Measurements.—Type: Total length, 183; tail vertebræ, 83; hind foot, 21; ear from notch (dry), 15.7 (15–16). Average of 10 topotypes: 181 (172–189); 83 (78–90); 21.

Remarks.—This island form differs in color more decidedly from *P. m. abietorum*, which occurs on the mainland of Nova Scotia and New Brunswick, than it does from typical *maniculatus* of Labrador. It is in fact nearly intermediate between *abietorum* and *maniculatus*, being darker than the former and paler than the latter.

Specimens examined.—Total number 19, all from the type locality.

PEROMYSCUS MANICULATUS NUBITERRAE RHODES. CLOUDLAND MOUSE.

Peromyscus leucopus nubiterrae Rhodes, Proc. Acad. Nat. Sci. Phila., pp. 187–188, April, 1896.

Peromyscus canadensis nubiterrae Rhodes, *ibid.*, p. 213, May, 1897.

Type locality.—Summit of Roan Mountain, North Carolina, altitude 6,370 feet.

Geographic distribution.—Allegheny and Blue Ridge Mountains and adjacent ranges from western Pennsylvania south to western North Carolina, and northeastern Georgia.* Canadian zone.

Characters.—Similar to *gracilis* but slightly smaller; dusky area in middle of back broader and better defined. Tail longer than head and body; skull quite small; pelage very soft.

* The occurrence of *P. m. nubiterrae* in Georgia is not indicated on the distribution map (Plate I), as specimens from that State were not received until after the plate was printed.

Color.—Much as in *gracilis* but usually with a broader, better defined, dusky dorsal area, particularly in unworn pelage. Topotype No. 54491 in full winter pelage (January): Sides of body, head, and shoulders russet, thickly sprinkled with blackish, producing a general effect approximating Prout brown; back from shoulders to base of tail broadly blackish brown, sparingly relieved with russet; underparts pure creamy white entirely dominating the slaty basal color; ears dusky, rather sharply edged with whitish; small white tufts at anterior bases of ears; a narrow dusky orbital ring and spot at base of whiskers; feet white, 'ankles' dusky; tail dusky brownish above, white below. Topotype No. 73121 in partly worn pelage (July 20): Sides cinnamon tinged with fawn; back brownish.

Skull.—Similar to that of *gracilis*, but averaging decidedly smaller; very much smaller and lighter than in *leucopus* and *gossypinus*.

Measurements.—Type: Total length 170; tail vertebræ 87; hind foot 20.5. Two adult topotypes: 173, 188; 93, 98; 21, 19.5.

Type specimen.—No. 3664 Collection Academy of Natural Sciences, Philadelphia. ♂ adult, June 19, 1895. Samuel N. Rhoads. Specimen in good condition.

Remarks.—This form is not strongly characterized, but seems worthy of recognition, particularly since it is a divergent, or what may be called a peripheral development, not standing between any two oppositely characterized forms. Its peculiarities, though not absolutely constant, are shared by a majority of individuals. The skulls from the type locality are variable, perhaps indicating that the small size and other characteristics are not as yet thoroughly established. The dark color more nearly approaches that of true *gracilis* than it does that of specimens from New York and New England, all of which tend more or less toward *abietorum*.

Specimens examined.—Total number 175, from localities as follows:

Georgia: Brasstown Bald, 12.

Maryland: Bittinger, 6; Finzel, 19; Grantsville, 16.

North Carolina: Highlands, 7; Pisgah Ridge, Transylvania County, 6;^a Roan Mountain (4,700–6,300 feet), 36.

Pennsylvania: Drury Run, 1; Eaglesmere, Sullivan County, 4; King Station, Cambria County, 9; Lake Ganoga, Sullivan County, 2; Mount Pocono, 2; near Round Island, Clinton County, 2; Summit Mills, Somerset County, 19.

Tennessee: Holston Mountains, 1.

Virginia: Mount Rogers, 4; Peaks of Otter, 2; Skyland, Page County, 1; Tazewell Peak, 1.

West Virginia: Black Mountain, 5; Cold Knob Mountains, 1; Jobs Knob 6; Travelers Repose, 10; White Sulphur, 3.

^a Coll. Biltmore Forest School.

PEROMYSCUS MANICULATUS ARCTICUS (MEARNS).

(Pl. I, fig. 2.)

*Hesperomys leucopus arcticus** Mearns, Bull. Am. Mus. Nat. Hist., N. Y. II, p. 285, Feb., 1890.

Peromyscus maniculatus arcticus Osgood, N. Am. Fauna No. 19, p. 33, Oct., 1900.

Type locality.—Fort Simpson, Mackenzie, Canada.

Geographic distribution.—Interior of northwest Canada; from southeastern Saskatchewan north along the Mackenzie River at least to Fort Norman; west to the upper waters of the Yukon, and thence south to eastern Alberta. Canadian and Hudsonian zones.

Characters.—Similar to *maniculatus*, but tail shorter; nasals shorter and wider. Similar to *gracilis*, but slightly more dusky throughout; tail shorter; skull broader and heavier. Similar to *nebrascensis*, but decidedly darker, less ochraceous; tail slightly longer; skull broader. Similar to *artemisiae* and *oreas*, but tail shorter; skull shorter and more angular.

Color.—Unworn pelage (November): Ground color of upperparts isabella color to cinnamon, quite heavily and uniformly mixed with dusky, which is slightly or not at all concentrated in middle of back; general effect thus produced varying from grayish cinnamon to drab or hair brown, much like the adolescent pelage of related forms; orbital ring and spot at base of whiskers strongly blackish; white hairs in basal ear tufts usually well developed; underparts creamy white; tail deep dusky, almost black, above, white below; 'ankles' sharply blackish. Worn pelage (April–August): General effect of sides cinnamon, shading into pale russet in middle of back; 'ankles' dusky brownish; tail dusky brownish; otherwise similar to unworn pelage. Adolescent pelage: Slightly grayer and more dusky than in unworn adult; ground color of upperparts nearly drab; general effect hair brown to blackish mouse gray. Young in first coat: General effect mouse gray to slate color, often quite blackish in middle of back.

Skull.—Similar to that of *gracilis*, but averaging larger and heavier; nasals wider; infraorbital part of zygomata heavier; entire skull shorter relative to its width; lower lip of foramen magnum broader and condyle more sharply notched on each side. The same characters in greater or less degree also distinguish it from the skulls of *nebrascensis*, *rufinus*, *artemisiae*, and *oreas*, the only other forms to which it is closely related.

Measurements.—Average of 25 adults and adolescents from the type locality: Total length, 160 (150–172); tail vertebrae, 71 (62–78);

*The name *arcticus* was published as a *nomen nudum* in 1877—cf. Coues, Monogr. N. Am. Rod., p. 67.

hind foot, 20 (19-21); ear from notch (dry), 15.8 (15-16.8). Of 5 adults from the upper Athabaska River (approaching *oreas*): 179 (168-193); 85 (80-91); 20.

Type specimen.—No. 5555, Museum of Comparative Zoology, Cambridge, Mass.; formerly No. 4531, U. S. National Museum. ♂ young adult, Sept. 7, 1859. Robert Kennicott. Skin in fair condition with all parts intact. Head and neck show slight effect of recent moistening, evidently done in removing the skull. Hind feet turned under body, but in good condition; tail perfect. Color rather paler than in recently collected topotypes, doubtless due to fading, which renders the specimen unreliable for close comparisons. Skull with zygomata not 'squared' greatly as in older individuals; crowns of teeth scarcely worn. Zygomata somewhat broken; basi-occipital and sphenoid region cut out in a long rectangle.

Remarks.—*P. m. arcticus* is the only member of the genus inhabiting the great forested region of the interior of northwest Canada. Its range in this region is very wide, evidently covering the entire Canadian section and entering the Hudsonian at some points. Throughout the center of its range it is very constant in character, but around the edges it is unstable and intergradation with various forms is evident. Its relationships might still be a puzzle but for the large series recently secured by the expeditions of Edward A. Preble. Specimens from the lower Athabaska River are quite typical, but those from the upper river have increasingly longer tails, and certain individuals from the extreme headwaters near Henry House, Alberta, are almost like *oreas*. The evidence that *arcticus* as it ranges westward into the mountains gradually merges with *oreas* is thus almost complete. On the east the chain of intergrades is less complete, but sufficient to show that *arcticus*, as it ranges down the Saskatchewan River, intergrades with *gracilis* or *maniculatus*. On the south it meets *nebrascensis*, which replaces it on the open plains. Intermediates between the two are abundant, a series from Osler, Saskatchewan, perhaps containing the greatest number. About the upper waters of the Lewes River, of the Yukon drainage, *arcticus*^a is found in company with *algidus* and apparently distinct from it, though elsewhere the two are connected. Such a state of affairs, however, is not unique, as it is found in several other cases in the extraordinary *maniculatus* group.

The interrelations of *arcticus*, *oreas*, and *artemisiae* are extremely difficult to understand. Further material from the interior of British Columbia will be required before many doubtful points can be satisfactorily cleared up. That all three forms intergrade with

^a These western specimens of *arcticus* are slightly smaller than typical, but not sufficiently so to be separable.

each other, however, and in turn with *gambeli*, *sonoriensis*, etc., is scarcely to be doubted.

Specimens examined.—Total number 1,043, from localities as follows:

Alberta: Athabaska Lake (outlet), 15; Athabaska Landing, 22 (5 miles above 8; 30 miles above 14); Athabaska River, 22 (Brulé Rapid 3, Cascade Rapid 1, Crooked Rapid 2, Grand Rapids 5, 60 miles above Grand Rapids 3, Mountain Rapid 2, Pelican Rapid 3, 50 miles above Pelican Rapid 2, Swift Current 1); Banff, 10; Blindman River, 5; Bragg's Crossing, 4;^a Buffalo Lake, 10; Calgary, 7 (approaching *nebrascensis*); Canadian National Park, 15; Canmore, 2; Crows Nest Pass, 5;^a Edmonton, 3;^a Fish Creek, 3;^a Forks Blindman and Red Deer rivers, 7; Fort Chipewyan, 22; Fort McMurray, 1; Grand Cache River, 6;^b Henry House, 26;^a Jasper House, 6;^b Miette River, 1;^a Moose Mountain, 3; Moose River, 4;^a Muskeg Creek, 13;^b Peace River Landing, 14;^a Red Deer, 5; Red Deer River, 15 (approaching *nebrascensis*); St. Albert, 1; Slave River, 31 (near mouth Peace River 17, Smith Landing 14); South Edmonton (=Strathcona), 49; Sturgeon River, 1.^a

British Columbia: Cariboo, 1; Cheonnee Mountains, 6; Level Mountain, 3; Raspberry Creek, 10; Shesley River, 3; Telegraph Creek, 272.

Mackenzie: Fort Norman, 6; Fort Providence, 21; Fort Rae, 63; Fort Resolution, 109; Fort Simpson, 78; Fort Smith, 39; 60 miles below Fort Smith, 2; Fort Wrigley, 2; Great Slave Lake (islands east of Fort Resolution), 4; Nahanni River Mountains, 4; mouth Nahanni River, 5; Willow River, near Fort Providence, 2.

Saskatchewan: Carlton, 5; Indian Head, 38; Wingard, 11.

Yukon: Fifty Mile River, 3; Lewes River, 2; Lake Lebarge, 17; Lake Marsh, 8; White Horse Rapids, 1.

PEROMYSCUS MANICULATUS OREAS BANGS.

Peromyscus oreas Bangs, Proc. Biol. Soc. Wash., XII, p. 84, Mar. 24, 1898.

Type locality.—Mount Baker Range (altitude 6,500 feet), British Columbia.

Geographic distribution.—Mountains and coast of western Washington, north to southern British Columbia, south to Columbia River.

Characters.—Size rather large (hind foot 22–24); tail very long (seldom less than 100, usually more than 110); color very dark and rich. Similar in general to *arcticus*, but color darker and richer; tail and hind foot longer; ears larger. Similar to *austerus*, but size decidedly larger; color averaging much less blackish; skull larger and broader.

^a Collection of Canadian Geological Survey.

^b Approaching *oreas*.

^c The majority of this series are intermediate between *arcticus* and *oreas*, but a few specimens are almost as long-tailed as *oreas*. Possibly they are still more closely allied to *algidus*.

Color.—Unworn pelage: Ground color of upperparts cinnamon to russet, slightly paler on anterior half of body; dusky mixture rather strong, but not predominating except in middle of back, where it shows as a broad, irregular blackish patch; eye with a well-defined sooty ring around it; a prominent sooty spot at base of whiskers; underparts creamy white; feet white, forearm dusky and tawny, 'ankles' dusky brownish; ears dusky, very narrowly edged with whitish; very little or no white at anterior base of ear; tail blackish brown above, white below. Worn pelage:^a Sides bright russet to Mars brown; middle of back Mars brown to mummy brown; dusky mixture variously eliminated and changed to shades of brownish. Adolescent pelage: Upperparts pale cinnamon uniformly mixed with dusky, producing a general effect of broccoli brown tinged with fawn.

Skull.—Size slightly larger than in *arcticus*; nasals, palatine slits, and general rostral region longer; infraorbital foramina more compressed laterally; inferior lip of foramen magnum less distinctly notched on either side; general outline of skull more compressed anteriorly. Similar to that of *austerus*, but much larger; nasals and palatine slits longer; braincase broader; teeth larger.

Measurements.—Type and one topotype, respectively: Total length, 200; 207; tail vertebrae, 101; 114; hind foot, 24; 24. Average of 10 adults from Mount Rainier, Washington: 203 (194–214); 111 (105–120); 23.2 (22–24); ear from notch (dry) 16.6 (15.9–17.1). Of 12 adults from Neah Bay, Washington: 201 (185–214); 111 (105–123); 22.8 (22–24).

Type specimen.—No. 3696 Museum of Comparative Zoology, formerly same number, Collection of E. A. and O. Bangs. ♀ adult, Aug. 29, 1896. A. C. Brooks. Specimen in good condition.

Remarks.—In length of tail, this form exceeds all other members of the *maniculatus* group. Although the average length is about 110 mm., specimens with tails longer than 120 are common, and an extreme example from Quiniult Lake, Washington, has a tail measuring 131 mm. *P. m. oreas* is not confined strictly to mountainous country, but inhabits also the heavily forested lowlands of the Puget Sound region. Its relationship to *austerus* is difficult to understand. The case is very similar to that of *gambeli* and *rubidus* in California, the complications of which may be due either to hybridization or to intergradation. It is already known that *oreas* and *austerus* occur together at a number of localities and apparently maintain their respective characters. At other places only one form has thus far

^a A single specimen from Tenino, Wash., appears to represent a peculiar pale phase which in worn pelage is pale vinaceous drab. Several like it have been examined from mountains near Wenatchee, and from Lake Kichelos. Others from Tenino and from Easton, near Lake Kichelos, seem to be typical *oreas*.

been found, at others extremes of both forms and intermediates occur, and at still others intermediates only. There is no environmental distinction as in the case of *gambeli* and *rubidus*, for *oreas* and *austerus* live under apparently identical conditions. Although only one form has been found at the respective type localities of *oreas* and *austerus*, both occur together near by and further collecting may show that they do so over a wide area. Specimens which appear to be intermediate between *oreas* and *austerus* may in reality represent special differentiations of the one or the other showing accidental parallelism.

As stated elsewhere, *oreas* appears to intergrade with *arcticus*, most of the intermediate specimens having been referred to *artemisiae*. It intergrades also with *macrorhinus*, as proved by specimens from River Inlet, British Columbia. Intergradation with *rubidus* also is evident. When intergradation occurs with so many forms even the extremes of which are closely similar in general characters, the allocation of individual specimens or of small series is extremely difficult. Specimens from Lake Bennett and the region of the headwaters of the Yukon, previously referred to *oreas*,^a prove to be separable and apparently are most closely related to forms of the Alaskan coast. They may be connected with *oreas* through the interior of British Columbia.

Specimens examined.—Total number, 357, from localities as follows:

British Columbia: Chilliwack Valley, 9; Hope and near Hope, 50; Mount Baker Range, 5; Port Moody, 14.

Washington: Aberdeen, 2; Boulder Creek, 20;^b Boulder Lake, 11;^b head of Cascade River, 7; Chehalis County, 3; near Lake Cushman, 15; Easton, 7; Granville, 7; Happy Lake, 42; ^b Kent, 1; Kichelos Lake, 6; Lake Washington, 2; Lapash, 19; Martin, 2; Mount Rainier, 29 (Longmire Springs 9, Paradise Creek, altitude 5,200 feet, 11); Mount St. Helens, 2; Mount Vernon, 8; Neah Bay, 49;^c Quinault Lake, 15; Roy, 1; Shoalwater Bay, 1; North Fork Skokomish River, 6; Suez, 6; Tenino, 10; 60 miles east of Toledo, 2; near Wenatchee, 6 (aberrant).

. PEROMYSCUS MANICULATUS HYLAEUS Osgood.

(PL II, fig. 4).

Peromyscus hylaeus Osgood, Proc. Biol. Soc. Wash., XXI, pp. 141–142, June 9, 1903.

Type locality.—Hollis, Kasaan Bay, Prince of Wales Island, Alaska.

Geographic distribution.—Islands and coast of southeast Alaska west and northwest of the range of *P. m. macrorhinus*, including

^a North Am. Fauna No. 19, p. 32, Oct., 1900.

^b May include some specimens of *P. m. austerus*.

^c Three specimens in this series, although having the large hind foot and long tail of *oreas*, have small skulls very similar to those of *austerus*.

Prince of Wales, Kupreanof, Mitkof, and Admiralty islands and the mainland coast from Lynn Canal to Frederick Sound.

Characters.—Color rich and dark, about as in *macrorhinus*; size decidedly smaller. Similar to *oreas*, but color possibly averaging slightly darker and otherwise differing much as *keeni* does in having smaller ears and shorter tail. Similar to *keeni*, but skull more lightly built; rostrum longer, more slender. Similar to *algidus*, but color darker.

Color.—Practically as in *keeni*. Worn pelage: Sides varying from russet to Mars brown and shading into Mars brown and Prout brown on dorsum.

Skull.—Very similar to that of *oreas*; nasals and rostrum averaging slightly more slender. Similar to that of *keeni*, but more lightly built throughout; rostrum and nasals longer and more slender; posterior nasal endings usually exceeding premaxillæ; infraorbital region lighter. Somewhat similar to that of *macrorhinus*, but decidedly smaller.

Measurements.—Average of 20 adult topotypes: Total length 198.4 (191–205); tail vertebræ 98 (91–105); hind foot 23 (22–23.5); ear from notch (dry) 15.3 (14.5–16.8).

Type specimen.—No. 127038 U. S. National Museum, Biological Survey Collection. ♂ adult. May 15, 1903. W. H. Osgood. Specimen in good condition.

Remarks.—This is the form prevalent over most of the coast region of southern Alaska. In general terms it is like *keeni*, except in cranial characters, and both *keeni* and *hylaesus* are very similar to *oreas* except in respect to their shorter ears and tails. All are decidedly smaller than *macrorhinus* and *sitkensis*. The form from the Queen Charlotte Islands, *keeni*, so far as known, is the only well-developed insular form north of Puget Sound, all those from the various islands of the Alexander Archipelago, with the exception of *sitkensis*, being too slightly or not at all differentiated. *P. m. hylaesus* probably intergrades with *macrorhinus* in the vicinity of Frederick Sound, as indicated by the slightly increased size of specimens from Mitkof Island. Intergradation with *algidus* takes place in the region of Lynn Canal.

Specimens examined.—Total number, 163, from localities as follows:

Alaska: Glacier Bay, 2; Juneau, 10; Kasaan Bay, Prince of Wales Island, 63; near Killisnoo, Admiralty Island, 54; Lindenburgh Peninsula, Kupreanof Island, 16; Petersburg, Mitkof Island, 13; Taku Harbor, 5.

PEROMYSCUS MANICULATUS KEENI (Rhoads).

(Pl. II. fig. 8.)

Sitomys keeni Rhoads, Proc. Acad. Nat. Sci. Phila., pp. 258-259, Oct. 23, 1894.*Peromyscus keeni* Bangs, Am. Naturalist, XXXI, p. 75, Jan., 1897.

Type locality.—Masset, Graham Island, Queen Charlotte Islands, British Columbia.

Geographic distribution.—Moresby and Graham islands, Queen Charlotte Group, British Columbia.

Characters.—Similar to *oreas*, but ears decidedly smaller; tail averaging shorter; skull slightly heavier. Similar to *hylaesus*, but skull heavier, with shorter broader nasals. Size smaller than in *macrorhinus*, *prevostensis*, and *sitkensis*.

Color.—Not appreciably different from that of other forms of the northwest coast—*oreas*, *macrorhinus*, *hylaesus*, etc. Worn pelage: Sides russet shading into darker Mars brown in middle of back. Unworn pelage probably much darker, with dorsum more contrasted with sides.

Skull.—Similar to that of *oreas*, but averaging slightly heavier, particularly in the rostral region. Similar to that of *hylaesus*, but nasals and rostrum shorter and thicker; posterior nasal endings usually about equaling premaxillæ; skull slightly heavier throughout.

Measurements.—Average of 20 males from Skidegate, Graham Island: Total length 197 (186-212); tail vertebrae 102 (95-111); hind foot 22.7 (22-23); ear from notch (dry) 14.7 (14-15.2). Of 15 females from the same locality: 199.8 (181-209); 103.4; 22.4 (22-23).

Type specimen.—No. 7768 Collection Academy of Natural Sciences, Philadelphia; formerly No. 768 Collection of S. N. Rhoads. ♂ young adult. 1892. J. H. Keen. Specimen in alcohol, except skull, which has been removed and preserved separately. It is of little value for comparison.

Remarks.—This mouse is of the same general type as *P. m. oreas* of the Puget Sound region and *P. m. hylaesus* of the islands and coast of southeastern Alaska. It is most closely related to *hylaesus*, being distinguished only by slight cranial characters. Since these characters, although reasonably constant, vary slightly towards *hylaesus*, it seems fitting to include *keenii* among the numerous subspecies of *maniculatus*. The only other white-footed mouse occurring on the Queen Charlotte Islands is *P. s. prevostensis*, which, although nearly the same color, is so much larger than *keenii* as not to require close comparison.

Specimens examined.—Total number 108, from localities in the Queen Charlotte Islands as follows:

Graham Island: Massett, 10; Skidegate Inlet, 50.

Moresby Island: Cumshewa Inlet, 40; near Rose Harbor, 8.

PEROMYSCUS MANICULATUS ALGIDUS^a subsp. nov.

Type from head of Lake Bennett (site of old Bennett City), British Columbia. No. 130013 U. S. National Museum, Biological Survey Collection. ♂ adult. Sept. 17, 1903. W. H. Osgood.

Geographic distribution.—Region of the headwaters of the Yukon River from Lake Bennett to the lower part of the Lewes River.

Characters.—Similar to *hylaesus*, but color paler and more grayish; similar to *oreas*, but paler and with shorter tail and ears.

Color.—Much as in *arcticus*, but with rather less dusky; similar to *hylaesus* but decidedly paler and more grayish. Unworn pelage: Upperparts between cinnamon and isabella color, mixed with dusky rather lightly on sides and more heavily in middle of back, over quite an area of which it predominates; head and face and sometimes shoulders slightly grayish; orbital ring and dusky spot at base of whiskers present, but less conspicuous than in *hylaesus*. Worn pelage: Sides cinnamon or wood brown to russet, becoming slightly darker on dorsum; dusky mixture seldom or never thoroughly eliminated; ears rather broadly edged with whitish; pre-auricular lanuginous tufts usually with a few white hairs.

Skull.—Very similar to those of *oreas* and *hylaesus*; possibly averaging slightly larger; larger than in *arcticus*, with larger teeth and zygomata more compressed anteriorly.

Measurements.—Average of 20 adult topotypes: Total length 192 (178–204); tail vertebrae 94 (83–101); hind foot 22.5 (22–23.5); ear from notch (dry) 15.8 (15–16.4).

Remarks.—This is a slight form, the interior representative of the dark coast form *hylaesus*. It is very similar to *oreas*, differing only in slightly paler color and in shorter tail and ears. Possibly the two intergrade in the interior of northern and central British Columbia. Although *arcticus* and *oreas* appear to intergrade in southern British Columbia, *arcticus* and *algidus* occur together in the range of *algidus* and maintain their distinctness. Although nearly the same color, they are easily distinguishable by size and cranial characters. In the flesh, their distinctness is even more apparent. This form as well as *oreas* bears some general resemblance to *gracilis*, the long-tailed form of the East. All the similar western forms, however, regardless of color or length of tail, differ from *gracilis* in larger hind feet and in larger skulls with heavier teeth.

Specimens examined.—Total number 66, from localities as follows:

Alaska: Glacier, White Pass Railroad, 11; Haines, 1 (approaching *hylaesus*); Skagway, 1; Summit, White Pass, 1.

British Columbia: Bennett, 41; Cheonnee Mountains, 1.

Yukon Territory: Caribou, 2; Fifty Mile River, 1; Lake Tagish, 4; White Horse, 3.

^a *Algidus* = very cold, pertaining to a cold climate.

PEROMYSCUS MANICULATUS MACRORHINUS (Rhoads).

Peromyscus macrorhinus Rhoads, Proc. Acad. Nat. Sci. Phila., pp. 250-250, Oct. 23, 1894.

Peromyscus macrorhinus Bangs, Am. Naturalist, XXXI, p. 75, Jan., 1897.

Type locality.—North Pacific Salmon Cannery,^a mouth of Skeena River, British Columbia.

Geographic distribution.—Mainland coast of northern British Columbia and southern Alaska.

Characters.—Size very large (hind foot 24-25); color dark and rich. Similar to *oreas*, but decidedly larger; tail relatively shorter. Similar to *hylaeus*, but larger throughout. Similar to *sithkensis*, but smaller, skull decidedly smaller and more slender.

Color.—Almost as in *oreas*, possibly averaging slightly darker. Worn pelage:^b Sides varying from rich russet to Mars brown; middle of back slightly darker, approaching Prout brown and burnt umber; orbital ring and spot at base of whiskers rather extensive and contrasted (probably more so in unworn pelage); 'ankles' broadly dusky brownish behind, foreleg with a russet stripe extending from side nearly or quite to wrist; underparts creamy white.^c

Skull.—Similar to that of *oreas* and *hylaeus*, but decidedly larger; nasals more elongate; molariform teeth larger; zygomata more compressed anteriorly. Similar to that of *sithkensis*, but smaller; rostrum more slender; molariform teeth smaller; audital bullae relatively larger.

Measurements.—Average of 6 adults from Inverness, mouth of Skeena River, British Columbia: Total length 209 (200-217); tail vertebrae 112 (105-117); hind foot 24.5 (24-25); ear from notch (dry) 16.1 (15-17). Average of 10 adults from Wrangell, Alaska: 215 (202-222); 112 (104-123); 23.8 (23-24.5).

Type specimen.—No. 8381 Collection Academy of Natural Sciences, Philadelphia. Formerly No. 1381 Collection of S. N. Rhoads. Collected by J. H. Keen. Skin in alcohol. Skull not thoroughly cleaned; right zygoma and part of infraorbital plate broken away; otherwise in good condition.

Remarks.—The mice of the northwest coast, including *oreas*, *macrorhinus*, *hylaeus*, *sithkensis*, and *keenii*, are very similar in color,

^a The exact locality, as I am informed by Rev. J. H. Keen, who collected the type.

^b Specimens in complete unworn pelage are not at hand. As indicated by a few specimens in changing pelage, it would be very nearly the same as in *oreas* and *hylaeus*.

^c One specimen from Inverness, British Columbia, is abnormally colored. The entire underparts are rich brownish russet like the sides; the underside of the tail is flecked with dusky; and the feet are brownish dusky to the bases of the toes. Thus the only white on the animal is on its toes.

and the various forms are distinguishable only by size, proportions, and slight cranial characters. With the exception of *sitkensis* and *prevostensis*, *macrorhinus* is the largest of these northwest coast forms. Since *sitkensis* and *prevostensis* are insular in distribution so far as known, *macrorhinus* is the only very large mainland form. Its size readily distinguishes it from *oreas* and *hylaesus*, though indications of intergradation with each are known, and specimens from outlying localities therefore may prove troublesome. A series from River Inlet, British Columbia, seems to show intergradation between *macrorhinus* and *oreas*, containing, as it does, individuals which may be referred without violence to either one, and others that are as nearly halfway between the two as conceivable. Another series from Petersburg, Alaska, though referable to *hylaesus*, have somewhat larger teeth than that form and may be considered as connecting *hylaesus* with *macrorhinus*. Thus it appears that the type locality of *macrorhinus* is in about the center of its range, a most unusual circumstance, for when it was described absolutely nothing was known of the distribution and relationships of the mice of the northwest coast and the type locality was determined only by the location of the first collector to secure specimens and forward them to a mammalogist.

Specimens examined.—Total number 111, from localities as follows:

Alaska: Loring, Revillagigedo Island, 34; Woronkofski Island, 6; Wrangell, 33.

British Columbia: Metlakatla, 4;^a Port Simpson, 3; River Inlet, 22 (approaching *oreas*); mouth of Skeena River, 9 (Inverness, 8; North Pacific, 1).

PEROMYSCUS MANICULATUS ARTEMISIAE (RHODS).

Sitomys americanus artemisiae Rhoads, Proc. Acad. Nat. Sci. Philadelphia, pp. 260-261, Oct. 23, 1894.

Peromyscus texanus subarcticus Allen, Bull. Am. Mus. Nat. Hist., N. Y., XII, pp. 15-16, Mar. 4, 1899—Deerlodge County, Mont.^b

Peromyscus texanus artemisiae Miller and Rehn, Proc. Bost. Soc. Nat. Hist., XXX, p. 84, Dec., 1901.

Type locality.—Ashcroft, British Columbia.

Geographic distribution.—South central British Columbia, north-eastern Washington, northern Idaho, western Montana, and western Wyoming. Transition and Canadian zones.

Characters.—More or less similar to *arcticus*, *rufinus*, and *gambeli*; size about as in *arcticus*, color somewhat paler, skull narrower; color

^a Collection of Canadian Geological Survey.

^b The exact locality is "SW. corner of Deerlodge Co.—about 20 miles west and a very little north of Anaconda—near a Post Office called Cable," as I am informed by a letter from the collector, Prof. L. L. Dyche.

about as in *gambeli*, though slightly darker, size larger; color less tawny and size larger than in *rufinus*; white in subauricular tufts nearly obsolete; tail shorter and color paler than in *oreas*; darker and larger than *nebrascensis* and *sonoriensis*.

Color.—Ground color of upperparts varying from pale cinnamon to brownish fawn, about as in *gambeli*, duller and less tawny than in *rufinus*; dusky mixture usually somewhat concentrated on dorsum into an irregular darker area; ears dusky, whitish edged; subauricular tufts, when conspicuous, chiefly buffy cinnamon, lightly mixed with dusky, white much reduced or absent; a dusky spot at base of whiskers; eyelids and sometimes a very narrow orbital ring dusky; feet white; forelegs white or often with a light mixture of dusky to wrists; 'ankles' dusky; underparts creamy white; tail dark brownish above, white below. Worn pelage: General color rather dull; sides pale fawn to russet; dorsum russet to Prout brown. Adolescent pelage: Ground color pale drabby fawn heavily mixed with dusky, slightly increased on dorsum; general effect of upperparts broccoli brown to hair brown. Young in first coat: Base of hairs slate color to blackish slate; general effect of upperparts mouse gray, decidedly darker and more slaty on dorsum.

Skull.—Much as in *rufinus* and *gambeli*, but averaging larger and more elongate with longer nasals; similar to that of *arcticus*, but averaging narrower with less spreading zygomata and longer more slender nasals.

Measurements.—Average of 6 topotypes: Total length 167 (155–180); tail vertebrae 75 (69–86); hind foot 20.5 (19–22); ear from notch (dry) 16.1 (15–17). Of 5 adults from Similkameen River: 172 (158–186); 77.5 (68–82); 20.2 (20–21).

Type specimen.—No. 7368 Collection of Academy of Natural Sciences, Philadelphia. Formerly No. 368 Collection of S. N. Rhoads. ♂ adult. July 5, 1892. S. N. Rhoads. A flat skin without stuffing, but otherwise in good condition; tail stiffened with a quill; skull practically perfect.

Remarks.—It is extremely difficult to characterize this form since it shows some resemblance to so many surrounding forms. It seems to be an aggregation of intermediates, but sufficiently constant and restricted in range to merit recognition. Its recognition as a distinct form is far more satisfactory than an attempt to adjust it with the several related forms, with none of which it thoroughly agrees. In a way, it connects the long-tailed and the short-tailed forms of the *maniculatus* group, although intergradation between the two series occurs also elsewhere. The gradation from *gambeli* via *artemisiae* to *oreas* seems to be complete, although at certain localities representatives of each may be found apparently preserving distinctness. At St. Mary Lake, Montana, two forms occur, one

referable to *nebrascensis* and occupying the open sagebrush country, and the other, called *artemisiae*, being confined to the heavy forest. Although distinct here and apparently free from hybridization, each form is connected by slight gradations with the same parent (?) form. The majority of the series called *artemisiae* are indistinguishable from topotypes except by size, and in this respect variation in the series extends from the average dimensions of *artemisiae* to those of *oreas*. The closest relations of *artemisiae* are with *arcticus*, and some specimens are almost indistinguishable. Additional material from central and northern British Columbia, western Montana, northern Idaho, and adjacent regions, supplemented by careful field studies, would doubtless reveal some very interesting facts regarding intergradation and distribution, and it may be necessary later for *artemisiae* and *arcticus* to be thrown together; for the present both may be recognized. *P. m. artemisiae* intergrades even with *sonoriensis*, as proved by specimens from east-central Idaho, and these in turn merge with *nebrascensis*, *rufinus*, *gambeli*, etc., and so connection with all the forms of this remarkable group is shown. *P. subarcticus* Allen is an absolute synonym of *artemisiae*, the type being indistinguishable in even the slightest degree from topotypes of *artemisiae*.

Specimens examined.—Total number 549, from localities as follows:

- British Columbia:** Ashcroft, 28; Barkerville, 1; Bonaparte, 1; Ducks, 2; Field, 16 (approaching *oreas* and *arcticus*); Glacier, 6 (approaching *oreas* and *arcticus*); Gold Range, 1; Golden, 8 (approaching *oreas* and *arcticus*); Hope and near Hope, 87; 125 Mile House, Caribou Road, 2; Kamloops, 15;^a Lac La Hache, 2;^b Midland, 1;^a Moniskee Divide, 15; Myer Creek, 2;^a Nelson, 18; Okanagan, 14;^a Okanagan Lake, 3; Rossland, 1;^a Shuswap, 3; Sicamous, 13 (approaching *oreas*); Similkameen River, 5 miles north of U. S. boundary, 7; Sophia Mountain, 1;^a Spences Bridge, 2;^a Vernon, 6.
- Idaho:** Bitter Root Mountains, 1; Cœur d'Alene, 19; near Collins, Latah County, 2; Craig Mountains, 1; Fiddle Creek, 4; Freedom, 1; Kingston, 2; Mission, 1; Mullan, 8; Osborn, 3; Priest Lake, 8 (approaching *oreas*); Seven Devils Mountains, 3.
- Montana:** Beartooth Lake, 6; Beartooth Mountains, 2; Deerlodge County, 3; Flathead Lake, 13; Helena, 2; Horse Plains, 3; Hot Springs Creek, 1; Kallispell, 1; Little Bitter Root Creek, 3; Lolo, 5; Nyack, 7; Prospect Creek, 5; St. Mary Lake, 10 (approaching *oreas*); Saltese, 10; Stanton Lake, 1; Stevensville, 4; Summit, 2; Thompson Falls, 1; Thompson Pass, 4; Tobacco Plains, 11; Upper Stillwater Lake, 1.
- Oregon:** Elgin, 3 (approaching *gambeli*); Wallowa Lake, 14 (approaching *gambeli*); Wallowa Mountains, 1.
- Washington:** Asotin, 2 (approaching *gambeli*); Blue Creek, 5; Cheney, 2; Columbia River (Lord), 1; Colville, 15; Conconully, 3; Crab Creek, Lincoln County, 1 (approaching *gambeli*); Davenport, 1;

^a Collection Canadian Geological Survey.

^b Specimens poor, position doubtful.

Douglas, 1; Easton, 2; Fort Spokane, 2; Marcus, 4; Rock Lake, 2; Spokane Bridge, 15; Spokane Falls, 1; Wawawai, 2 (approaching *gambeti*).

Wyoming: "Baggs Crossing (30 ml. NW.), 8; Clarks Fork, 9; Jacks-sons Hole, 1; La Barge Creek, 3; Lake City, 10; Mammoth Hot Springs, 34; Yellowstone Park, 4.

PEROMYSCUS MANICULATUS SATURATUS BANGS.

Peromyscus texanus saturatus Bangs, Am. Naturalist, XXXI, pp. 74-75, Jan. 1, 1897.

Type locality.—Saturna Island, Island District, British Columbia.

Geographic distribution.—Confined to Saturna Island.

Characters.—Similar in color to *P. m. austerus*, but lateral line and cinnamon beneath base of tail more conspicuous; size larger; skull larger, broader, and more angular; hind foot 21 to 22; tail shorter than head and body.

Color.—Unworn or slightly worn pelage: Upperparts very dark; general effect cinnamon heavily clouded with blackish, the latter somewhat concentrated dorsally; lateral line cinnamon, rather well defined, extending to the heels, which are mixed cinnamon and dusky, and broadening across the interfemoral region beneath the tail into a conspicuous patch of nearly clear cinnamon; upper side of arm to wrist cinnamon lightly mixed with dusky; ears dusky brownish, edged with whitish, subauricular tufts same color as rest of upperparts; tail blackish brown above, white below; underparts creamy white not thoroughly concealing slaty undercolor. Worn pelage: Sides bright cinnamon to russet, blending with the lateral line which is much less contrasted than in unworn pelage; back dark, Mars brown to mummy brown and Prout brown. Adolescent pelage: Sides drabby hair brown or sooty isabella color; narrow cinnamon lateral line usually well marked; back with a rather well-defined sooty grayish brown stripe.

Skull.—About the size of that of *oreas* but more angular and more arched in the interorbital region; larger, broader, and more angular than in *austerus*; audital bullæ and molar teeth about as in *oreas*, slightly larger than in *austerus*.

Measurements.—Average of 10 adults from the type locality (fide Bangs, l. c.): Total length 180.9; tail vertebræ 76.2; hind foot (dry) 21.25.

Type specimen.—No. 2581 Museum of Comparative Zoology, Cambridge, Mass., formerly same number Collection of E. A. and O. Bangs. ♂, adult, January 31, 1894. W. C. Colt. Specimen in fair condition. Skull with nasals slightly broken anteriorly; otherwise perfect.

Remarks.—Although typical *austerus* occurs on both sides of Puget Sound and even on Vancouver Island, it does not appear to range unchanged over the small islands between Vancouver Island and the mainland. The form of Saturna Island will perhaps be found on adjacent islands and may be connected by them with *austerus*. Certain aberrant specimens from the mainland at Howe Sound and Malaspina Inlet, British Columbia, show some approach to *saturatus*, particularly in their skulls, but for the present seem best considered as variously intermediate between the mainland forms.

Specimens examined.—Total number 221, all from the type locality.

PEROMYSCUS MANICULATUS HOLLISTERI subsp. nov.

(Pl. II, fig. 6.)

Type from Friday Harbor, San Juan Island, San Juan County, Wash. No. 130318 U. S. National Museum, Biological Survey Collection. ♂ adult, Oct. 23, 1903. N. Hollister.

Characters.—Color almost as in *saturatus*; skull larger and heavier, with larger molar teeth, and larger audital bullæ.

Color.—Almost as in *saturatus*; ground color a slightly paler shade of cinnamon; lateral line not so sharply defined.

Skull.—Similar to that of *saturatus*, but larger and heavier; palate broader, molar teeth heavier; audital bullæ actually and relatively larger.

Measurements.—Average of 10 adult topotypes: Total length 180.8 (167–188); tail vertebræ 79.3 (73–84); hind foot 22.1 (21–22.5); ear from notch (dry) 16.8 (15.2–17.2).

Remarks.—The relationship of this form to *saturatus* is evident. The cranial characters by which it differs are constant, and it seems necessary to recognize them, especially since it is an insular form. The evident deviation of both *saturatus* and *hollisteri* from mainland forms of the *maniculatus* series seems best expressed by trinomial names, particularly since so many of the small islands of the Puget Sound region are as yet unrepresented by specimens in collections. The whole question of the interrelations of *oreas*, *austerus*, and *artemisiae* is not as yet satisfactorily worked out, and much material and careful field notes from islands and mainland coasts of southern British Columbia and northern Washington are greatly to be desired.

Specimens examined.—Total number 41, all from the type locality.

PEROMYSCUS MANICULATUS AUSTERUS (BAIRD).

(Pl. II, fig. 3.)

Hesperomys austerus Baird, Proc. Acad. Nat. Sci. Phila., VII, p. 236, 1855.*Peromyscus austerus* Bangs, Am. Naturalist, XXXI, p. 75, Jan., 1897.*Peromyscus aklepi* Elliot, Field Col. Mus., Chicago, Zool. Ser. I, p. 226, Feb., 1899—Elwah River, Olympic Mountains, Washington.*Type locality*.—Old Fort Steilacoom, Wash.*Geographic distribution*.—Coast region of Puget Sound, Washington; north to southern British Columbia and including Vancouver Island.*Characters*.—Size medium (hind foot 19–22, tail usually less than 100); color very dark. Similar to *oreas*, but decidedly smaller and more sooty in color; similar to *saturatus* and *rubidus*, but skull smaller and narrower; similar to *gambeli*, but very much darker and with different skull.*Color*.—Unworn pelage: Ground color of upperparts brownish fawn; sides with liberal mixture of sooty, middle of back with still more, forming a more or less distinct sooty stripe; ears sooty, very narrowly edged with whitish, no white at anterior bases; a narrow dusky orbital ring and a small dusky spot at base of whiskers; underparts creamy white, slaty undercolor usually showing through; tail sooty above, white below; ‘ankles’ dusky brownish. Worn pelage: Sides Mars brown to Prout brown; dorsum Prout brown to mummy brown. Adolescent pelage: Sides grayish wood brown heavily mixed with sooty, middle of back and top of head black or nearly black, shoulders slightly less intense.*Skull*.—Size small; braincase very narrow; nasals rather short; zygomata not ‘squared’ anteriorly; molariform teeth small; palatine slits short. Most similar to that of *gambeli*, but narrower and more elongate; zygomata lighter; decidedly smaller than in *saturatus*, *oreas*, and *rubidus*.*Measurements*.—Average of 10 topotypes: Total length 172 (163–190); tail vertebræ 86 (79–96); hind foot 20.5 (20–21); ear from notch (dry) 15 (14–15.5). Of 10 adults from Goldstream, Vancouver Island, British Columbia: 173 (170–178); 85 (81–89); 20.3 (19–21).*Type specimen*.—In the original description of *austerus*, Baird does not designate a type but mentions two localities, thus: “Collected at Fort Steilacoom, Puget Sound, by Dr. Geo. Suckley, U. S. A., and by Dr. Cooper on the Spokane Plains.” In 1857, two years later, he published a more complete description and listed 1 specimen from Spokane Plain and 11 from Steilacoom, 4 of the latter queried and mentioned in the text as possibly belonging to another form (Mamm. N. Am., p. 466, 1857). Allen (Bull. Am. Mus. Nat. Hist., V, p. 192, 1893) has selected Steilacoom as the type locality of *austerus* on the grounds that it is the locality first mentioned in the original description and the one from which came the majority

of the specimens examined by Baird in 1857. Miller and Rehn (Proc. Bost. Soc. Nat. Hist., XXX, p. 69, Dec., 1901), either unaware of Allen's action or in exception to it, gave Spokane Plain as the type locality. There appear to be good grounds for either decision, but Allen's, having priority, is entitled to more consideration even though it can not be denied that the specimen from Spokane Plain may have been the chief basis of the original description. The statement by Baird (Mamm. N. Am., p. 466) that "the *Hesperomys austerus* has thus far only been found in the eastern part of Washington Territory" is hard to understand in connection with the list of specimens immediately following, the majority of which are from western rather than eastern Washington. No. 1964, U. S. National Museum, from Steilacoom, which is one of the specimens listed in 1857 now extant, was considered the type by Coues, and now bears a type label, but as it was not collected until 1856, the year following the first publication of the name, and as its measurements do not agree with those of the original description, obviously it can not logically be considered the type. The measurements given in the original description do not agree exactly with those of the specimen from Spokane Plain as published by Baird in 1857, nor yet with any of those from Steilacoom, so no conclusion can be adduced from that source. On the whole, the question appears to be open, and therefore Allen's right to fix Steilacoom as the type locality can not fairly be disputed.

Of Baird's original specimens from Steilacoom now extant, No. 364 U. S. National Museum (skull only) may perhaps be regarded as the type. It is badly broken and of little value for comparison (see Lyon and Osgood, Bull. U. S. Nat. Mus. No. 62, p. 125, 1909).

Remarks.—Typical *austerus* appears to be confined to the immediate vicinity of Puget Sound. Specimens from Howe Sound and Malaspina Inlet on the coast of southern British Columbia are slightly large, but do not seem separable. In cranial characters some of them approach *oreas* very closely, but others are exactly like *austerus*; since the majority have skulls more similar to *austerus* and all have rather short tails and hind feet, they are referred to *austerus*. In the same way, specimens from Lake Cushman and the Skokomish River in the eastern Olympic Mountains are larger than typical; these, however, may possibly be tending toward *rubidus*. The series representing '*P. akeleyi*' also comes within this category. The type, however, is like *austerus* in size and cranial characters. Specimens from Vancouver Island are almost exactly like topotypes, differing only in having slightly wider braincases. Some specimens from the coast of Oregon approach *austerus* quite decidedly, but the general average of the majority from that region seem referable to *rubidus*, chiefly on account of their larger, broader skulls. The occurrence of *austerus* and *oreas* at the same localities has been discussed in the account of *oreas*.

Specimens examined.—Total number 408, from localities as follows:

British Columbia: Agassiz, 10; Comox, 6; Chilliwack Valley 11; Gibson Landing, Howe Sound, 12; ^a Goldstream, 27; Hastings 3; Kent, 2; Langley, 1; Land, Malaspina Inlet, 20; ^a Mount Baker Range, 1; Mount Lehman, 1; Port Moody, 14; Salt Spring Island, 2; ^a Sumas, 22; Victoria, 26; ^b Wellington, 3; Westminster, 9.

Washington: Aberdeen, 9; ^a Avon, 5; Boulder Creek, 30; ^c Bou'er Lake, 1; Elwah River, Olympic Mountains, 38; ^c Lake Cushman, 1; Hamilton, 3; Happy Lake, 2; Johnson Ranch, Elwah River, 2; Mount Ellnor (3 m. S.E.), 2; Mount Vernon, 28; Nesqually Flats, 31; Roy, 1; Sauk, 2; Seattle, 9; North Fork Skokomish River, 21; Soladuck River, 1; ^a Steilacoom, 40; Tacoma, 3; Tenino, 3; Whidby Island, 6.

PEROMYSCUS MANICULATUS RUBIDUS Osgood.

Peromyscus oreas rubidus Osgood, Proc. Biol. Soc. Wash., XIV, pp. 193-194, Dec. 12, 1901.

Peromyscus perimckurus Elliot, Field Col. Mus., Chicago, Pub. 74, Zool. Ser., III, p. 156, Apr., 1903—Goldbeach, Oreg.

Type locality.—Mendocino City, Calif.

Geographic distribution.—Coast of California and Oregon from San Francisco Bay to the mouth of the Columbia River.

Characters.—Similar to *oreas*, but tail and hind foot shorter; similar to *austerus*, but color paler, skull larger and broader; similar to *gambeli*, but tail longer and color darker.

Color.—Unworn pelage: Ground color of upperparts cinnamon; black mixture rather heavy on sides, predominating on back, forming a broad blackish stripe from shoulders to base of tail or an irregular patch between shoulders and rump; head and shoulders somewhat grayish; a conspicuous blackish orbital ring and spot at base of whiskers; ears dusky, edged with whitish; very few or not any white hairs at anterior bases of ears; feet white, 'ankles' dusky; tail blackish above, white below; underparts creamy white. Worn pelage: Sides fawn color to russet; dorsum russet to Mars brown; face and head nearly like sides; dusky mixture often almost entirely eliminated or so faded as to show scarcely any contrast with ground color. Adolescent pelage: General effect of upperparts varying from grayish hair brown to hair brown tinged with fawn. Young in first coat: General color mouse gray, more or less sooty in middle of back.

Skull.—Similar to that of *gambeli*, but larger and heavier; similar to that of *oreas*, but with nasals averaging slightly shorter; somewhat similar to that of *austerus*, but decidedly larger and heavier, brain-case broader, teeth heavier.

Measurements.—Three adult topotypes: Total length, 189, 190, 203; tail vertebrae, 99, 95, 99; hind foot, 21, 22, 21. Average of 6

^a Approaching *oreas*?

^b Collection of Canadian Geological Survey.

^c May include some specimens of *P. m. oreas*.

adults from Mendocino County, Calif., 193 (189-203), 96 (90-100), 21.5 (21-22), ear from notch (dry), 15.8 (15.2-16.9).

Type specimen.—No. 91650 U. S. National Museum, Biological Survey Collection. ♀ adult. November 17, 1897. J. Alden Loring. Specimen in good condition.

Remarks.—The range of this form follows quite closely the humid coast belt of California and Oregon. Specimens from the southern part of its range approach *gambeli*, and in the north, near the mouth of the Columbia River, approach to *oreas* or *austerus* or both is evident. Some series from this latter region are too variable to admit of satisfactory classification, for they contain individuals showing some of the characters of any of the three closely related forms, *oreas*, *austerus*, and *rubidus*. The difficulty is increased by two names, *akeleyi* and *perimekurus*, which confront the reviser. Their respective types do not exactly agree with any of the other forms, and series from their type localities contain large and small, dark and light individuals. Neither form can be definitely characterized, and the soundest procedure seems to be to consign each to the form which appears to be dominant in the region from which it comes. Thus *akeleyi* falls under *austerus* and *perimekurus* under *rubidus*. Specimens from the Willamette Valley are nearly typical, though possibly tending in slight degree toward *gambeli*. All along the border between the humid coast and the relatively arid interior are found intermediates between *rubidus* and *gambeli*, or in some localities the two forms are found side by side. Six specimens from the Outer Peninsula, near Samoa, Humboldt Bay, are decidedly paler than others from the neighboring redwoods. They evidently represent an incipient and very local subspecies, and well illustrate the plasticity of the group to which they belong. A careful study of this variation and the local conditions doubtless would prove instructive. An aberrant specimen is present also in the series from Wells, Oreg. It is so much paler than the others of the series that partial albinism is suggested, but possibly local environment may be the true explanation.

Specimens examined.—Total number 838, from localities as follows:

California: Alton, 11; Alton Junction, 8; Berger Creek, 4; Blue Lakes, 1; Bodega, 10; Briceland, 4; Cahto, 17; near Calpella, 2; Camp Meeker, 1; Canyon Creek, Trinity County, 1; Cape Mendocino, 2; Cazadero, 1; Crescent City, 51; Dyerville, 7; Eureka, 15; Freestone, 2; Gasquet, 8; Hoopa Valley, 18; Humboldt Bay, 19 (Carson Camp, Mad River, 13; Outer Peninsula, near Samoa, 6^a); Inverness, 8; La Honda, 46; Laytonville, 1; near Lower Lake, 18; Mad River, 2; Marshall, Marin County, 5; ^a Mendocino City, 15; Mount Tamalpais, 1; Nicasio, 67; Novato, 2; Olema, 6; ^a Orick, 21; Petrolia, 10; Point Reyes, 38; ^a Portola, 160; ^a Requa, 18; Rio Dell, 1; Rockport, 2; Sherwoods, 15; Siskiyou Mountains (Shelley Creek), 3; Smith River, 4; Sur, 10; ^a Ukiah, 11; ^a Westport, 1; Woodside, 2.^a

Oregon: Agnes, 2; Astoria, 12; Beaverton, 1; Elkhead, 1; Florence, 7; Forest Grove, 1; Gardiner, 22; Glendale, 1; Gold Beach, 17; Grants Pass, 5;^a Marshfield, 3; McCoy, 9; Mount Hood (west slope), 1; Oregon City, 5; Portland, 22; Port Orford, 2; Prospect, 12;^a Riddle, 1; Rogue River Valley, 2;^a Roseburg, 5;^a Scottsburg, 6; Seaside, 15; Sheridan, 6; Tillamook, 1; Wells, 20; Yaquina, 6; Yaquina Bay, 4.

PEROMYSCUS MANICULATUS GAMBELI (BAIRD).

(Pl. II, fig. 12.)

Hesperomys gambelii Baird, Mamm. N. Am., Pac. R. R. Reports, VIII, pp. 464-465, 1857.

Sitomys americanus gambelii Allen, Bull. Am. Mus. Nat. Hist., N. Y., V, pp. 190-191, Aug. 18, 1893.

Sitomys americanus thurberi Allen, *supra cit.*, pp. 185-186—San Pedro Martir Mountains, Lower California.

P [eromyscus] t[exanus] gambelii Mearns, Proc. U. S. Nat. Mus., XVIII, p. 446, Mar. 25, 1896.

Peromyscus texanus medius Mearns, Proc. U. S. Nat. Mus., XVIII, p. 446, Mar. 25, 1896—Nachoguero Valley, Lower California.

Type locality.—Monterey, Calif.

Geographic distribution.—Central Washington east of the Cascades, thence south through central and eastern Oregon to California; throughout California except the 'redwood strip' of the northwest coast and except the southeastern desert region and the region east of the Sierra; south into northwestern Lower California. Upper Sonoran to Hudsonian zone.

Characters.—General characters similar to *rufinus*, *sonoriensis*, and *artemisiae*; color much as in *rufinus*, but usually duller, less tawny; decidedly darker, more clouded with dusky than in *sonoriensis*; size smaller than in *artemisiae*; also slightly smaller than *sonoriensis*; somewhat dimorphic in color, but with one phase greatly predominating; somewhat similar to *rubidus*, but smaller, with shorter tail and less intense color.

Color.—Buff phase ^b in unworn pelage: Upperparts between ochraceous and ochraceous buff heavily and nearly uniformly mixed with dusky, producing a general effect varying from rusty isabella color to bister; sides nearly or quite like back; underparts creamy white; ears dusky, narrowly edged with whitish; subauricular tufts same color as back, white spots nearly or quite obsolete; no definite dusky facial markings; feet white, 'ankles' slightly dusky or nearly white; tail bicolor, dusky brownish above, white below. Dark phase: Rather variable, but in general more dusky and more vinaceous than buff

^a Approaching *gambelii*.

^b The predominating phase, and though not so distinctly buffy as the buff phases of *sonoriensis* and *blandus*, it is evidently the corresponding condition.

phase; general effect Mars brown strongly tinged with fawn. Worn pelage: General effect of upperparts varying from clay color or dingy ochraceous buff to lightly grizzled fawn color, dusky mixture changed to cinnamon or brownish, but seldom so thoroughly eliminated as in *sonoriensis*; sides usually nearly the same as back. Adolescent pelage: General effect of upperparts varying from hair brown to sepia, dusky mixture often very strong. Young in first coat: Bases of hairs slate color or blackish slate, tips mouse gray, usually slightly darker on back than on sides; general effect grayish slate color.

Skull.—Practically as in *sonoriensis* but averaging slightly smaller; smaller and with shorter nasals than in *artemisiae*; decidedly smaller than in *rubidus*, with smaller teeth, smaller and narrower braincase, and shorter, relatively broader, nasals.

Measurements.—Average of 6 adult topotypes: Total length 159 (148–170); tail vertebrae 71.6 (64–80); hind foot 20; ear from notch (dry) 14.9 (14.2–15.8). Of 10 adults from Stanford University, California: 161 (157–173); 72.4 (70–77); 20. Of 10 adults from northwestern Lower California: 170 (160–183); 80 (69–86); 20.7 (20–21.7).

Type specimen.—An individual type was not specified by Baird. His list of specimens with the original description includes various localities in Washington, Oregon, and California. Since the list appears to follow a geographic sequence from north to south, the specimens from Washington are mentioned first. It is evident, however, that the specimens from California formed the principal basis of the description. One from Monterey, Calif. (No. 369), is specifically mentioned in the description, and farther on the form is referred to as "the common California species." Doctor Allen, therefore, in 1893 (l. c.), designated this specimen (No. 369 U. S. National Museum) as the type of *gambeli*. It is not now extant, but a so-called cotype, No. 368, is in the National Museum. It is in very bad condition, having been exposed as a mounted specimen until the color has faded very much. The present color is chiefly pale yellowish buff. The ears are entirely gone and patches of hair are gone from the sides. The skull has been removed from the skin and is in good condition.

Remarks.—*P. m. gambeli* is one of the most widely ranging and best known of the *maniculatus* group. It is extremely abundant throughout its range, and large representations of it are present in most American collections. It is quite variable and its intergradation with surrounding forms is complete. Since it stands between *sonoriensis* and the paler shorter-tailed forms of the group on the one hand and *rubidus* and the darker longer-tailed forms on the other, it necessarily includes a considerable range of variation. That is, intermediates between *gambeli* and *sonoriensis* must be quite

different from intermediates between *gambeli* and *rubidus*, although both are referable to *gambeli* because nearer to that than to the other forms. For example, specimens from Berkeley, Calif., are darker and longer-tailed than typical *gambeli* and evidently approach *rubidus*; while others from Jacumba, Calif., are paler than *gambeli* and approach *sonoriensis*. The Berkeley specimens are therefore decidedly darker than those from Jacumba, but they are nearer to *gambeli* than to *rubidus*, and those from Jacumba likewise nearer than to *sonoriensis*. In studying such material, there is constant temptation to treat these intergrades as separate forms, but after testing every possible alternative one is forced to conclude that no logical subdivision of *gambeli* as here recognized can be made. When the problem is viewed as a whole—in perspective, so to speak—*gambeli* appears to be a tolerably constant entity throughout what may be called the center of its range and about the periphery to merge with other forms. Thus, specimens from Monterey, the type locality, are absolutely identical with those from San Diego and the northeast coast of Lower California, and the intervening region is inhabited by exactly the same form. These, moreover, are like specimens from the greater part of the interior of California, including the west slope of the Sierra. Whenever this constant form meets the range of *sonoriensis*, however, the effect is immediately apparent, and throughout a narrow strip between the ranges of the two forms intermediates or mixed specimens fairly representative of each form are found. Thus intermediates between *gambeli* and *sonoriensis* are similar, whether from the San Pedro Martir Mountains of Lower California or from the eastern slopes of the northern Sierras or Cascades. As Monterey, the type locality of *gambeli*, is on the coast not far from San Francisco Bay, it might be supposed that topotypes would be nearer to the darker form *rubidus* than to the animal of the coast ranges of southern California. This is not the case, however, and the reason is easily understood when the local conditions are known. At Monterey it is dry and sandy, and these conditions continue inland to the Salinas Valley. Although specimens from the Santa Cruz Mountains on one side of Monterey Bay and from Sur on the other are referred to *rubidus*, those from the vicinity of the town of Monterey are like those from Salinas and other interior localities.

The transition from *gambeli* to *rubidus* along the line between their ranges is rather sudden, suggesting the possibility of hybridizing. From several localities specimens fairly typical of both forms are known, from others we have both forms and apparent intermediates, and from still others all specimens thus far obtained are intermediates not typical of either form. This is exactly what would be expected upon the theory of hybridism, but of course it can not

be considered as conclusive proof. Specimens from the higher parts of the Sierra appear to differ in an extremely slight degree from the coast range specimens and apparently approach *rufinus*. The amount of individual variation is so great, however, that there seems to be no means of distinguishing the mountain specimens. In fact, even *gambeli* from the region of the type locality differs but little from *rufinus*. Specimens slightly darker or lighter than the average may be found almost anywhere in the range, as the animal seems to respond to local environment very readily. Thus specimens caught in thick woods along a comparatively cold stream may be noticeably darker than others taken perhaps within half a mile in the chaparral of a dry hillside. It is possible that the first generation of progeny from the darker specimens if transferred to the dry hillside would be lighter than their parents. Such questions, of course, can be determined only by experimentation, but obviously variations that occur fortuitously throughout wide areas can not be distinguished by name. In spite of this frequent variability *gambeli* is not a respecter of zones, as appears in many localities, notably on Mount Shasta, where it ranges unchanged from the base of the mountain to the rocky cliffs above timberline. In northeastern California the mice of the semidesert lava beds are more like the dark *gambeli* than the pale *sonoriensis*. Throughout the desert region *sonoriensis* is the prevailing form, except on the lava beds. Apparently the animals inhabiting lava beds differ from those of the wooded Sierra in the causes of their acquiring their dark color, but since they are indistinguishable they must be referred to *gambeli*.

Specimens examined.—Total number 2,077, from localities as follows:

California: Adln, 2; Ager, 1; Allila, 11;^a Alta Peak, Kaweah River, 1; Alturas, 2; Alum Rock Park, 24; Aspen Meadow, Tuolumne County, 7; Auburn, 2; Ballena, 3;^a Banta, 6; Bartlett Mountain, 2; Bartlett Springs, 2; Bear Valley, San Benito County, 1; Belmont, 2; Berkeley, 43; Beswick, 19; Bieher, 1; Bitterwater, 7; Bloods, Calaveras County, 2; Blue Canyon, 3; Brentwood, 1; Brownell, 13; Bully Choop Mountains, 3; Bunch Grass Spring, 5; Burbank, 1; Burney, 1; Burney (12 m. E.), 1; Buttonwillow, 4; Calaveras Big Trees, 15; Canyon Creek, 17; Carberry Ranch, 6; Carbondale, 2; Carpenteria, 2; Cassel, 18; Cedarville, 1;^a Chinese Camp, 2; Colusa, 2; Cuyamaca, 1; Dana, 15; Donner, 53; Dos Palos, 1; Dulzura, 19; Dyerville, 1; Echo, 6; Emerald Bay, Lake Tahoe, 11; Encinitas, 1; Etna, 1; Fairfield, 16 (approaching *rubidus*); Fall River, 5; Ferndale, 6; Fort Crook, 10; Fremont Peak, Gabilan Range, 4; Freshwater Creek, 1; Fresno, 2; Gaviota Pass, 4; Giant Forest, Sequoia National Park, 2; Gilroy, 2; Glen Ellen, 13 (approaching *rubidus*); Goose Lake, 6; Goosenest Mountain, 2; Greenville, 2; Grizzly Mountains, 4; Halstead Meadows, 14; Hayden Hill, 1; Hermit Valley, Calaveras County, 15; Hoopa Valley, 2; Hornbrook, 1; Horse Corral Meadows,

^a Approaching *sonoriensis*.

- 1; Horse Creek, Siskiyou County, 10; Hueneme, 10; Jackson, 6; Jacumba, 54;^a Jamesburg, 11; Jamul, 1; Jamul Creek, near El Nido, 8; Jolon, 5; East Fork Kaweah River, 9; King City, 1; Laguna Ranch, 1; Laguna Mountains, San Diego County, 9; La Panza, 2; Lassen Creek, Modoc County, 5; Lassen Peak, 12; Learlys Ranch, Mendocino County, 2; near Leesville, 3; Lemoore, 1; Little Shasta, 3; Long Valley, Lake County, 2; Los Angeles, 17;^a Los Banos 17; Lower Alkali Lake, 1; Lyonsville, 6; Mad River, 1; Madeline Divide, 4; Madeline Plain, 12; Mansfield, 3; Marysville Buttes, 23; McKinney, 1; Mendota, 3; South Fork Merced River, 3; Merrillville, 2; Millford, 2; Mission Santa Cruz, 3; Mohawk, 3; Montague, 4; Monterey, 12; Montgomery, 1; Morro, 4; near Morro Rock, 3; Mount Dana, 1; Mount Diablo, 1; Mount Hamilton, 3; Mount St. Helena, 16; Mount Sanhedrin, 13; Mount Shasta, 102; Mount Tallac, 7; Mountain House, Butte County, 2; Nelson, 5; Nordhoff, 2; Oakdale, 1; Orosi, 1; Orris, 1; Pacheco Peak, 2; Pacific Grove, 2; Palo Alto, 2; Petaluma, 5; Picard, 15; Pine Valley, Monterey County, 13; Pitt River, 6; Pleyto, 2; Point Pinos, 7; Porcupine Flat, 1; Porterville, 3; Port Harford, 1; Posts, 5; Poway, 1; Pozo, 1; Priest Valley, 1; Pyramid Peak, 43; Quincy, 11; 20 miles SW. of Quincy, 12; Ripon, 1; Riverside, 5; Robbins Creek, 4; Rose Canyon, San Diego County, 14;^a Round Valley, Mendocino County, 14; Salinas, 1; Salt Springs, Fresno River, 5; San Antonio, 6; San Diego, 1; San Fernando, 8; Cliff House, San Francisco, 8 (approaching *rubidus*); San Gabriel Mountains, 1;^a San Juan, Orange County, 2; head of San Joaquin River, 2; San Luis Obispo, 11; San Luis Rey, 2; San Mateo, 2; San Miguel, 4; San Simeon, 7; Santa Barbara, 1; Santa Cruz, 1; Santa Lucia Peak, 12; Santa Maria, 3; Santa Monica, 6; Santa Paula, 2; Santa Ynez Mission, 3; Santa Ynez River, 1; Santa Ysabel, 9; Saticoy, 2; Secret Valley, 3; Sierra City, 4; Sierra Valley, 36;^a Silver Lake, 136; Sisson, 2; Slippery Ford, 4; Smith Mountain, San Diego County, 6; Snow Mountain, 38; Soledad, 1; Sonora Pass, 2; Soquel Mill, 1; Sorrento, 1; Stanford University, 34; Stanley (8 m. W. of Huron), 1; Stillwater, 1; Stockton, 1; Summit Lake (12 m. NW. of Lemoore), 1; Tassajara, 11; Tehama, 5; Temescal, 3; Three Rivers, 6; Tower House, 1; Tracy, 6; Tulare Lake, 2; Tule Lake, 4; Tuleda Canyon, 4; Tuolumne Meadows, 3; Twin Oaks, 5; Upper Lake, 1; Van Deusen River, 2; Ventura, 3; Walnut Creek, 12; Wawona, 3; Weber Lake, 2; West Riverside, 2;^a Willows, 11; Witch Creek, 1; South Yolla Bolly Mountain, 12; Yosemite Valley, 8.
- Lower California:** Canyon Salado, 1;^a Cape Colnett, 1; Carrizo Creek, 5; El Alamo, 2;^a Encinita, 1; Ensenada, 28; Gato Creek, 2; Guadalupe Valley, 1;^a Juncolito, 2; La Huerta, 3;^a Los Encinas, 1;^a Nachoguero Valley, 5; edge of Pacific Ocean at Boundary Monument No. 258, 3; Piñon, 9;^a Pozo Luciano, 1;^a Rancho San Antonio, 12;^a Rancho Santo Tomas, 2;^a Rancho Viejo, 6;^a Rosarito, 6;^a San Felipe, 2;^a Saños Cedros, 6; San Pedro Martir Mountains (Coll. by Thurber and Anthony), 61;^a San Quentin, 40; Santa Eulalia, 14;^a Santa Rosa, 4;^a San Telmo, 4; San Vicente, 2; San Ysidro Ranch, 16; Tecate Valley, 7; Trinidad, 6;^a Ysadora, 1.^a
- Nevada:** Deep Hole, 1; Flowing Springs, 1; Smoke Creek, 4; Summit Lake, 4.

^aApproaching *sonoriensis*.

Oregon: Adel, Lake County, 1; Anna Creek, Mount Mazama, 6; Antelope, 10; Bake Oven, 1; Bend, 7; Buck Creek, 2; Burns, 5; Camp Creek, 3; Crater Lake, 14; Crooked River, 4; The Dalles, 9; Detroit, 5; Diamond Lake, 3; Fort Klamath, 15; Goose Lake Valley, 2; Harney, 1; ten miles N. of Harney, 10; John Day River, 1; Lake Alvord, 3;^a Lone Rock, 4; Lost River, Klamath Basin, 8; Matoles River, 2; Maury Mountains, 10; Mount Hood, 12 (approaching *rubidus*); Mount Jefferson, 14; Narrows, 13; Paulina Lake, 2; Pendleton, 5; Plush, 4; Prineville, 8; Rock Creek Sink, 3; Shirk, 2; Siskiyou, 6; Stein Mountains, 3; Summer Lake, 4; Summit, 1; Swan Lake Valley, 2; Twelve Mile Creek, 2; Tule Lake, 4; Wapinitia, 7; Warner Mountains, 2; Williamson River, 3.

Washington: Chelan, 19 (approaching *artemisiae*); Head of Lake Chelan, 8 (approaching *artemisiae*); Cleveland, 9; Coulee City, 2; Douglas, 1; Goldendale, 2; North Yakima, 7; Trout Lake, 2; Wenatchee, 3.

PEROMYSCUS MANICULATUS RUFINUS (MERRIAM).

Hesperomys leucopus rufinus Merriam, N. Am. Fauna No. 3, pp. 65-66, Sept. 11, 1890.

Peromyscus rufinus Allen, Bull. Am. Mus. Nat. Hist., N. Y., VIII, p. 252, Nov. 25, 1896.

Type locality.—San Francisco Mountain, Arizona, at 9,000 feet altitude.

Geographic distribution.—Southern Rocky Mountain region, including the elevated part of New Mexico, scattered peaks and ranges in Arizona, eastern Utah, and the greater part of western and central Colorado. Transition to boreal zones.

Characters.—Similar to *nebrascensis* and *sonoriensis*, but darker, more richly colored, shades of ground color richer and more tawny, dusky more extensive; similar to *arcticus* and *artemisiae*, but smaller and less extensively dusky, skull slightly different; most similar to *gambeli*, but color slightly brighter, more rufescent, particularly in unworn pelage.

Color.—Unworn pelage: Upperparts ochraceous or tawny ochraceous, thickly and finely mixed with dusky; dorsum somewhat darker than sides, or sometimes nearly same color; subauricular tufts usually conspicuous, mixed white and buffy ochraceous; ears dusky, edged with creamy white; a small dusky spot at base of whiskers and a narrow dusky orbital ring; underparts creamy white; feet and forelegs white; 'ankles' buffy ochraceous; tail blackish brown above, white below. Worn pelage: Upperparts ochraceous buff to tawny, varying in clearness according as the dusky of the unworn pelage is more or less altered and eliminated; back nearly same color as sides except in stages of slight wear. Adolescent pelage: Ground color of upperparts paler than in adults, inclining to buffy rather than tawny; dusky mixture heavier and more uniform; general effect somewhat

^a Approaching *sonoriensis*.

between cinnamon and raw umber. Young in first coat: Base of hairs slate color (Ridgw. pl. II, No. 4); ends of hairs pale drabby fawn mixed with dusky brownish; general effect of upperparts mouse gray.

Skull.—Practically as in *nebrascensis* and *sonoriensis*; slightly smaller than in *artemisiae*; smaller and narrower than in *arcticus* and with less spreading zygomata.

Measurements.—Average of 15 adult topotypes: Total length, 160 (150–170); tail vertebrae, 70 (56–75); hind foot, 20 (19–21); ear, from notch (dry), 15.5 (14.1–16.6). Of 20 males from Manzano Mountains, New Mexico: 151 (144–165); 63.4 (59–77). Of 15 females from the same locality: 156 (142–168); 68 (61–73).

Type specimen.—No. $\frac{11844}{11845}$ U. S. National Museum, Biological Survey Collection. ♀ adult. August 22, 1889. C. Hart Merriam and Vernon Bailey. Specimen in partly worn pelage, in good condition.

Remarks.—This is a mountain form, but like other members of the *maniculatus* group it variously intergrades with surrounding forms, and differs from them only in average characters. On the north it meets *artemisiae*, from which it differs mainly in smaller size and slightly more rufescent color. Specimens from Mammoth Springs, Yellowstone Park, in unworn winter pelage are very similar to typical *rufinus* in the same pelage from Arizona and New Mexico, and others from Clarks Fork, Wyoming, in partly worn pelage are more dusky than *rufinus* and very similar to *artemisiae*, to which they are referred.

On the east, intergradation with *nebrascensis* is evidenced by specimens from the foothill region of eastern Colorado, and in some series specimens which might be referred to either form are found. Possibly, if the exact localities from which they came were known, the difference would be explained. Connection with *sonoriensis* in the same way is shown on the west, although in a series from Bluff, Utah, we find 11 specimens that are typical *rufinus* and one that is typical *sonoriensis*, which might seem to indicate that the two forms are distinct. At other localities, however, there is ample evidence of intergradation, and, indeed, individual variation in each form is almost enough to cover the average difference between the two. Moreover, *sonoriensis* unquestionably intergrades with *gambeli*, which is distinguishable from *rufinus* only with great difficulty. In worn pelage, the majority of specimens of *rufinus* are indistinguishable from *gambeli* in the same pelage. This is particularly true of specimens from the Sierra-Cascade region, which for the present are referred to *gambeli* under the belief that they are nearer that form, though undoubtedly tending somewhat toward *rufinus*. In winter pelage *gambeli* from the coast of California is more dusky and less tawny than *rufinus*. Very few specimens in winter pelage from the Sierra Ne-

vada are available at present, but the scanty material shows somewhat more similarity to *gambeli* than to *rufinus*. Since, however, the differences are within the limits of variation, it will not be surprising if good series in winter pelage from the Sierra-Cascade region prove referable to *rufinus*.

Specimens examined.—Total number, 1,336, from localities as follows:

Arizona: Baker Butte, Mogollon Mountains, 4; Chiricahua Mountains, 131; Graham Mountains, 25; Keam Canyon, 4 (approaching *sonoriensis*); San Bernardino Ranch, 21 (approaching *sonoriensis*); San Francisco Mountain, 28; Show Low, 2; Springerville, 59; Taylor, 3; Turkey Tanks, 3; White Mountains, 66.

Colorado: Allenton, Eagle County, 2;^a Almont, 2; Antonito, 2; Ashbaugh Ranch, 2;^a Arboles, 2; Bayfield, 1; Black Hawk 2; Boreas Pass, Summit County, 1;^a Boulder, 63 (approaching *nebrascensis*); Boulder County, 23; Canadian Creek, 7; Canyon City, 4; Conejos River, 2; Cortez, 1;^a Coulter, 5; Coventry, 3; Debeque, 1; Del Norte, 1; Durango, 4; Elkhead Mountains, 1; Estes Park, 63 (approaching *nebrascensis*); Florida, 15; Fort Garland, 4; Glenwood Springs (12 miles above), 2;^a Golden, 4; Gold Hill, 16 (approaching *nebrascensis*); Hermit, 2; Longs Peak, 22; McCoy, 1; Mesa Verde, 1; Mount McLellan, 1; Mud Springs, Garfield County, 2;^a Naturita, 1; Nederland, 14 (approaching *nebrascensis*); Pagosa Springs, 4; Pearl, 3; Rabbit Ear Mountains, 2; Rifle, 3; Ruby Lake, 1; Salida, 1; Santa Maria Lake, 3; Sapinero, 1; Sheephorn Pass, Grand County, 2;^a Silverton, 4; Tarryall Creek, near Puma, 1;^a Toponas, 2; Trinidad, 1; Uncompahgre Plateau, 3; White River Plateau, 3; Whiteley, 3.

New Mexico: Abiquiu, 4; Albuquerque, 2; Amizett, 2; Ancho, 2; Arroyo Hondo, 3; Arroyo Seco, 6; Aztec, 20; Bear Canyon, Raton Range, 6; Bear Spring Mountains, 6; Boulder Lake, 1; Cabra Springs, 1; Capitan Mountains, 53; Carrizozo, 1; Chama, 10; Chama River, 2; Chico Springs, 1; Cieneguilla, 6; Clouderoft, 19; Copperton, 23; Costilla Pass, 7; Coyote Creek, 3; Datil Mountains, 25; Espanola, 7; Fisher Peak, 1; Fort Wingate, 5; Gallina, 3; Gallinas Mountains, 19; Gallo Canyon, 1; Gallup, 1; Glorieta, 5; Grants, 10; Hall Peak, 5; Hondo Canyon, 1; Jamez Mountains, 1; Jicarilla Mountains, 17; Laguna, 1; La Plata, 42; Las Vegas, 17; Long Canyon, near Catskill, 2; Manzano Mountains, 127; Mesa Jumanes, 4; head of Mimbres River, 1; Moreno Valley, 3; Pecos Baldy, 8; Piñon Hills, 1; Ribera, 2; Rinconada, 4; Rio Puerco, 4; Ruidoso, 2; Ruidoso Creek, 7; San Mateo Mountains, 20; San Pedro, 5; Santa Clara Canyon, 2; Sierra Grande, 4; Stinking Spring Lake, 2; Taos, 1; Taos Mountain, 1; Taos Pueblo, 5; Thomkins Lake, 4; Tierra Amarillo, 2; Tres Piedras, 25; 5 miles E. of Tularosa, 1; Twining, 8; Willis, 5; Willow Creek, Mogollon Mountains, 2.

Utah: Barclay, 8; Bluff City, 16; La Sal Mountains, 1; Noland Ranch, 20; Park City, 5; Riverview, 24.

^a Collection of E. R. Warren.

PEROMYSCUS MANICULATUS NEBRASCENSIS (MEARNS).

Hesperomys leucopus nebrascensis (Baird) Mearns, Bull. Am. Mus. Nat. Hist., N. Y., II, p. 235, Feb. 21, 1890—not *Hesperomys sonoriensis* var. *nebrascensis* Baird, *nomen nudum*, 1857.

? *Hesperomys* (*Vesperinus*) *cherrii* Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, pp. 211-212, Apr., 1891—part, reference to skull only.

Peromyscus texanus nebrascensis Allen, Bull. Am. Mus. Nat. Hist., VIII, p. 251, Nov. 25, 1896—part.

Type locality.—Calf Creek, Custer County, Mont.

Geographic distribution.—Plains and foothills along the eastern base of the Rocky Mountains from south central Saskatchewan to the Panhandle of Texas, occupying in general the eastern parts of Montana, Wyoming, and Colorado, and the western and southwestern parts of Saskatchewan and the Dakotas. Upper Sonoran and Transition zones.

Characters.—Similar to *P. m. arcticus*, but color decidedly paler, more buffy ochraceous; size slightly smaller, tail averaging shorter (usually less than 70 mm.); color nearly as in *P. m. sonoriensis*, buffy and ochraceous with slight variations predominating in all adult pelages, tail shorter; very similar to *P. m. luteus*, but larger, with noticeably larger ears; also similar to *P. m. rufinus*, but color paler; somewhat similar to *P. l. aridulus*, but smaller, with a shorter, more hairy, and more sharply bicolor tail; skull smaller, with narrower braincase, smaller audital bullæ, longer parallel-sided palatine slits, and smaller molar teeth.

Color.—Unworn pelage (Sept.-Dec.): Upperparts pale ochraceous buff or between cream buff and ochraceous buff, lightly and uniformly mixed with dusky; back scarcely or not at all darker than sides; underparts pure creamy white; ears dusky brownish, broadly edged with white; subauricular tuft pure white anteriorly, nearly clear buffy posteriorly, the white usually quite conspicuous; feet and forelegs white, 'ankles' buffy or buffy and dusky; tail sharply bicolor, blackish brown above, white below. Worn pelage (Apr.-July): Similar in general to unworn pelage but color of upperparts much brighter, more ochraceous; dusky mixture becoming gradually eliminated with increasing wear and changed to cinnamon and russet; general effect of upperparts varying from ochraceous buff to tawny ochraceous. Adolescent pelage: Most similar to unworn pelage of adult but less buffy; general effect of upperparts pale drab or isabella color. Young in first coat: Upperparts slate color at base of hairs, brownish smoke-gray at tips; underparts grayish white.

Skull.—Similar in general to that of *P. m. arcticus*, but averaging slightly smaller and narrower; nasals usually longer, narrower, and more convex; braincase narrower and less arched; zygomata not so heavy nor so much 'squared' anteriorly. The skull of *nebrascensis* is essentially like those of *sonoriensis* and *rufinus*; it is larger than that of *luteus*.

Measurements.—Average of 10 adults from Fort Custer, Mont.: Total length 158.3 (147–170); tail vertebrae 63.7 (56–71); hind foot 20.1 (20–21); ear from notch (dry) 14.5 (14–15.2).

Type specimen.—No. 1200 American Museum of Natural History, New York. ♂ adult. October 16, 1887. W. W. Granger. The skin of the type is in good condition in fresh fall pelage. Its hind foot measures dry 20.8 mm. No skull corresponding to this skin can at present be found in the collection of the American Museum.

Remarks.—*P. m. nebrascensis* is almost identical in color with *sonoriensis* and very similar in general appearance. Certain specimens of *nebrascensis* in partly worn pelage are deeper, more nearly tawny ochraceous, than any *sonoriensis*, and *vice versa*, certain much-worn examples of *sonoriensis* are paler than any *nebrascensis*, but the majority of examples of each in ordinary conditions of pelage are indistinguishable by color alone.

The tail in *nebrascensis* averages constantly shorter than in *sonoriensis*, though many specimens of each are fairly between the extremes. The skulls are somewhat variable, but the same sort of variations apparently occurs in each form. The color of *nebrascensis* is also very much like that of *luteus*, which usually may be distinguished by its small size, particularly by its small ears, skull, and teeth.

P. m. nebrascensis intergrades on all sides with other forms. On the north it merges into *arcticus*, as amply proved by specimens from Osler and Moose Jaw, Saskatchewan. On the east it meets *luteus*, on the west and southwest *rufinus* and *sonoriensis*, and future collections may show its connection with *blandus* on the south.

The name *nebrascensis*, as first used by Baird in 1857, was a *nomen nudum* and deserved no definite recognition until employed in connection with a description by Mearns in 1890. This has been discussed more fully under *P. m. luteus*.

The name *Hesperomys cherrii* applies to a species of *Reithrodontomys*, but the skull of a *Peromyscus* indistinguishable from *nebrascensis* was included among the specimens originally referred to it (see Proc. Biol. Soc., XX, pp. 50–51, Apr. 18, 1907).

Specimens examined.—Total number 617, from localities as follows:

Alberta: Medicine Hat, 71.

Colorado: Baxter Pass, 3; Buford, Rio Blanco County, 1; ^a Colorado Springs, 12; near Craig, Routt County, 1; ^a Crested Butte, 1; Douglas Spring, Routt County, 1; ^a Escalante Hills, 1; Flagler, 1 (approaching *luteus*); Four Mile Creek, 4; Fruita, 1 (immature); Gaume Ranch, 8; ^a Grand Junction, 3; Ladore, 2; Lay, 2; ^a Lily, 2; Loveland, 35; Medano Ranch, 2; Meeker, 2; ^a Rangeley, 1; mouth of Sand Creek, Routt County, 1; ^a Snake River, 5; Steamboat Springs, Routt County, 2; ^a Valmont, 1; White River, 1; Wray, 4; Wright Ranch, Yampa County, 1; ^a Yarmany Creek, near McCoy, 2.^a

^a Collection of E. R. Warren.

Montana: Bear Paw Mountains, 8 (approaching *rufinus*); Big Snowy Mountains, 2; Birch Creek, 6; Bower, 1; Calf Creek, 5; Columbus, 5; Fort Assiniboine, 8; Fort Custer, 26; Great Falls, 20; Jefferson River, Gallatin County, 1; Midvale, 4; Milk River, 3; Musselshell River, 2; Little Porcupine Creek, 2; Powderville, 3; Pryor Mountains, 2 (approaching *artemisia*); Red Lodge, 2; Robare, 6; St. Mary Lake, 16 (approaching *artemisia*); Shelby Junction, 4; North Branch Sunday Creek, 1; Tilyou Ranch, 1.

North Dakota: Fort Buford, 5; Glenullin, 12 (in part approaching *luteus*); Little Missouri River, 7.

Saskatchewan: Crane Lake, 7; ^a Cypress Hills, 7; ^a Moose Jaw, 11; Old Wives Creek, 10; ^a Osler, 111 (approaching *arcticus*).

South Dakota: Belle Fourche, 2; Buffalo Gap, 1; Deadwood, 1; Elk Mountain, 9; Rapid City, 3; Smithville, 10.

Texas: Washburn, 10.

Wyoming: Aurora, 10; Beaver, 1; Bighorn Basin, 2; Bighorn Mountains, 1 (approaching *rufinus*?); Bitter Creek, 7; Bridger Pass, 3; Bull Lake, 3; Clarks Fork, 4; Devils Tower, 2; Fontanelle, 1; Fort Bridger, 18 (approaching *sonoriensis*); Fort Fetterman, 1 (approaching *luteus*); Fort Laramie, 1; Fort Steele, 5; Fort Washakie, 3 (approaching *sonoriensis*); Green River, 7; Kinney Ranch, Bitter Creek, 1; Lake Fork, 3; Little Powder River, 3; Newcastle, 10; Otto, 6; Powder River Crossing, 2; Sheep Creek (17 mi. W. of Toltec), 6; ^b Sheridan, 5; Sherman, 4; South Pass City, 1; Sundance, 8; Woods, 2.

PEROMYSCUS MANICULATUS LUTEUS Osgood.

Hesperomys sonoriensis var. *nebrascensis* Baird, Mamm. N. Am., p. 464, 1857—*nomen nudum*.

Hesperomys sonoriensis var. *nebrascensis* Coues, Monogr. N. Am. Rodentia, p. 78, synonymy under *Hesperomys leucopus sonoriensis*, 1877—mentions specimens from Deer Creek, Nebraska.

Peromyscus nebrascensis of authors, not of Mearns.

Peromyscus luteus Osgood, Proc. Biol. Soc. Wash., XVIII, p. 78, Feb. 21, 1905.

Type locality.—Kennedy, Nebr.

Geographic distribution.—Sandhill region of western Nebraska and adjoining parts of the States of Kansas, Colorado, South Dakota, and Wyoming. Possibly extending north to western North Dakota and south to western Oklahoma.

Characters.—Similar to *P. m. nebrascensis*, but averaging smaller; ears decidedly smaller; color more buffy ochraceous, particularly in unworn pelage; skull and teeth averaging smaller and lighter.

Color.—Unworn pelage (Oct.–Nov.): Upperparts varying from ochraceous buff to almost orange buff lightly and uniformly lined with dusky; sides like back (occasionally a bright ochraceous buff lateral line unmixed with dusky is found), sides of face usually a trifle paler; ears dusky, broadly margined with white; subauricular tufts white or mixed white and buffy, usually very conspicuous; underparts creamy white; feet white; 'ankles' white or buffy; tail sharply bicolor, dusky brownish above, white below. Worn pelage

^a Collection of Canadian Geological Survey.

^b Carnegie Museum.

(April–July): Similar to unworn pelage, but ground color brighter, dusky mixture changed to cinnamon rufous or almost entirely eliminated; general effect of entire upperparts bright ochraceous buff, slightly paler across shoulders and often slightly tinged with cinnamon rufous in middle of back. Young: Similar to *P. m. nebrascensis*, but usually slightly paler.

Skull.—Similar to that of *nebrascensis*, but averaging smaller and lighter; teeth slightly smaller; nasals usually shorter and relatively broader. Extreme type of skull about as in *P. m. bairdi*; average type slightly larger.

Measurements.—Average of 10 adults from the type locality: Total length 149 (142–158); tail vertebræ 61.5 (56–65); hind foot 19.5 (19–20.5); ear from notch (dry) 12.5 (11.8–13).

Type specimen.—No. $\frac{189558}{13447}$ U. S. National Museum, Biological Survey Collection. ♀ adult. Apr. 23, 1890. V. Bailey. Specimen in good condition.

Remarks.—Those familiar with *P. m. bairdi* (better known under the name *michiganensis*) will readily recognize *luteus*, which is practically identical in every respect save color. Its bright buffy ochraceous color easily distinguishes it from *bairdi*, while its small size separates it from nearly all other forms. In the somewhat brightened and worn pelages of spring and summer its color is practically like that often shown at the same season by *nebrascensis* and *sonoriensis*; but in fresh fall and winter pelage it is more ochraceous than either of these forms. Its small size, and particularly its small ears, are usually safe guides in separating it from *nebrascensis*, which is the form with which it is most apt to be confused. In the center of its range—that is, in the sandhills of Nebraska—its characters are well established, but on either side intergrading specimens occur, approaching *bairdi* on the east and *nebrascensis* on the west. Although the average typical *nebrascensis* is decidedly larger than typical *luteus*, the amount of individual variation in either form is almost enough to cover the two extremes. In spite of this fact, and in spite of fairly convincing evidence of gradual intergradation around the periphery of its range, typical *luteus* and *nebrascensis* sometimes occur together. For example, a series of 13 specimens from Elk Mountain, South Dakota, contains 5 that are typical of *luteus* and 8 that are as typical of *nebrascensis*. Two specimens from Dickinson, N. Dak., are unquestionably referable to *luteus*, although the locality is quite removed from the general range of the form and well within the supposed precincts of *nebrascensis*.

The name *nebrascensis* has been applied frequently to the form now called *luteus*, and it was doubtless intended by Baird for that form. This is made clear by Coues (Monogr. N. Am. Rodentia, p. 79, 1877), who states that Baird based the name upon two specimens

from Deer Creek, Nebraska. As used by Baird and Coues, it was unquestionably a *nomen nudum*, and so remained until Mearns redefined it and selected a new type belonging to a form different from that to which Baird intended to apply the name.

Specimens examined.—Total number 253, from localities as follows:

Colorado: Spring Canyon, near Fort Collins, 5.^a

Kansas: Hays, 6 (approaching *bairdi*); Logan County, 2; Long Island, 1; Pendergast, 14; Trego County, 7.

Nebraska: Callaway, 9; Broken Bow, 1; Cherry County, 13; 10 miles S. of Cody, 4; Deer Creek, 1; Hagler, 8; Kennedy, 20; 18 miles NW. of Kennedy, 4; Perch, Rock County, 14; Thomas County, 1; Two Mile Lake, Cherry County, 1; Valentine, 1.

North Dakota: Bottineau, 3; Dickinson, 5; Medora, 1 (identity not certain); Minnewaukan, 6.

Oklahoma: North Beaver River, 7.

South Dakota: Cheyenne River, 3; Corral Draw, Pine Ridge Reservation, 46; Custer (?), 35; Elk Mountain, 9; "Southern Dakota," 3; Spring Creek, 10; Squaw Creek, 12 (approaching *bairdi*).

Wyoming: Little Medicine, 1.^a

PEROMYSCUS MANICULATUS BAIRDI (HOY AND KENNICOTT).

(Pl. II, fig. 10.)

Mus bairdii Hoy and Kennicott, in Kennicott, Agricultural Report, U. S. Patent Office (1856), pp. 92-95, Pl. XI, 1857.

Peromyscus michiganensis of authors, not of Audubon and Bachman.

Peromyscus bairdi Snyder, Bull. Wis. Nat. Hist. Soc., II, p. 116, April, 1902.

Type locality.—Bloomington, McLean County, Ill.

Geographic distribution.—Prairie region of the upper Mississippi Valley in southern Wisconsin, Minnesota, Illinois, Indiana, eastern Ohio, Iowa, Missouri, Oklahoma, and the eastern or humid parts of Kansas, Nebraska, South Dakota, and North Dakota; north to southern Manitoba. Upper Austral and Transition zones, meeting the range of *P. m. luteus* along the border between the humid and the arid subdivisions.

Characters.—Size and proportions about as in *P. m. luteus*; color very dark, dorsum usually black or very dark brown; ears and feet smaller and tail decidedly shorter than in *leucopus* or *noveboracensis*; tail more thickly haired and more sharply bicolor.

Color.—Unworn winter pelage: Upperparts russet or Mars brown heavily mixed with black, the latter usually concentrated in the middle of the back; sides also heavily mixed with black, but usually noticeably paler than back; sides of face nearly the same as sides of body, somewhat paler than top of head; underparts pure creamy

^a Collection of Colorado State Agricultural College.

white, often separated from the sides by a narrow russet lateral line; ears brownish black, very narrowly margined with creamy; sub-auricular tufts mixed russet and dusky, very rarely with a few white hairs; feet white, 'ankles' usually extensively blackish brown, this sometimes extending out on top of foot; tail sharply bicolor, black or blackish brown above, white below. Slightly worn pelage of spring: Similar to unworn pelage, but contrast between back and sides somewhat heightened, black predominating on the back and brownish russet on the sides. Summer pelage (June-July): The extremely worn pelage becomes brighter, more nearly russet throughout, and the dark dorsal area is much reduced and changed to pale brownish. The short new pelage as it begins to come in is also uniform russet lightly sprinkled with dusky and with very little or no decided difference between back and sides. Young: Darker than adults, black usually predominating, more or less modified on the sides by grayish broccoli brown.

Skull.—Practically as in *P. m. luteus*, possibly averaging slightly smaller with shorter nasals. General characters as in *nebrascensis*, *sonoriensis*, etc., but size smaller. Compared with those of *noveboracensis* and *leucopus* it is much smaller; teeth, braincase, and audital bullæ much smaller; palatine slits relatively longer and with sides more nearly parallel.

Measurements.—Two adults from Racine, Wis.: Total length 161, 140; tail vertebræ 70, 54; hind foot 19, 18; ear from notch (dry) 11.6, 10.6.

Type specimen.—The only specimen now extant having any claim to consideration as the type of this form seems to be No. 750 Collection of Academy of Natural Sciences, Philadelphia. The record in the catalogue is as follows: "No. 750, *Hesperomys bairdii*. Donor Dr. LeConte. Locality Illinois. Entered January, 1860." The specimen now bears a red label marked "Type of *Mus bairdii* Hoy and Kennicott." This label, however, is recent, as also a white one which reads in the handwriting of Witmer Stone: "750 *Hesperomys bairdii*. Illinois. Type." Mr. Stone informs me that, according to his recollection, these data were transcribed by him from the stand upon which the specimen was formerly mounted. The specimen, though identifiable and unquestionably of this form, is in very poor condition and of little interest save from a historical standpoint.

Remarks.—Under the name *michiganensis* this mouse has been well known for years. Its small size, sharply bicolor and somewhat penciled tail, and its cranial characters serve to distinguish it easily from *leucopus* or *noveboracensis*, while its dark color at once separates it from *luteus* and *nebrascensis*, to which it is really most closely related. It appears to be confined to the prairie or more open parts, including cultivated fields, of the central Mississippi Valley, while

leucopus and *noveboracensis* are found in wooded parts of the same region. Its known eastern limit is in eastern Ohio and southern Ontario, but with the clearing of the land it is apparently extending its range to the eastward. Thus it is now found at Elk River, Minnesota, as evidenced by a specimen collected by A. B. Mills in 1899, although some ten years earlier Vernon Bailey made large collections there and did not secure it.

Along the border between the humid and arid regions it intergrades with *P. m. luteus*. Specimens from Pierre, S. Dak., are perfect intermediates, and others throughout the western part of its range tend more or less toward *luteus*. In west central Oklahoma it apparently intergrades with *nebrascensis* rather than with *luteus*, and in southern Oklahoma it probably meets *P. m. pallescens*, though the evidence in both cases is rather unsatisfactory. A small series from Fort Reno, Okla., are slightly paler than *bairdi*, but decidedly darker than *luteus* or *nebrascensis*; the ears are small, as in *bairdi*, but the skulls are rather large, as in *nebrascensis*. Specimens from Chattanooga, Oklahoma, and Belle Plain, Kans., agree fairly well with those from Fort Reno. A little to the westward we have fairly typical *nebrascensis* from Washburn, Tex., and to the eastward we find *bairdi* at Red Fork, Okla. Thus the Fort Reno specimens are intermediate in characters and in geographic situation, so the most logical treatment seems to be to refer them to *bairdi*, the form they most resemble. Surely nothing is to be gained by making such intermediate specimens the basis of new names.

The name *michiganensis* was adopted for this form by Baird (Mamm. N. Am., p. 416, 1857), who evidently was misled by the rather small measurements published by Audubon and Bachman for their supposed new species. Subsequent authors have followed Baird in the use of the name. A careful analysis of the original description of *michiganensis*, however, leads to the conclusion that it was based upon an immature example of *P. l. noveboracensis*, as the following extracts indicate:

Mouse with yellow cheeks, a light grayish brown color above, whitish beneath. This species bears some resemblance in size and colour both to the common house mouse (*M. musculus*) and the white-footed mouse (*M. leucopus*.) The colour on the back resembles the former and on the under surface the latter.^a

Hoy and Kennicott appreciated the difference between *bairdi* and *michiganensis*, but supposed that three forms were distinguishable.

^aAud. and Pach., Jour. Acad. Nat. Sci. Phila., VIII, pt. II, pp. 304-306, 1842.

This is shown by a letter from Doctor Hoy, quoted by Baird, as follows:

I consider the difference between the oak opening deer mouse (*michiganensis*) and the prairie deer mouse (*bairdii*) to consist mainly in the more uniform color, longer tail, and larger head of the former, giving to it the look more of the common house mouse than the latter.^a

The facts of the case were suspected also by Coues, who says:^b

There are, however, several discrepancies between the description of Audubon and Bachman and the characters of the animal which Hoy, Kennicott, Baird, and ourselves describe. * * * We fail to realize "cheeks yellow," though, perhaps, they are a little brighter than surrounding parts. The dimensions given, 4 inches for length of head and body, are so much greater (by a full inch) that possibly the figure "4" may be a typographical error; but then the tail, 2½, is nearly as much in excess of what we find. It is barely possible, after all, that, as Professor Baird hints, none of our specimens are what Audubon and Bachman called *michiganensis*. In that event, and if positively distinct from Audubon's and Bachman's animal, they would, of course, bear the name *bairdii* and *michiganensis* Aud. & Bach. be relegated among the unnumbered synonyms of *leucopus*.

Specimens examined.—Total number 334, from localities as follows:

Illinois: Chicago, 7; Fox Lake, 1; "Illinois," 1; Parkersburg, 4; West Northfield, 4.

Indiana: Bicknell, 2;^c Bloomington, 5;^d Denver, 8.

Iowa: Clay County, 5; Knoxville, 12; Marion County, 2; Palo Alto County, 4.

Kansas: Belle Plain, 5 (approaching *luteus*); Fort Leavenworth, 2; Lawrence, 28; Lost Springs, 2; Manhattan, 2; Medicine Lodge, 1 (approaching *luteus*); Onaga, 28.

Manitoba: Aweme, 1;^e Carberry, 1.^e

Michigan: Sand Point, Huron County, 5.^f

Minnesota: Browns Valley, 2; Elk River, 1; Fort Snelling, 54. Steele County, 5.

Missouri: Carthage, 3;^g Independence, 1; Stotesbury, 19.

Nebraska: Columbus, 3; Ewing, 1; Grand Island, 1; London, 5; Verdigris, 1.

North Dakota: Devil's Lake, 13 (approaching *luteus*); Harrisburg, 1; Harwood, 3; Jamestown, 1; Oakes, 2; Pembina, 5; Portland, 10.

Ohio: London, 2.^h

Oklahoma: Chattanooga, 2 (approaching *nebrascensis*); Fort Reno, 7 (approaching *nebrascensis*); Mount Scott P. O., 1 (approaching *pallesceus*); Red Fork, 6.

^a Baird, Mamm. N. Am. p. 417, footnote, 1857.

^b Monogr. N. Am. Rodentia, p. 96, 1877.

^c Received for identification from E. J. Chanler.

^d Coll. Univ. of Indiana, collected by W. L. McAtee.

^e Collection of Ernest T. Seton.

^f Collection of University of Michigan.

^g Collection of H. H. T. Jackson.

^h Loaned by Prof. J. I. Hine of the Ohio State University.

Ontario: Leamington, 2; ^a Point Pelee, 7.^a

South Dakota: Flandreau, 5; Fort Sisseton, 1; Traverse, 4; Vermillion, 4.

Wisconsin: Beaver Dam, 12; Delavan, 3; Milton, 12; Racine, 3; Rock Prairie, Rock County, 2.

PEROMYSCUS MANICULATUS PALLESCENS (ALLEN).

(Pl. II, fig. 9.)

Peromyscus michiganensis pallescens Allen. Bull. Am. Mus. Nat. Hist., N. Y., VIII, p. 238, November 21, 1896.

Type locality.—San Antonio, Tex.

Geographic distribution.—Central Texas, from the vicinity of the northern boundary at Gainesville south to the region immediately west of Corpus Christi Bay. Lower Sonoran zone.

Characters.—Similar to *P. m. bairdi*, but averaging smaller; color somewhat paler, less blackish.

Color.—Topotype No. 87876, ♂ adult. Feb. 9: General color of upperparts pale russet, lightly mixed with dusky on sides and more heavily in middle of back; middorsal region not solid black nor dusky, but mixed dusky and pale russet; shoulders and nape about like sides; ground color nearly ochraceous buff, showing unmixed with dusky in the subauricular tufts and in the interfemoral region about the base of the tail; ears dusky, whitish edged; feet white, 'ankles' slightly brownish; tail dusky brownish above, white below; underparts creamy white, rather thinly overlaying pale plumbeous undercolor. Worn pelage: Not positively known but as indicated by specimens in changing pelage, chiefly pale russet varying nearly to Mars brown in middle of back. Young in first coat: Upperparts slate gray, slightly darker in middle of back. Adolescents: General effect of upperparts broccoli brown produced by pale fawn mixed with dusky.

Skull.—As in *bairdi*, but averaging somewhat smaller.

Measurements.—Average of 9 adult topotypes: Total length, 126 (121–130); tail vertebræ, 51 (50–52); hind foot, 16. (15–17); ear from notch (dry), 11.7 (11.2–12.7).

Type specimen.—No. 11111 American Museum of Natural History, New York. ♂ young adult. Feb. 7, 1896. H. P. Attwater. Skin perfect and in full winter pelage. Skull with right audital bulla and right side of basioccipital broken.

Remarks.—Except the small series from the type locality, very few specimens of this form have been taken. It therefore appears to be rare or difficult to secure, as considerable collecting within its range has been done recently. In color it resembles intermediates

^a Collection of W. E. Saunders. Mr. Saunders writes, July 27, 1908, that he has specimens of *bairdi* also from Grand Bend and the mouth of the Sauble River.

between *bairdi* and *luteus*, such as occur in central Nebraska and Kansas. With the exception of *P. taylori*, it is the smallest member of the genus found in Texas and should be easily recognizable.

As judged by rather limited material, *pallescens* is remarkably similar to *P. polionotus* of Georgia and Florida, differing only in slight cranial characters. The wide region separating their ranges, however, is, so far as known at present, uninhabited by closely related forms.

Specimens examined.—Total number 14, from localities as follows:

Texas: Alice, 1; Gainesville, 1; San Antonio, 11; Waco, 1.

PEROMYSCUS MANICULATUS BLANDUS Osgood.

Peromyscus texanus Mearns, Proc. U. S. Nat. Mus., XVIII, p. 446, footnote, 1896—not of Woodhouse.

Peromyscus sonoriensis blandus Osgood, Proc. Biol. Soc. Wash., XVII, p. 56, Mar. 21, 1904.

Type locality.—Escalon, Chihuahua, Mexico.

Geographic distribution.—Lower Sonoran zone of western Texas from the Pecos Valley westward; north along the Pecos Valley and other Lower Sonoran valleys of southern New Mexico to about latitude 34° north; south in Mexico east of the Sierra Madre in Chihuahua, southern Coahuila, southwestern Nuevo Leon, western Tamaulipas, northwestern San Luis Potosi, Durango, and Zacatecas.

Characters.—Similar to *P. m. sonoriensis*, but averaging smaller; tail shorter (usually less than 75); color more vinaceous; likewise similar to both *P. m. labecula* and *P. m. fulvus*, but somewhat smaller and more vinaceous. Usually dichromatic, the buff phase being quite similar to *sonoriensis* and the gray phase unique.

Color.—Type, gray phase in winter: Upperparts pale, often whitish vinaceous buff, thickly and delicately lined with dusky, producing a grayish drab general effect; a narrow lateral line of vinaceous buff; ear tufts conspicuous, mixed white and vinaceous buff; underparts creamy white; ears dusky, rather widely margined outside and inside with whitish; tail sharply bicolor; feet white, 'ankles' with traces of dusky and buffy. Topotype No. 57644, buff phase in winter: Upperparts pinkish buff instead of vinaceous buff, lined with dusky, producing a pale cinnamon general effect; otherwise similar to gray phase. Worn pelages:—Gray phase: Vinaceous buff of upperparts paler and dusky mixture changed to cinnamon fawn in varying degrees, producing an écru drab general effect. Buff phase: Upperparts nearly clear ochraceous buff with little or no dusky mixture. All stages of variation between the two phases occur.

Skull.—Similar to that of *sonoriensis*, but averaging slightly smaller; nasals slightly wider and flatter; similar to that of *P. m.*

labecula, but smaller and less angular; rostrum more depressed; zygomatica more lightly built anteriorly. Cranial characters rather variable and more or less inconstant when applied throughout the range of the form.

Measurements.—Type: Total length, 145; tail vertebra, 61; hind foot, 21. Average of 7 adult topotypes: 161 (145–173); C8 (59–75); 21.4 (21–22); ear from notch (dry), 14.9 (13.8–15.3).

Type specimen.—No. 57635 U. S. National Museum, Biological Survey Collection. ♀ adult. Nov. 27, 1893. E. A. Goldman. Specimen in excellent condition.

Remarks.—Any small, short-tailed mouse with conspicuous ear tufts and a slightly pinkish or vinaceous cast to its general color, if from western Texas, southern New Mexico, or northwestern Mexico, may be safely referred to this form. In full winter coat it presents an attractive appearance, the pelage being exceedingly soft and the coloration very delicate. The two phases of coloration are very distinct and examples of both may be found in almost every series. Specimens in the buff phase, especially in worn pelage, are difficult to distinguish from *sonoriensis*, but the presence of one or more in the gray phase showing the pinkish tints not found in *sonoriensis* usually furnishes the clue to the identity of any particular series. In the northern part of its range, *blandus* is often found at the same localities with *P. l. tornillo*, from which it is easily distinguished by numerous characters, among which may be mentioned the following: Size smaller; tail shorter, more distinctly penciled, and more sharply bicolor; subauricular tufts more prominent and nearly always extensively white; nasals flatter; premaxillae less swollen laterally; braincase smaller. Intergradation is evident in the north with *P. m. rufinus* and in the south with *P. m. labecula*. It meets *rufinus* in the foothills of the mountains of southern New Mexico, and, although the line may be drawn quite sharply between the two forms, there is only a slight color difference and this is practically bridged by the variation in *rufinus* from different elevations. Specimens from Berriozabal, Zacatecas, agree in color with *blandus*, but vary in size and cranial characters to an extent that covers the extremes of both *blandus* and *labecula*. Two specimens from still farther south, at Lagos, Jalisco, seem referable to *blandus*, while series from Zacatecas City and Valparaíso Mountains, localities northwest of Berriozabal, are referable to *labecula*, though possibly somewhat intermediate.

Specimens examined.—Total number 162, from localities as follows:

Chihuahua: Chihuahua, 7; Escalon, 15; Gallego, 4; Mesquite Springs, near U. S. Boundary, 5.

Coahuila: Jimulco, 1; La Ventura, 1; Saltillo, 3.

Durango: Inde, 1; Río Sestín, 14; Rosario, 2; San Gabriel, 2; Villa Ocampo, 3.

Jalisco: Lagos, 2.

New Mexico: Adobe Ranch, Grant County, 1; near Alamogorda, Otero County, 3; Animas Valley, Grant County, 1; Burley, 5; Carlsbad, 1; near Carrizalillo Spring, 4; Deming, 1; Dog Spring, Grant County, 3; Hachita, 4; Hatchet Ranch, Grant County, 1; Jarilla, 1; Mesquite Springs, 6; Tularosa, 13.

Nuevo Leon: Doctor Arroyo, 9.

San Luis Potosí: Hacienda La Parada, 4.

Tamaulipas: Miquihuana, 12.

Texas: Franklin Mountains, 1; Marathon (53 m. south), 1; Marfa, 5; Maxon Spring, 1; Presidio County, 2; Sierra Blanca, 3; Toyahvale, 1; Valentine, 1.

United States-Mexican Boundary: Corner Monument, 100 miles west of El Paso, 5; 50 miles west of El Paso, 5.

Zacatecas: Berriozabal, 6; Canitas, 2; Plateado, 1.

PEROMYSCUS MANICULATUS FULVUS Osgood.

Peromyscus sonoriensis fulvus Osgood, Proc. Biol. Soc. Wash., XVII, p. 57, Mar. 21, 1904.

Type locality.—Oaxaca, Oaxaca, Mexico.

Geographic distribution.—Southeastern Mexico, in parts of the States of Oaxaca, Puebla, Veracruz, Tlaxcala, and Hidalgo, extending from Oaxaca City north to the vicinity of Pachuca, Hidalgo. Lower Sonoran zone.

Characters.—Similar to *sonoriensis*, *blandus*, and *labecula*, but color darker and more rufescent; skull about as in *blandus*, but anterior part of zygoma usually heavier and more deeply notched by infraorbital foramen.

Color.—April and May specimens: General color of upperparts russet, deepening in middle of back to darker (Mars brown and Prout brown); underparts creamy white; subauricular tufts prominent, buffy or pale creamy; tail sharply bicolor, brown above, white below; feet and forelegs white; outer side of 'ankles' brownish. Worn pelages somewhat brighter colored, running to ochraceous and tawny, but not very decidedly different from fresher pelages. Fall and winter pelages apparently with considerable mixture of dusky in middle of back.

Skull.—Similar in general to that of *blandus*, but anterior part of zygoma averaging somewhat heavier and more deeply notched by infraorbital foramen; similar to that of *labecula*, but smaller and shorter; zygomata not so heavy nor so broadly expanded anteriorly; nasals rather short and wide. Cranial characters more or less variable throughout range.

Measurements.—Type: Total length, 167; tail vertebræ, 68; hind foot, 22. Average of 10 adults from Chalchicomula, Puebla: 162 (150–183); 71.5 (65–78); 22; ear from notch (dry) 15.5 (14.2–16.9).

Type specimen.—No. 68655 U. S. National Museum, Biological Survey Collection. ♂ adult. June 12, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—*P. m. fulvus* is the southernmost representative of the widely distributed *maniculatus* group. In general terms it may be said to be a somewhat more brownish edition of the well-known United States form, *P. m. sonoriensis*. It does not appear to be dichromatic like *blandus*, but it is not unlikely that future collections (from eastern San Luis Potosi, for example) will show that it intergrades with that form. Intergradation with *labecula* is indicated by specimens from Amecameca, Mexico, which are rather dusky, particularly on the dorsum. The specimens, however, were taken in February, whereas those considered typical of *fulvus* were taken in April, May, and June, so that the darker color of the Amecameca series may represent merely a seasonal difference. *P. m. fulvus* might possibly be confused with *P. melanotis*, although it is very distinct. In *melanotis* the tail is slightly shorter, the ears are larger and darker, the pelage usually longer and more fluffy, and the skull differs noticeably in its longer, more slender rostrum. *P. affinis* may be found at the same localities with *fulvus*, but will be easily distinguished by the characters of the *leucopus* group, particularly by its shorter pelage, longer, less distinctly bicolor, and practically unpenciled tail, and by the absence of distinct preauricular spots.

Specimens examined.—Total number 124, from localities in Mexico as follows:

Hidalgo: El Chico, 1; Irolo, 9; Pachuca, 10; Sierra de Pachuca, 3; Real del Monte, 25; Tulancingo, 7.

Mexico: Amecameca, 10.

Oaxaca: Huajuapam, 2; Oaxaca, 3.

Puebla: Chalchicomula, 17; Esperanza, 8.

Tlaxcala: Apixaco, 4; Huamantla, 5.

Veracruz: Las Vigas, 3; Perote, 3; Cofre de Perote, 1; Xuchil, 13.

PEROMYSCUS MANICULATUS LABECULA ELLIOT.

Peromyscus labecula Elliot, Field Col. Museum, Zool. Ser., III, pp. 143-144, Mar. 1903.

Peromyscus sonoriensis labecula Osgood, Proc. Biol. Soc. Wash., XVII, p. 57, Mar. 21, 1904.

Type locality.—Ocotlan, Jalisco, Mexico.

Geographic distribution.—Southwestern and south central Mexico, chiefly in the States of Jalisco, Guanajuato, and Mexico. Lower Sonoran and Upper Sonoran zones.

Characters.—Similar in general to *sonoriensis*, *blandus*, and *fulvus*, but size larger; color decidedly darker, more sooty; skull larger and more angular.

Color.—Fresh pelage, topotype No. 120135, December 30: Upperparts fawn color heavily mixed with sooty throughout, producing a

general effect from drab to hair brown; middle of back somewhat darker than sides; underparts white; feet white; forelegs with traces of dusky inside; 'ankles' extensively dusky; ears blackish, faintly edged with whitish; subauricular tufts mixed whitish and fawn strongly pervaded with sooty; tail sharply bicolor, blackish above, white below. Worn pelage, topotype No. 120114: Upperparts chiefly fawn color mixed with rusty brownish, producing a general effect of nearly clear dark fawn color. Young: General effect of sides slaty gray; middle of back darker, slaty to almost black. Extreme types of coloration are more sooty, less fawn, than in specimens from the type locality.

Skull.—Slightly larger, longer, and more angular than in *sonorien-sis*, *blandus*, and *fulvus*; anterior part of zygoma very heavy and deeply notched by interorbital foramen; braincase relatively small.

Measurements.—Average of 10 adults from the type locality: Total length, 173 (168–182); tail vertebræ, 72 (64–82); hind foot, 22.5 (22–24); ear from notch (dry), 14.9 (14.5–15.5).

Type specimen.—No. 8693 Field Museum of Natural History. June, 1901. F. E. Lutz. Skin poorly made; side of head torn; feet slightly injured; tail vertebræ not removed from skin; skull with anterior part of right zygoma broken; teeth much worn.

Remarks.—Except in certain worn pelages, this form is always more or less sooty in color. It is less confined to the Lower Sonoran zone than *blandus* and *fulvus* and apparently enters even the Transition, where it ranges with *P. melanotis*. In certain pelages it is often scarcely distinguishable by color alone from *P. melanotis*. Its skull, however, always presents diagnostic characters in the shorter, broader rostrum, and narrower, less-rounded braincase. It approaches, also, *P. l. mesomelas* in color, but is of course distinguished by the numerous characters which separate the *maniculatus* and *leucopus* groups.

Specimens from Etzatlan and Atemajac, Jalisco, seem to be somewhat intermediate between *labecula* and *blandus*, while those from Ajusco, Federal District of Mexico, approach *fulvus*. Two specimens from Hacienda Magdalena, Colima, are tentatively referred to *labecula*, although they are very small and rufescent. Possibly they represent a slightly characterized coast form or an approach to *fulvus*. Several from Tepic also are small and have short, broad nasals and small molar teeth, but in view of the known cranial variability in the group and the scantiness of material, it does not seem wise to attempt to define such forms.

Specimens examined.—Total number 152, from localities in Mexico as follows:

Colima: Hacienda Magdalena, 2 (aberrant).

Guanajuato: Irapuato, 6; Santa Rosa, 1; Silao, 1.

Hidalgo: Ixmiquilpan, 1; Zimapan, 2.

- Jalisco:** Arroyo de Plantinar, 3; Atemajac, 4; El Molino, 2; Estancia, 4; Elzatlán, 3; Garabotos, 1; Mascota, 1; Ocotlán, 41; Plantinar, 1; Sierra Nevada de Colima, 9; Zapotlán, 6.
Michoacan: Patamban, 2; Patzenaro, 1.
Morelos: Huitzilac, 1; Yantepec, 3.
Mexico: Ajusco, 4 (not typical); Tlalham, 8; Toluca Valley, 15; north slope Volcan Toluca, 2.
Tepic: Ojo de Aguas, near Amatlán, 4; Tepic, 3.
Zacatecas: Valparaiso Mountains, 16; Zacatecas, 5.

PEROMYSCUS MANICULATUS SONORIENSIS (Le Conte).

- Hesperomys sonoriensis* Le Conte, Proc. Acad. Nat. Sci., Phila., VI (1852-3), p. 413, 1853.
Hesperomys leucopus deserticolus Mearns, Bull. Am. Mus. Nat. Hist., N. Y., II, pp. 285-286, Feb., 1890—Mohave River, 12 miles below Hesperia, Calif.
Sttomys insolatus Rhoads, Proc. Acad. Nat. Sci., Phila., pp. 256-257, Oct. 23, 1894—Oro Grande, San Bernardino County, Calif.
[*Peromyscus texanus*] *sonoriensis* Mearns, Proc. U. S. Nat. Mus., XVIII, p. 446, Mar. 25, 1896.
Peromyscus oresterus Elliot, Field Col. Mus., Chicago, Pub. 74, Zool. Ser., III, pp. 159-160, Apr., 1903—Vallecitos, San Pedro Martir Mountains, Lower California, Mexico.

Type locality.—Santa Cruz, Sonora, Mexico.

Geographic distribution.—Great Basin region in general. Northern Sonora, southern and western Arizona and Utah, exclusive of the higher mountains, northeastern Lower California east of the San Pedro Martir Mountains, southern and eastern California east of the Sierra Nevada and the San Bernardino and associated ranges, practically all of Nevada, and parts of southeastern Oregon and south-central Idaho.

Characters.—Similar in general to *P. m. nebrascensis*; size averaging larger, tail longer (70 to 80 mm.); slightly dimorphic in color, but less so than in *blandus*; predominating color in most adult pelages ochraceous buff; white spots at anterior base of ear usually conspicuous; color paler, less mixed with dusky than in *rufinus* and *gambeli*.

Color.—Unworn pelage, pale phase represented by No. 58788 U. S. National Museum, from Lochiel, Pima County, Ariz.: Ground color of upperparts ochraceous buff lightly and uniformly mixed with fine dusky lines; back scarcely or not at all darker than sides; underparts white or creamy white; ears dusky, rather broadly edged with whitish; subauricular tufts chiefly ochraceous buff lightly mixed with dusky, but with a small tuft of pure white hairs at the anterior base of the ear; little or no dusky at base of whiskers and no orbital ring, although the eyelids may be dusky; feet and forelegs white, tarsal joints white, buffy, or buffy slightly mixed with dusky; tail brownish dusky above, white below. Dark phase, represented by No. 58788 U. S. National Museum, from Santa Cruz River, Sonora: Similar to pale phase, but darker, often closely resembling

normal pelages of *rufinus* and *gambeli*; ground color of upperparts ochraceous, or even tawny ochraceous, usually with a more or less vinaceous cast; dusky mixture heavier; basal color of hairs darker; dusky markings about face inclined to be slightly developed; white in subauricular tufts reduced or obsolete; 'ankles' usually somewhat dusky. Worn pelage: Dusky mixture of upperparts much reduced and changed to cinnamon or russet, so that the general effect becomes clear ochraceous buff, lightly overcast with russet; this change is effected without much abrasion, so that specimens in full long pelage may have the predominating ochraceous buff color; in extreme wear the darker mixture is very pale and almost eliminated and the general color paler, becoming nearly cream buff or pinkish buff; the difference between the dark and light phases in worn pelage is minimized, one being merely somewhat more vinaceous than the other. Adolescent pelage: Upperparts mixed dusky and pale clay color, general effect varying from wood brown to broccoli brown. Young in first coat: Upperparts slate color at base of hairs, pale drab gray at tips.

Skull.—About as in that of *nebrascensis*, possibly averaging slightly larger; also similar to those of *gambeli*, *rufinus*, and *blandus*; slightly larger than in *blandus* and *gambeli*, with nasals averaging longer and more convex; braincase smaller and narrower than in *arizonae* or any of the *leucopus* group; palatine slits relatively long and nearly parallel-sided.

Measurements.—Average of 10 adults from Santa Cruz River, Sonora: Total length 166 (152–176); tail vertebrae 75 (65–80); hind foot 20.7 (20–21.5); ear from notch (dry) 16.4 (15.2–17.7). Of 10 adults from Oro Grande and Mohave, Calif.: 164 (150–174); 72 (60–80); 19.8 (19–21). Of 10 adults from Panamint Mountains, Calif.: 165 (155–172); 73 (64–82); 20.2 (19–21). Of 10 adults from Vallecitos and Hanson Lagoon, Lower California (exclusive of type of *P. oresterus*): 165.8 (158–173); 76.6 (71–82); hind foot 20.8 (19.5–22).

Type specimen.—No. 14883 U. S. National Museum. Immature. Sex? 1851. J. H. Clarke. Skin in grayish plumbeous first coat; in fairly good condition, being made in proper form like a modern skin, evidently having been renovated after being originally preserved in alcohol. Pelage somewhat greasy and stained, but color not materially different from recent specimens in same pelage. The skull has been broken through the interorbital constriction and glued together. The braincase, audital bullae, and posterior parts of the skull are nearly perfect; the anterior parts are also in fair condition, although the boundaries of the long palatine slits are slightly broken. The teeth are intact, except the last left upper molar, which is absent. Left mandible perfect; right mandible with processes broken off.

That this specimen is actually the type of *sonoriensis* is vouched for by Baird (Mamm. N. Am., p. 475, 1857), who states that it was the basis of LeConte's name and description. Its immaturity makes the skin practically worthless for distinguishing it from *arizonae*, which occurs in the same region, but the characters of its skull, particularly the small comparatively narrow braincase, are conclusive.

Remarks.—The name *sonoriensis* as applied to some form of white-footed mouse is well known, perhaps almost as well as the name *leucopus*. It was recognized by Baird in 1857, and although placed as a synonym of *leucopus* by Coues in 1877, it has had some sort of recognition for more than fifty years. Fortunately the name may now be applied in a general way to the same form with which it has always been associated. To distinguish it from *nebrascensis*, *rufinus*, *gambeli*, and other forms with which it intergrades will doubtless always be difficult, but its short, well-haired, and sharply bicolor tail will separate it from most forms from which it is specifically distinct. It may possibly be confused with *arizonae* when both are found at the same or neighboring localities, for although *sonoriensis* and *arizonae* are unequivocally distinct species respectively representing large groups, in certain pelages many specimens might be misidentified by one not thoroughly familiar with the characters of the two groups. The most important characters of *sonoriensis* as contrasted with *arizonae* are as follows: Size smaller; tail shorter, more hairy, and more sharply bicolor; white subauricular spots usually well developed; skull smaller; braincase decidedly narrower and relatively deeper; palatine slits relatively longer and more nearly parallel-sided; mandibles more slender.

P. m. sonoriensis ranges in general throughout the Great Basin region and prefers relatively arid country, although apparently it is absent from the hottest parts of the lower Sonoran zone, where *P. eremicus* thrives. It intergrades with the large number of forms which range to the borders of the Great Basin, including *nebrascensis*, *rufinus*, *artemisiae*; *blandus*, and *gambeli*. The differences separating all these forms, although undeniably sufficient, are at most differences in shade of color or in average size and proportions. Frequently the average difference in color is enough to be appreciated by any amateur, while nevertheless absolutely bridged by individual variation. It may be easily seen therefore that the certain identification of single specimens or even small series from border regions or intergrading areas is next to impossible. However, the attempt has been made to allocate specimens as nearly as possible with the forms which they seem to resemble most. Along the east slope of the Sierra Nevada Mountains, in the Tejon Pass region, and thence south along the eastern side of the San Bernardino Mountains and to the east of the San Pedro Martir Mountains, *sonoriensis* intergrades

with the darker and smaller *gambeli*; it meets *artemisiae* in central Idaho, where specimens occur that are colored like *sonoriensis*, but attain almost the size of *artemisiae*; in southwestern Wyoming and northern Utah it apparently intergrades with *nebrascensis*; in the mountains of central and western Nevada and also in Utah it shows tendencies toward *rufinus*; and in southeastern Arizona, southwestern New Mexico, and adjacent parts of Mexico it connects with *blandus*; in northern and central Lower California it merges with *coolidgei*.

The predominating color is ochraceous buff, practically like that of *nebrascensis*; in slightly worn pelage it becomes very bright, with little or no dusky. The bright slightly worn specimens are usual in spring and early summer, but the sequence of pelages conforms less with season than in the more northern forms, and worn specimens are often taken in midwinter. The existence of two phases of color, one darker and somewhat vinaceous and the other paler and more yellowish, seems to be beyond question, but the pale phase is much the more prevalent and the difference between the two is not nearly so marked as in *P. m. blandus*. Specimens from the Mohave Desert and other parts of southeastern California seem to average very slightly smaller than typical *sonoriensis*; others from northeastern Lower California average slightly larger; in neither case, however, is the difference sufficiently marked or constant to warrant recognition by name, particularly since series that measure slightly larger or smaller are found throughout the entire range. *Hesperomys l. deserticolus* and *Sitomys insolutus*, both from the same vicinity in the Mohave Desert, and *Peromyscus oresterus*, from northern Lower California, are therefore considered as synonyms of *sonoriensis*. The type of *P. oresterus* is evidently abnormally long-tailed, since the average of a series of topotypes is much smaller, being almost exactly the same as that of a series of typical *sonoriensis*.

Specimens examined.—Total number, 1,923, from localities as follows:

Arizona: Adonde, Yuma County, 3; Head of Barbacomori Creek, San Pedro Valley, 1; Calabasas, 5; Dos Cabezas, 1; Ehrenberg, 1; Fairbank, 5; Fort Huachuca, 3; Fort Mohave, 4; Gila City, 1; Grand Canyon, 1; Holbrook, 32; Huachuca Mountains, 8; Lochiel, Pima County, 6; Mohave County, opposite Needles, 19; Oracle, 1; Painted Desert, 11; Phoenix, 8; San Pedro River, 5; Sonora, Pima County, 1; Willeox, 1; Yuma, 7.

California: Adobe Station, 2;^a Amedee, 10;^a Ash Creek, 20; Bakersfield, 1;^a Banning, 4; Baregas Spring, 2; Barstow, 3; Bear Valley, San Bernardino County, 10;^a Bennett Wells, 3; Big Pine Mountain, 9;^a Bishop Creek, 3; Blue Lake, 6;^a Bridgeport, 1;^a Cabezon, 1; Cameron, 2; Cameron Lake, 1; Carrizo Plains, 3;^a Casa Diablo, Mono County, 2;^a Coahuila Mountain, 1; Colorado Desert, 3; Coso, 32; Coso Mountains, 2; Cuyama Valley, 3;^a Death Valley, 8; Fort Tejon, 20;^a Furnace Creek, 11; Granite Springs, 2; Grapevine Springs, 1; Haway

^a Approaching *gambeli*.

Meadows, 6; Honey Lake, 4;^a Hope Valley, 2;^a Hot Springs, Mono County, 2; Hot Springs Valley, 1; Independence Creek, 2; Indian Canyon, 4;^a Inyo Mountains, 16; Keeler, 5; South Fork Kern River, 25 miles above Kernville, 18; Kernville, 5; Leavett Meadows, Mono County, 1; Little Bear Valley, San Bernardino Mountains, 14;^a Little Owens Lake, 3; Lone Pine, 28; Long Valley, Mono County, 24;^a Lytle Creek, 1; Mammoth, 1; Markleeville, 3;^a Maturango Spring, 4; Menache Meadows, 6; Mesquite Valley, 1; Mohave, 13; Mohave Desert, 1;^b Mohave River, 7; Mono Flats, Santa Barbara County, 3;^a Mono Lake, 38;^a Mono Pass, 5;^a Morongo Pass, 13; Mount Pinos, 6;^a Mount Whitney, 48; Needles, 26; Nee-nach, 4; Olancha, 11; Olancha Peak, 1; Onyx, 11; Oro Grande, 12; near Owens Lake, 6; head of Owens River, 1; Owens Valley, 12; Painted Rock, SE. of Shumler, 1;^a Palm Springs, 4; Panamint, 5; Panamint Mountains, 62; Panamint Valley, 3; Pine City, 1; Pine Creek, 4; Reche Canyon, near San Bernardino, 10;^a Resting Springs, 2; Round Valley, 1; San Antonio Mountains, 2; San Bernardino, 7; San Bernardino Mountains, 19;^a San Bernardino Valley, 21; San Enigdio, 6;^a San Enigdio Canyon, 8;^a San Felipe Valley, 6; San Geronio Pass, 1; San Jacinto Mountains, 41;^a San Rafael Mountains, Santa Barbara County, 14;^a Santiago Springs, 1;^a Sanatoga Springs, 7; Squirrel Inn, 6; Susanville, 3;^a Tehachapi, 50;^a near Tejon Pass, 2;^a Vallecito, Colorado Desert, 1; Victor, 1; Walker Basin, 3; Walker River, Mono County, 2;^a Walker Pass, 5; Walters, Colorado Desert, 2; White Mountains, 3; Whitewater, 4; Woodford, Alpine County, 53; Yuma, 2.

Idaho:^c Arco, 1; Big Butte, 2; Big Lost River, 16; Birch Creek, 13; Blackfoot, 16; Crow Creek, 1; Lemhi, 8; Montpelier Creek, 1; Puh-simeroi, 2; Sawtooth, 4; Sawtooth Lake, 12; Shoshone Falls, 5.

Lower California: Aguaje de las Fresas, 4; Cocopah Mountains, 6; Hanson Lagoon, 17; Hardy River, near Volcano Lake, 4; head of Hardy River, 1; La Grulla, 19; Poso Vicente, 1; San Matias Spring, 1; Seven Wells, 9; Vallecitos, 20.

Nevada: Anderson Ranch, Douglas County, 10; Arc Dome, 1; Ash Meadows, 10; 30 miles SW. of Austin, 3; Bijou, 2;^a Bull Run Mountains, 2;^a Carson, 3;^a Carson River, 6;^a Carson Sink, near Timber Lake, 3; Charleston Mountains, 11; Cloverdale, 1; Cottonwood Range, 8; Edgewood, 4; Elko, 1; Genoa, 1; Gardnerville, 12; Granite Creek, 6;^a Grapevine Mountains, 30; Halleck, 5; Holbrook, 3; East Humboldt Mountains, 1; Indian Creek, 1; Lovelocks, 1; McDermitt, 1; Monitor Valley, 2; Mount Siegel, 228; Mount Sugar, 7; Mountain City, 39;^a Oasis Valley, 4; Osobb Valley, 1; Pahrnagat Valley, 4; Pahrump Valley, 1; Palsade, 4; Rabbit Hole Mountains, 2; head of Reese River, 35; Reno, 6;^a Ruby Mountains, 3;^a Ruby Valley, 1; near Stillwater, 14; Summit Lake, 1; Thorp Mill, 3; Vegas Valley, 11; Verdi, 8;^a Wadsworth, 1; Washoe, 3;^a White Rock Valley, 3; Winnemucca, 1; Winter's Mine, Douglas County, 17.

Sonora: Cienega Well, 5; Colonia Lerdo, 1; Colorado River, 20 miles S. of U. S. Boundary, 2; opposite mouth of Hardy River, 19; Santa Cruz, 4; Santa Cruz River, 20; Sierra de los Patogones, 1.

^a Approaching *gambeli*.

^b Type of *descriptus*.

^c Nearly all Idaho specimens referable to *sonoriensis* show approach to *artemisiac*.

^d Approaching *rufinus*.

United States and Mexican Boundary: Colorado River, at Boundary Monument No. 204, 17; San Luis Springs, Animas Valley, 4.

Utah:^a Beaver Mountains (Puffer Lake), 4; Beaver Valley, 4; Browns Park, 2; Clear Creek, 1; Diamond Peak, 2; Fairfield, 9; Fish Lake Plateau, 2; Glenwood, 3; Hanksville, 1; Henry Mountains (Mount Ellen), 6; Kelton, 2; Laketown, 3; Loa, 4; Manti, 2; Marysvale, 5; Nephi, 11; Ogden, 4; Panguitch, 2; Panguitch Lake, 2; Parawan Mountains (Brian Head), 2; Provo, 6; St. George, 4; Salt Lake City, 13; Santa Clara, 3; Santa Clara Creek, 1; Uncompahgre Indian Reservation, 11.

PEROMYSCUS MANICULATUS COOLIDGEI THOMAS.

Peromyscus leucopus coolidgei Thomas, Ann. & Mag. Nat. Hist., ser. 7, I, p. 45, Jan. 1898.

Type locality.—Santa Anita, Lower California, Mexico.

Geographic distribution.—Greater part of the peninsula of Lower California from Cape St. Lucas northward to the vicinity of the southern base of the San Pedro Martir Mountains.

Characters.—Size slightly larger than in *P. m. gambeli*, about as in *P. m. sonoriensis*; color decidedly paler and more ochraceous than in *gambeli*, paler even than in *sonoriensis*; subterminal zone of hairs of upperparts very pale and usually considerably exposed in worn pelages; color somewhat dimorphic as in *P. m. blandus*.

Color.—Similar to that of *sonoriensis* but averaging slightly paler, especially in worn pelage. Unworn pelage, buff phase: Upperparts, head, and sides ochraceous buff lightly and uniformly mixed with dusky, producing a general effect very near to clay color; lateral line scarcely evident; ears broadly whitish distally, white spots at anterior bases conspicuous; underparts pure white; feet, forelegs, and tarsal joints white; tail sharply bicolor, grayish brown above, white below. Worn pelage, buff phase: Upperparts bright ochraceous buff very lightly mixed with cinnamon on back and rump, becoming pinkish buff on shoulders where the pale subterminal zone of the hairs is more exposed; face and nose usually pale, varying from pinkish buff to ochraceous buff; white spots in front of ears slight or obsolete. Unworn pelage, gray phase: Upperparts pale salmon buff to pinkish buff mixed with dusky, producing a general effect approaching écru drab; otherwise about as in buff phase. Worn pelage, gray phase: General effect of upperparts pale whitish écru drab lightly touched with cinnamon; pale whitish buff subterminal zone of hairs variously exposed.

Skull.—Rather variable, but not definitely distinguishable from that of *sonoriensis*; possibly averaging slightly smaller.

Measurements.—Average of 7 adults from Santa Anita, San Jose del Cabo, and Cape St. Lucas, Lower California: Total length, 171

^a Mostly approaching *rustnus*.

(162-178); tail vertebrae, 82 (79-86); hind foot, 21; ear from notch (dry), 16.3 (15.4-18). Average of ten adults from Santo Domingo, Lower California: Total length, 164 (158-171); tail vertebrae, 75 (70-78); hind foot, 21.9 (21.5-22).

Type specimen.—In British Museum. Collected May 21, 1896, by Dane Coolidge. Specimen in good condition.

Remarks.—Considering its distribution, it is perhaps strange that this form is not more decidedly different from *P. m. sonoriensis*. The most that can be said is that it averages paler. Many specimens are almost indistinguishable, particularly from the *sonoriensis* found in southeastern California. These, which have received the name '*deserticolus*,' may perhaps be regarded as in a slight degree intermediate between true *sonoriensis* and *coolidgei*. In worn pelage, *coolidgei* is very pale and the head and shoulders are usually of a whitish cast never seen in *sonoriensis*. Intergradation with *sonoriensis* and *gambeli* apparently takes place in the San Pedro Martir region. In this region, specimens partake of the characters of all three of the surrounding forms, *gambeli*, *sonoriensis*, and *coolidgei*. Unfortunately, two names, '*thurberi*' and '*oresterus*,' were based on specimens from this region, and as neither can be characterized they are synonymized with the forms they resemble most closely. The series representing '*thurberi*' seems to average more like *gambeli* while that representing '*oresterus*' is practically indistinguishable from *sonoriensis*. They are from localities not far apart, and when specimens in all pelages are available, they may prove to be alike, but at present the only course seems to be to dispose of them as above.

Specimens examined.—Total number 114, from localities as follows:

Lower California: Agua Dulce, 1; Calamahue, 9; Cape St. Lucas, 8; La Paz, 9; Playa Maria Bay, 9; Pozo San Augustin, 7; Rosario, 1 (approaching *sonoriensis*?); San Andres, 6; San Fernando, 3 (approaching *sonoriensis*); San Francisquito, 4; San Ignacio, 4; 20 miles west of San Ignacio, 1; San Jose del Cabo, 11; Santa Anita, 4; Santa Rosalia Bay, 15; Santo Domingo, 14; Turtle Bay (=San Bartolome Bay), 8.

PEROMYSCUS MANICULATUS MARGARITAE subsp. nov.

Type from Margarita Island, off west coast of southern Lower California, Mexico. No. 146958, U. S. National Museum, Biological Survey Collection. ♀ adult. Dec. 1, 1905. E. W. Nelson and E. A. Goldman.

Geographic distribution.—Known only from Margarita Island.

Characters.—Size and general characters about as in *P. m. coolidgei*; color decidedly paler, upperparts chiefly pale pinkish buff; skull short and broad.

Color.—Unworn pelage: Upperparts, sides, and head pinkish buff lightly lined with dusky, the latter scarcely modifying the gen-

eral effect; sides of face, including base of whiskers, nearly clear pinkish buff; eyelids very slightly dusky; ears thinly clothed basally and more thickly distally with whitish hairs, membranous part of ears whitish basally and dusky distally; white spots at anterior bases conspicuous; underparts, nose, feet, and fore and hind legs white; hairs of throat white to roots, those of remainder of underparts with slaty basal zone relatively narrow; tail sharply bicolor, narrowly dusky above, white below. Worn pelage: General effect of upperparts very pale pinkish buff; head and shoulders distinctly whitish, produced by the exposure of the subterminal zone of the hairs; upper side of tail sometimes whitish all around on distal third.

Skull.—Similar in general to that of *P. m. coolidgei*, but averaging shorter and wider; nasals rather short and very wide.

Measurements.—Average of 10 adult topotypes: Total length 163 (157–168); tail vertebræ 77 (74–81); hind foot 21.3 (20–22); ear from notch (dry) 16.5 (14.6–17.5).

Remarks.—This mouse was found by Nelson and Goldman only on a strip of light-colored sand beach on the west side of Margarita Island. It was not obtained on other parts of the island where trapping was done. In color it is almost identical with *P. niveiventris*, which is found on similar beaches on the coast of Florida, and thus affords an excellent example of the development of like characters under like conditions. Although quite isolated and well characterized, this form seems best treated as a subspecies, since it is obviously derived from the mainland *coolidgei*, in which variation in the direction of *margaritæ* is considerable.

Specimens examined.—Total number 19, all from the type locality.

PEROMYSCUS MANICULATUS CLEMENTIS MEARNS.

Peromyscus texanus clementis Mearns, Proc. U. S. Nat. Mus., XVIII, pp. 446–447, Mar. 25, 1906.

Type locality.—San Clemente Island, off coast of southern California.

Geographic distribution.—Outer islands of the Santa Barbara group, off the coast of southern California, including San Clemente, Santa Barbara, San Nicolas, Santa Rosa, and San Miguel islands.

Characters.—Similar to *P. m. gambeli*, but averaging slightly larger and darker.

Color.—Similar to that of *P. m. gambeli*, but averaging slightly darker; ochraceous buff lateral line more distinctly marked; unworn pelage slightly darker, more vinaceous, and more mixed with dusky; worn pelage slightly deeper, more reddish colored.

Skull.—Similar to that of *P. m. gambeli*, but averaging slightly larger, and a trifle more elongate; teeth slightly heavier.

Measurements.—Average of 10 adult topotypes: Total length 164 (156–172); tail vertebrae 74 (68–78); hind foot 20.6 (20–21.5); ear from crown 15.2 (14.5–16); ear from notch (dry) 15.3 (14–17).

Type specimen.—No. 61117 U. S. National Museum. ♂ adult. Aug. 27, 1894. E. A. Mearns. Specimen in good condition.

Remarks.—This form, which occupies the outermost of the Santa Barbara Islands, is more closely similar to *gambeli*, the mainland form, than is *catalinae*, which occupies the nearer islands. The slight characters which distinguish it from *gambeli*, though not evident in every specimen, are observable in the majority of every series. Such exceedingly slight peculiarities as are found in each of the series from individual islands are scarcely tangible, so the most satisfactory arrangement seems to be the reference of all from the outer islands to one form.

Specimens examined.—Total number 136, from localities as follows:

California: San Clemente Island, 54; San Miguel Island, 25; San Nicolas Island, 22; Santa Barbara Island, 20; Santa Rosa Island, 15.

PEROMYSCUS MANICULATUS CATALINAE ELLIOT.

Peromyscus catalinae Elliot, Field Col. Mus., Chicago, Zool. Ser., III, p. 160, April, 1903.

Type locality.—Santa Catalina Island, Santa Barbara group, off the coast of southern California.

Geographic distribution.—Santa Catalina and Santa Cruz islands, Santa Barbara group, off the coast of southern California.

Characters.—Similar to *P. m. elementis*, but larger; ears larger; tail longer and coarser; skull larger and heavier.

Color.—About as in *P. m. elementis*; slightly darker and more vinaceous than in *P. m. gambeli*.

Skull.—Similar to that of *P. m. elementis*, but decidedly larger and heavier; zygomata very heavy and deeply notched anteriorly; nasals very broad and slightly concave anteriorly; audital bullae actually and relatively larger; molar teeth large.

Measurements.—Type: Total length 176; tail vertebrae 92; hind foot 23; ear from notch 18. Average of ten adults from Santa Cruz Island: 196 (185–214); 96 (88–105); 22 (21–23); 15.7 (15–16.8).

Type specimen.—No. 11017 Field Museum of Natural History, Chicago. ♂ adult. Feb. 6, 1903. J. Rowley. Skin in good condition; skull with vault of cranium broken.

Remarks.—This form differs decidedly from *P. m. gambeli*, and fully adult specimens almost equal *P. boylei* in size and length of tail. Most of the specimens available are in ragged worn pelage, so that it is difficult to ascertain to what degree the form may be characterized by color, but apparently it does not differ greatly, if

at all, from *P. m. clementis*. Specimens from Santa Catalina and Santa Cruz islands appear to be practically identical, notwithstanding the fact that both islands are nearer to islands inhabited by *P. m. clementis* than to each other. The Santa Cruz Island specimens appear to have slightly smaller ears than those from Santa Catalina.

Specimens examined.—Total number 50, from localities as follows:

California: Santa Catalina Island, 25; Santa Cruz Island, 25.

PEROMYSCUS MANICULATUS DUBIUS ALLEN.

Peromyscus dubius Allen, Bull. Am. Mus. Nat. Hist., N. Y., X, pp. 157-158, April 12, 1898.

Type locality.—Todos Santos Island, off west coast of northern Lower California, Mexico.

Geographic distribution.—Known from Todos Santos and Coronados islands off west coast of northern Lower California, Mexico.

Characters.—Size large, decidedly larger than *P. m. gambeli*; hind foot equaling that of *P. m. catalinae*, tail and ears relatively shorter; color dark.

Color.—Similar in general to that of *gambeli*, *catalinae*, and *geronimensis* but darker and richer. Worn pelage: General effect of sides and rump rich russet, becoming nearly Mars brown in middle of back; head and shoulders cinnamon to russet, slightly grizzled with dusky; ears dusky brownish, rather broadly edged with whitish; underparts buffy white; tail sharply bicolor.

Skull.—Large and heavy, nearly or quite equaling that of *catalinae* and decidedly exceeding that of *gambeli*; posterior palatine foramina very large; zygomata slightly notched anteriorly; teeth relatively large.

Measurements.—Average of 5 adult topotypes: Total length, 186 (176-195); tail vertebræ, 84 (77-92); hind foot, 21 (20-22); ear from notch (dry), 15.5 (14.6-17.4).

Type specimen.—No. 13333 American Museum of Natural History, New York. ♂ adult. Mar. 11, 1897. A. W. Anthony. Specimen in good condition.

Remarks.—The mice of the *maniculatus* group on the islands off the west coast of southern and Lower California are all of one general type and all differ from the mainland form *gambeli* in being larger and more robust. The distinctions separating the various forms in this insular series are slight. Beginning at the north, *catalinae* is distinguished chiefly by its long tail and ears; next comes *dubius*, in which the tail is slightly shorter and the color darkest of all; then follows *geronimensis*, which is very like *dubius* except

in its paler color, and then *cineritius*, which is the palest form. Any one of these forms may be separated from *gambeli* by larger size. Specimens from the Coronados Islands are exactly like topotypes of *dubius* in color, and their skulls differ only in having the zygomata slightly less notched anteriorly.

Specimens examined.—Total number 68, from localities as follows:

Lower California: Coronados Islands, 45; Todos Santos Island, 23.

PEROMYSCUS MANICULATUS GERONIMENSIS ALLEN.

Peromyscus geronimensis Allen, Bull. Am. Mus. Nat. Hist., N. Y., X, p. 156, Apr. 12, 1898.

Peromyscus exiguus Allen, *supra cit.* p. 157—San Martin Island, Lower California.

Type locality.—San Geronimo Island, off west coast of Lower California, Mexico.

Geographic distribution.—Known from various islands off the west coast of the northern half of Lower California, including San Martin, San Geronimo, and Natividad islands.

Characters.—Similar in size and general characters to *P. m. dubius*, but color paler; similar in color to *P. m. gambeli*, but size decidedly larger.

Color.—About as in *gambeli*, possibly averaging slightly paler, thus approaching the color of *sonoriensis*; upperparts, head, and sides ochraceous buff, lightly and uniformly mixed with dusky; ears extensively whitish distally, brownish dusky proximally; white spot at anterior bases usually prominent; underparts creamy white; feet white, without dusky markings on tarsal joint; tail sharply bicolor.

Skull.—Rather variable, but averaging practically as in *P. m. dubius*.

Measurements.—Average of 10 adult topotypes: Total length, 178 (170–182); tail vertebrae, 81 (79–85); hind foot, 22.4 (21–23); ear from notch (dry), 16 (14.5–17.3). Average of 10 adults from San Martin Island: Total length, 170 (163–181); tail vertebrae, 78.5 (70–82).

Type specimen.—No. 111111 American Museum of Natural History, New York. ♂ adult. March 17, 1897. A. W. Anthony. The above is the number originally published as that of the type but the specimen now bearing a type label does not have this number.

Remarks.—This form agrees with *dubius* and *cineritius* in size and proportions but differs in color, being paler than *dubius* and decidedly less grayish and more ochraceous than *cineritius*. Specimens from San Geronimo Island have skulls with nasals averaging slightly more slender than in those from San Martin Island, but variation is so great that there seems to be no safe basis for separa-

ting them. Specimens from Natividad differ only in a slight approach toward the paleness of *cineritius*.

Specimens examined.—Total number 220, from localities as follows:

Lower California: Natividad Island, 21; San Gerónimo Island, 142; San Martín Island, 57.

PEROMYSCUS MANICULATUS CINERITIUS ALLEN.

Peromyscus cineritius Allen, Bull. Am. Mus. Nat. Hist., N. Y., X, p. 155, April 12, 1898.

Type locality.—San Roque Island, off Lower California, Mexico.
Geographic distribution.—Confined to San Roque Island.

Characters.—Size, proportions, and cranial characters about as in *geronimensis*; color slightly less dusky and general effect much grayer; buffy ochraceous tints minimized.

Color.—Unworn pelage: General effect of upperparts pale drab (Ridg. Pl. III, No. 18); ground color pale écru drab uniformly mixed with dusky; lateral line scarcely evident except in interfemoral region about the base of the tail, where it is fairly well marked and of a rather lively pinkish buff color; a very small dusky spot at base of whiskers; orbital ring scarcely evident, or, at most, confined to the eyelids; ears dusky rather broadly edged with whitish; underparts yellowish white; tail sharply bicolor, dusky brownish above, white below; feet white with a dusky marking on the tarsal joint.

Skull.—Practically as in *geronimensis*; braincase apparently slightly lower and flatter; zygomata possibly more angular anteriorly.

Measurements.—Type: Total length 191; tail vertebrae 83; hind foot (dry) 21.8. Average of three adult topotypes: Total length 175 (171–184) tail vertebrae 76 (75–78).

Type specimen.—No. 13588, American Museum of Natural History, New York. ♂ adult. June 21, 1897. A. W. Anthony. Skin in fair condition. Skull in good condition but molariform teeth absent except right $\overline{m}1$ and left $\overline{m}1$ and $\overline{m}2$.

Remarks.—This is one of the best marked of the Pacific Coast insular forms. It is readily distinguishable from all others known, by its pale grayish-drab color. The color is somewhat similar to that of adolescents of other forms, but no specimens are at hand that are exactly like it. It may possibly possess certain average cranial characters, but with a very limited representation of it, this can not now be determined.

Specimens examined.—Total number 9, all from the type locality.

PEROMYSCUS MANICULATUS MAGDALENÆ subsp. nov.

Type from Magdalena Island, off west coast of southern Lower California, Mexico. No. 146971 U. S. National Museum, Biological Survey Collection. ♂ old. Dec. 3, 1905. E. W. Nelson and E. A. Goldman.

Geographic distribution.—Magdalena Island and a narrow strip of the adjacent mainland of the peninsula of Lower California.

Characters.—Most similar to *P. m. geronimensis*, but larger and with a slightly longer tail; color slightly darker and more tawny; decidedly larger and darker than in *coolidgei* and *margaritæ*.

Color.—Similar to that of *P. m. geronimensis*, but averaging slightly darker and more tawny. No. 146972, slightly worn pelage: Upperparts between ochraceous buff and vinaceous cinnamon lightly mixed with dusky, the latter somewhat heavier on dorsum; face and head very slightly paler than sides; eyelids dusky; ears dusky broadly edged with white; underparts creamy white.

Skull.—Practically as in *P. m. geronimensis*; braincase averaging slightly broader; zygomata not so deeply notched anteriorly.

Measurements.—Average of 7 adult topotypes: Total length 184 (175–200); tail vertebrae 88 (82–96); hind foot 22.8 (22–23); ear from notch (dry) 16.6 (15.5–17.8).

Remarks.—Although the characters are slight, the isolation of this form seems to warrant recognition. The form is apparently surrounded by *P. m. coolidgei*, from which it is quite distinct, while it is very similar to the isolated and geographically distant *geronimensis*. It occurs on the mainland of the peninsula as well as on the island, and quite probably intergrades with *coolidgei*. The island is but narrowly separated from the peninsula and at low tide the amount of intervening water is said to be so little at some points as to be easily fordable.

Specimens examined.—Total number 19, from localities as follows:

Lower California: Magdalena Island, 9; Matancita, 2; San Jorge, 7; San Juanico Bay, 1.

PEROMYSCUS SITKENSIS MERRIAM.

(Pl. II, fig. 7.)

Peromyscus sitkensis Merriam, Proc. Biol. Soc. Wash. XI, p. 223, July 15, 1897.

Type locality.—Sitka, Baranof Island, Alaska.

Geographic distribution.—Baranof and Chichagof islands, Alaska.

Characters.—Similar in color and general characters to *hylaesus* and *macrorhinus* but decidedly larger than either, though exceeding *macrorhinus* much less than *hylaesus*; skull very large and heavy, larger than that of any other species of the subgenus *Peromyscus* found north of Mexico.

Color.—Much as in *macrorhinus*, *hylaesus*, *keeni*, etc. Worn pelage: Sides rich russet or Mars brown, shading on dorsum to Prout brown and sometimes burnt umber; dusky markings about face, forearms, and ankles well developed; very little or no white at anterior bases of ears. Adolescent pelage: General effect on sides isabella color lightly tinged with dusky; dorsum usually darker than sides.

Skull.—Most similar to that of *macrorhinus*, from which it differs chiefly in larger size; nasals and rostrum very long; zygomata somewhat compressed anteriorly; teeth rather large; audital bullæ relatively small.

Measurements.—Average of ten adult topotypes: Total length 224; tail vertebrae 113.6; hind foot 26.5; ear from notch (dry) 16.5 (14.9–17.8).

Type specimen.—No. 73809 U. S. National Museum, Biological Survey collection. ♂ adult. July 30, 1895. C. P. Streater. Specimen in good condition.

Remarks.—*P. sitkensis* is closely allied to the species *maniculatus*, and though apparently distinct, extremes of variation show a marked approach to *macrorhinus*. From present material, however, it seems that the ranges of *macrorhinus* and *sitkensis* are not continuous, and it is therefore probable that if *sitkensis* intergrades with any member of the group it is with *hylaesus*. *P. m. sitkensis* is decidedly the largest member of the *maniculatus* group, and in other groups found north of Mexico it has no rival in size except *P. californicus*, with which close comparison is not necessary. Specimens from Chichagof Island are almost identical with topotypes, merely averaging a trifle smaller.

Specimens examined.—Total number 54, from localities as follows:

Alaska: Sitka, Baranof Island, 35; Tenakee Inlet, Chichagof Island, 19.

PEROMYSCUS SITKENSIS PREVOSTENSIS Osgood.

Peromyscus prevostensis Osgood, N. Am. Fauna No. 21, pp. 29–30, Sept. 1901.

Type locality.—Prevost Island, Queen Charlotte Group, British Columbia.

Geographic distribution.—Prevost Island.

Characters.—Similar to *sitkensis*, but with slightly shorter tail and slight cranial characters. Somewhat similar to *macrorhinus*, but hind foot longer and tail shorter; skull decidedly larger and heavier.

Color.—Similar to *sitkensis* and *macrorhinus*, but averaging slightly darker. Sides rich Mars brown shading into a broad irregular area of mummy brown on dorsum; dusky orbital ring and spot at base of whiskers very broad and scarcely separated, sometimes confluent.

ent; ears dusky, narrowly edged with whitish, no white at anterior bases; underparts grayish white, occasionally with a faint wash of pinkish buff on middle of breast; forearms to wrist same color as sides, hands white; 'ankles' dusky brownish posteriorly or sometimes all around; hind feet usually white, lightly washed with dusky brownish to bases of toes; tail dark brown above, white below.

Skull.—Similar to that of *sitkensis*, but slightly heavier; nasals averaging shorter and not so attenuate posteriorly; posterior palatine foramina nearly or fully twice as long as in *sitkensis*, forming distinct slits rather than nearly round punctures.

Measurements.—Average of 47 adult topotypes: Total length 217 (205–230); tail vertebrae 104 (97–116); hind foot 26 (25–27); ear from notch (dry) 15.6 (14.4–16.4).

Type specimen.—No. 100818 U. S. National Museum, Biological Survey collection. ♀ adult. July 5, 1900. W. H. Osgood and E. Heller. Specimen in good condition.

Remarks.—Since this form was described, 2 specimens referable to it have been received from Forrester Island, Alaska, a small islet off the southwest coast of Prince of Wales Island. Specimens of typical *sitkensis* also have been obtained from Chichagof Island, Alaska. The known distribution of *sitkensis* and its one closely allied subspecies is therefore curiously interrupted and quite independent of its nearest relatives (*macrorhinus*, *hylaesus*, and *keeni*), although so far as yet known *sitkensis* wherever found occurs alone. Thus in the long distance from Baranof and Chichagof islands to Forrester Island are several islands inhabited apparently by *hylaesus* alone. In the same way the large islands of the Queen Charlotte group (Graham and Moresby) inhabited only by *P. m. keeni* intervene between Forrester Island and Prevost Island.

Specimens examined.—Total number 49, from localities as follows:

Alaska: Forrester Island, 2.

British Columbia: Prevost Island, Queen Charlotte Islands, 47.

Key to subspecies of *Peromyscus polionotus*.

a. Hairs of underparts chiefly white to roots.

b. Size smaller; total length usually less than 130; color slightly darker. Western Florida.

1. Nose with a white stripe; or if not, thighs white all around.....*P. p. albifrons*

2. Nose without white stripe; thighs fuscous on inner side.....*P. p. rhoadsi*

bb. Size larger; total length usually more than 130; color slightly paler. Eastern Florida.

c. Color very pale; white of underparts usually reaching lower border of eye; white spots above eyes conspicuous. Anastasia Island...*P. p. phasma*

cc. Color not so pale; white of underparts usually not reaching lower border of eye; white spots above eyes usually obsolete. Mainland of Florida.

P. p. niveiventris

ss. Hairs of underparts chiefly slaty at bases.....*P. polionotus*

PEROMYSCUS POLIONOTUS (WAGNER).

(Pl. II, fig. 11.)

Mus polionotus Wagner, Archiv. f. Naturg. v. Wieg., II, p. 52, 1843.

Sitomys niveiventris subgriseus Chapman, Bull. Am. Mus. Nat. Hist., N. Y., V, p. 341, Dec. 22, 1893.

Peromyscus subgriseus subgriseus Bangs, Proc. Bost. Soc. Nat. Hist., XXVIII, p. 200, March, 1898.

Peromyscus subgriseus arenarius Bangs, *supra cit.*, pp. 202-203, 1898—Hursman Lake, Scriven County, Georgia—not *P. eremicus arenarius* Mearns 1896.

Peromyscus subgriseus baltolus Bangs, Science, N. S., VIII, pp. 214-215, Aug. 19, 1898—new name for *P. s. arenarius* Bangs, preoccupied.

Peromyscus polionotus Osgood, Proc. Biol. Soc. Wash., XX, p. 49, 1907.

Type locality.—Georgia.

Geographic distribution.—Open fields of the interior of northern Florida and southern Georgia.

Characters.—Similar in general to *P. m. pallescens* and *P. m. bairdi*, but even smaller—much smaller than any other species of the Atlantic States. Hairs of underparts slaty gray at base except on chin and throat where they are white to roots; tail definitely bicolor.

Color.—Unworn pelage: Upperparts nearly uniform brownish fawn; ground color dark fawn finely mixed with brownish dusky which is slightly concentrated on dorsum; sides of face and orbital region inclining to brighter fawn; narrow orbital ring dusky; ears dusky, whitish edged, decidedly darker than in *niveiventris*; sub-auricular tufts fawn and whitish or entirely like rest of upperparts; feet and forelegs white; underparts creamy white, hairs white to bases on chin and throat, slaty gray at bases elsewhere; tail decidedly bicolor, dusky brown above, white below. Worn pelage: Sides between fawn and cinnamon, rather brighter than either; back darker, almost Prout brown; otherwise similar to unworn pelage. Adolescent pelage: Sides broccoli brown tinged with fawn, nearly like écreu drab, middle of back much darker, blackish hair brown.

Skull.—Similar in general to that of *P. m. bairdi*, but slightly shorter; palatine slits in particular, shorter; audital bullæ slightly larger; skull incomparably smaller than that of *P. gossypinus* or any other species of the Atlantic coast region.

Measurements.—Average of 5 adults from Gainesville, Fla.: Total length, 130 (125-137); tail vertebræ, 47 (41-52); hind foot (dry), 16.6 (15.6-17.7); ear from notch (dry), 13 (12-13.4). Average of 10 adults from Hursman Lake, Georgia: 126; 46.5; 16.5.

Type specimen.—Wagner's original type of this species, as elsewhere stated (Proc. Biol. Soc. Wash., XX, p. 49, 1907), is still mounted and on exhibition in the museum of the Polytechnic in Zurich, Switzerland. Considering its long exposure, it is fairly well preserved, and its identity with the mouse that has been currently known as *subgriseus* is obvious. The color is not greatly changed,

the back being dull brownish and the sides tinged with fawn, while the narrow whitish edgings on the ears are still evident, and the underparts are white. The skull is contained in the skin, and the ungrooved upper incisors are plainly visible. The tail vertebrae also are present. The rough measurements of the mounted specimen are: Head and body, 55.5; tail vertebrae, 33; hind foot, 17.6; ear from notch, 10. On the stand are several labels pasted one upon another. The outer and most recent one is inscribed "*Mus polionotus*. Graurückige Maus. N. Amerika." On removing this the next was exposed as follows: "*Mus polionotus*. Die graurückige Maus. Nordamerika. Georgien." This was in the hand of a museum director, who I was informed had died in 1865. The undermost label was not fully legible, but the following in the hand of Schinz could be seen: "*Mus poliono- Nordamer.*" It would seem therefore that this specimen must be the one examined and named by Wagner in 1843. A few lines by Schinz^a bearing on the question are as follows: "Diese kleine Maus ist neu. Wagner benannte sie nach dem im Zürcher Museum befindlichen Exemplar."

Remarks.—*P. polionotus* is the representative of a small group of closely allied forms, all of very small size and of limited distribution in Florida and Georgia. As a group it is so distinct from all its congeners of the Atlantic slope as not to require close comparison. Its relationship seems to be with the *maniculatus* group, as represented by *bairdi* and *pallescens*. *P. polionotus* is very similar to *pallescens*, and if their ranges were continuous intergradation might well be expected.

Although *niveiventris* and *phasma* are slightly larger and apparently isolated from the smaller *polionotus* and *roadsi*, the relationship of all four is so close that it seems best to treat them as subspecies. Specimens from Gainesville, Fla. (*subgriseus*), are intermediate in color between *niveiventris* and *polionotus*, and the difference in size is so slight and so nearly bridged by individual variation that it seems very probable that intergradation to the last degree will yet be found.

Specimens examined.—Total number 108, from localities as follows:

Florida: Blitch Ferry, 1; Gainesville, 45.

Georgia: Butler, 24; 'Georgien,' 1 (type); Hursman Lake, 37.

PEROMYSCUS POLIONOTUS NIVEIVENTRIS (CHAPMAN).

Hesperomys niveiventris Chapman, Bull. Am. Mus. Nat. Hist., N. Y., II, p. 117, June, 1889.

Peromyscus niveiventris Bangs, Proc. Biol. Soc. Wash., X, p. 122, 1896.

Type locality.—East Peninsula, opposite Micco, Fla.

^a Syn. Mamm., II, p. 177, 1845.

Geographic distribution.—Sandy beach region of the eastern coast of Florida.

Characters.—General characters much as in *polionotus* but size slightly larger and color paler; color of upperparts chiefly pale ochraceous buff, underparts creamy white to roots of hairs.

Color.—Unworn pelage: Ground color of upperparts pale ochraceous buff, brighter on head and back and paler across shoulders and nape; upperparts with a fine delicate mixture of brownish dusky throughout but not greatly modifying the buffy which dominates the general effect; underparts pure creamy white to roots of hairs; white of underparts extending well up on sides, sometimes produced so as to reach the lower edge of the eye; white of sides near lateral line not extending to roots of hairs which are slaty gray at base like those of the upperparts; ear conch dusky, thinly clothed with buffy white hairs; subauricular tufts chiefly buffy, but with a few dusky and a few white hairs; feet and fore legs white; hind legs white except a pale buffy area from 'ankle' to body; tail indistinctly bicolor, buffy white below and on sides, pale brownish buff on top. Worn pelage: Similar to unworn pelage but brighter with dusky tone entirely eliminated, hairs tipped with rusty, tail very indistinctly bicolor. Young in first coat: General effect of upperparts smoke gray produced by slate gray underfur overcast by buffy white. Adolescents: Darker and more grayish than adults, otherwise similar.

Skull.—Essentially as in *P. polionotus*, but larger; molar teeth larger.

Measurements.—Average of 10 adult topotypes: Total length, 139 (128–153); tail vertebrae, 52 (50–60); hind foot, 18.1 (17–19); ear from notch (dry), 12.4 (11.6–13.5).

Type specimen.—No. $\frac{1}{3}\frac{1}{3}\frac{1}{3}$ American Museum of Natural History, New York. ♂ adult. March 3, 1889. F. M. Chapman. Skin in fair condition; skull with right zygoma somewhat broken but repaired so that no parts are missing.

Remarks.—The range of *niveiventris* as worked out by Bangs is very limited, including only the narrow strip of beach on the eastern coast of Florida where sea oats (*Uniola*) grow. This, however, does not of necessity preclude the possibility of intergradation with *polionotus*, the range of which is often interrupted, as is that of *bairdi*, which covers a wide area, but only on prairies and uplands, so that many small colonies are considerably isolated.

The color of the underparts in *niveiventris*, *phasma*, *albifrons*, and *rhoadsi*—white to the roots of the hairs—is unique within the genus with one exception. This is *P. l. ammodytes* from Monomoy Island, Massachusetts, which also lives on sandy beaches near salt water. *P. m. margaritae* from Lower California also shows much

superficial resemblance to it. Such parallel development from the same apparent causes suggests that purely physical processes may have determined it.

Specimens examined.—Total number 188, from localities as follows:

Florida: Canaveral, 8; Hillsboro Inlet, Dade County, 2; Jupiter Island, 22; Lake Worth, 3; Oak Lodge, opposite Mico, 149; Palm Beach, 4.

PEROMYSCUS POLIONOTUS PHASMA BANGS.

Peromyscus phasma Bangs, Proc. Bost. Soc. Nat. Hist., XXVIII, pp. 199-200, March, 1898.

Type locality.—Point Romo, Anastasia Island, Florida.

Characters.—Similar in size to *niveiventris*, but pallid color much accentuated; white markings more extensive; nose and spots over the eyes and at base of ears pure white and very conspicuous.

Color.—Upperparts pinkish buff with a grayish tinge in the middle of the back; nose, a spot above the eye, and a spot at the base of the ear white; underparts pure white to the roots of the hairs, the white extending farther up on the sides than in *niveiventris*; feet and both fore and hind legs pure white all around; tail white, unicolor, or with faint traces of dusky on the upper side; ears grayish white within and without.

Skull.—As in *P. p. niveiventris*.

Measurements.—Average of 10 adult topotypes: Total length 138.5; tail vertebræ 53.5; hind foot 18.7; ear from notch 14.

Type specimen.—No. 7173 Museum of Comparative Zoology, Cambridge, Mass.; formerly in collection of E. A. and O. Bangs. ♂ adult. Feb. 14, 1897. O. Bangs. Skin practically perfect; skull without first upper molar, otherwise perfect.

Remarks.—This form shows an extreme of paleness. It is thus quite the antithesis of *polionotus*. In general terms, therefore, *niveiventris* is intermediate in color between *phasma* and *polionotus*. Although individual variation in *niveiventris* does not reach the normal type of *phasma*, variation in that direction is not infrequent, as shown by certain specimens with incipient white superciliary spots and the white of the underparts extending to the lower margin of the eye.

Specimens examined.—Total number 54, all from the type locality.

PEROMYSCUS POLIONOTUS RHODASI BANGS.

Peromyscus subgriscus rhodasi Bangs, Proc. Bost. Soc. Nat. Hist., XXVII, pp. 201-202, March, 1898.

Type locality.—Head of the Anclote River, Hillsboro County, Fla.

Geographic distribution.—West central Florida, in the vicinity of Tampa Bay.

Characters.—Similar to *P. niveiventris*, but size smaller; color averaging slightly darker; hairs of underparts white to roots or very slightly slaty at bases.

Color.—Similar in general to that of *niveiventris*, but averaging darker, thus being intermediate between *niveiventris* and *polionotus*. Type in slightly worn pelage (May): Upperparts, sides, head, cheeks, etc., rather dark ochraceous buff (slightly deeper colored than in *niveiventris*), sparingly mixed with dusky; underparts creamy white, locally with traces of pale slaty at bases of hairs; ears rather darker than in *niveiventris*; feet white; tail white above and below distally, narrowly brownish buffy above proximally for about half its length.^a Unworn pelage (as partially indicated by available material): Similar to that of *niveiventris*, but slightly darker and more grayish.

Skull.—Similar to that of *niveiventris* and *polionotus*, but smaller than in either.

Measurements.—Type: Total length 124.5; tail vertebræ 46; hind foot 16.5. Average of 10 adults from Tarpon Springs, Fla., and vicinity: 126; 47; 17.

Type specimen.—No. 6980 Museum of Comparative Zoology, Cambridge, Mass., formerly in collection of E. A. and O. Bangs. ♂ adult, old. May 23, 1895. W. S. Dickinson. Skin in fair condition. Skull perfect, except for a slight break in the left audital bulla; crowns of molars greatly worn.

Remarks.—As suggested by Bangs, this form may range throughout southwestern Florida. Its relationship to *polionotus* is close, and specimens having some slaty gray at the bases of the hairs of the underparts are not uncommon even among those from the vicinity of the type locality. Except for its small size, its characters are intermediate between those of *niveiventris* and *polionotus*. Specimens from Citronelle, although strongly approaching *polionotus*, seem better referable to *rhoadsi*.

Specimens examined.—Total number 23, from localities as follows:

Florida: Head of Anclote River, 6; Citronelle, 2; Cootle River, 4; Tarpon Springs, 11.

PEROMYSCUS POLIONOTUS ALBIFRONS subsp. nov.

Type from Whitfield, Fla. No. 1297 Carnegie Museum, Pittsburg, Pa. ♀ adult. Apr. 17, 1903. W. E. Clyde Todd.

Geographic distribution.—Coast of western Florida and Alabama.

Characters.—Similar to *P. p. rhoadsi*, but white of underparts more extensive; end of nose and narrow stripe extending nearly to

^a Specimens having the tail entirely unicolor are to be found as in *niveiventris*; in the type of *rhoadsi* the upper and lower sides of the tail were reversed in preparing the specimen and the color of the natural upper side is easily overlooked.

interorbital region white or whitish; white of underparts reaching lower border of eye; thighs whitish with little or no extension of body color on inner sides.

Color.—General color of upperparts much as in *P. p. rhoadsi*; back and sides in slightly worn pelage (April) grayish fawn; hairs of underparts white to roots or very slightly plumbeous at bases; end of nose white and thence narrowly white or whitish on median line to the lower forehead between the eyes; white of underparts extending to lower border of eye; feet and legs white all around, thighs without extension of body color; ears broadly edged with white and with a few white hairs at bases; tail white all around except basal third or fourth, the upper side of which is pale grayish brown.

Skull.—Similar to that of *P. p. rhoadsi*, but slightly larger; molar teeth slightly larger.

Measurements.—Average of 10 adult topotypes: Total length 130 (122–136); tail vertebræ 49 (44–53); hind foot 17.5 (17–19).

Remarks.—So little mammal collecting has been done in the eastern Gulf States, except in peninsular Florida, that the discovery of this well-marked form in the western or 'panhandle' part of Florida is not surprising. It was first received from W. E. Clyde Todd, Assistant Curator, Section of Vertebrate Zoology, Carnegie Museum, who collected the type series. Later, specimens were secured on the coast of Alabama by A. H. Howell of the Biological Survey.

Specimens examined.—Total number 19, from localities as follows:

Alabama: Bon Secour, 6.*

Florida: Whitfield, 13.

PEROMYSCUS MELANOTIS ALLEN AND CHAPMAN.

Peromyscus melanotis Allen and Chapman, Bull. Am. Mus. Nat. Hist., N. Y., IX, p. 203, June 16, 1897.

Peromyscus cecillii Thomas, Ann. & Mag. Nat. Hist., Lond., Ser. 7, XI, pp. 486–487, May, 1903—Santa Barbara Camp, S. slope Mount Orizaba, Puebla, Mexico.

Peromyscus melanotis zamelas Osgood, Proc. Biol. Soc. Wash., XVII, p. 59, Mar. 21, 1904—Colonía García, Chihuahua, Mexico.

Type locality.—Las Vigas, Veracruz, Mexico. Altitude, 8,000 feet.

Geographic distribution.—Higher slopes of the principal mountains of Mexico north of the States of Guerrero and Oaxaca. Extending along the Cordillera of Veracruz; westward from Mount Popocatepetl to the Sierra Nevada de Colima, and northward into the Sierra Madre of Durango and Chihuahua. Transition and Canadian zones, from 7,000 feet to 12,000 feet altitude.

* Received too late for use in connection with the distribution map (Plate I).

Characters.—Size small; tail very short; pelage usually very long and lax. Most similar to *P. m. labecula*, but slightly smaller; braincase broader and more rounded; rostrum decidedly longer and more slender.

Color.—Winter pelage: Sides and most of upperparts tawny ochraceous lightly lined with dusky; median dorsal area between shoulders and rump distinctly darker than rest of upperparts, but always mixed dusky and tawny; lower cheeks and narrow lateral line tawny ochraceous; a very narrow dusky orbital ring; ears dusky brownish with whitish edgings; ear tufts not prominent, same

FIG. 1.—Distribution of *Peromyscus melanotis*.

color as surrounding parts; a very small dusky spot at base of whiskers; underparts pure white; hands and feet white; outer side of 'ankles' dusky brownish; tail very sharply bicolor, sooty brownish above, white below. Summer pelage: Sides tawny ochraceous, clouded with sooty; middle of back, from shoulders to base of tail, nearly black, with only slight mixture of tawny; dusky markings more extensive than in winter pelage, otherwise similar. Young: Sides pale hair brown overlaying deep slate color; middle of back blackish slate; underparts washed with white.

Skull.—About the size of that of *P. m. sonoriensis*; characterized chiefly by long, slender rostrum and nasals, decidedly longer than

in *P. m. fulvus* or *P. m. labecula*; nasals more compressed posteriorly; braincase more rounded; interorbital space narrower; prezygomatic notch less prominent; audital bullae slightly smaller; teeth about as in *P. m. fulvus*, smaller than in *labecula*.

Measurements.—Adult ♂, topotype: Total length, 148; tail vertebrae, 58; hind foot, 21. Average of 6 adults from Perote and Cofre de Perote, Veracruz: 155 (132–168); 64 (58–66); 20.7 (20–21.5); ear from notch (dry), 18 (17–19.2). Of 5 from Mount Orizaba: 164.4 (155–172); 71.8 (64–79); 21.7 (21–23). Of 10 from Mount Tancitaro, Michoacan: 167 (160–175); 77.5 (71–81); 21.5 (21–22).

Type specimen.—No. 13551 $\frac{1}{2}$ American Museum of Natural History, New York. ♂ adult. April 30, 1897. F. M. Chapman. Specimen in good condition. Skin in "left over" winter pelage, quite pale, with very little black on dorsum.

Remarks.—The small size and short tail of *P. melanotis* distinguish it from all other Mexican species except those of the *maniculatus* and *leucopus* groups. From the species of both of these groups it differs in cranial characters, particularly in the length and slenderness of the rostrum. Its long full pelage and short, sharply bicolor tail readily distinguish it from *texanus*, *mesomelas*, etc. It does not have the conspicuous ear tufts of *labecula* and *fulvus*, and its ears are larger and darker than in either of these. Nevertheless, specimens in certain pelages are not always distinguishable by external characters except size. It is found at high altitudes on most of the loftier mountains of central Mexico, and, though absolutely isolated in many such places, it shows remarkably little deviation from one general type. The variation is so slight that there seems to be no logical basis for the separation of local forms. The species shows considerable seasonal variation, however. In most Mexican species change of pelage seems to be irrespective of season. In this mountain species, however, distinct winter and summer pelages occur. As no specimens taken at one locality at different seasons are available, it is difficult to be sure that there are two yearly molts in this species, but the present material seems to indicate two. At any rate, all the winter specimens are in a relatively light-colored pelage and all the summer ones are in a darker pelage. Moreover, spring (May) specimens from Cofre de Perote, Veracruz, are changing from a worn, light-colored pelage to a fresh dark state, while fall (October) specimens from Salazar, Mexico, show a worn, dark pelage, which is being replaced by a fresh, light-colored one. *P. cecilia* was based on specimens of *P. melanotis* in summer pelage. Specimens taken in April on the west slope of Mount Orizaba at an elevation of 9,500 feet are in somewhat worn winter pelage, and show very little black. They do not differ from ordinary *melanotis* from numerous localities. There is only slight variation in cranial characters. Specimens from

Mount Tancitaro are a trifle larger and have rather wider nasals than usual. Similar specimens may be found in any good series from elsewhere. The molar teeth are somewhat larger than usual in series from Ajusco and Salazar, Mexico. The specimens representing the supposed form '*zamelas*' are very extensively black and are from a region greatly removed from the type locality of *melanotis*, but probably represent the extreme phase of the ordinary summer pelage.

Specimens examined.—Total number 203, from localities in Mexico, as follows:

Chihuahua: Colonia Garcia, 8; Sierra Madre near Guadalupe y Calvo, 18.
Durango: Coyotes, 8; near El Salto, 5; near Guanacevi, 3.

Hidalgo: Sierra de Pachuca, 3; Tulancingo, 1.

Jalisco: Sierra Nevada de Colima (12,000 feet), 8.

Mexico: Ajusco, 14; southwest slope Mount Iztaccihuatl (13,500 feet), 3; north slope Mount Popocatepetl (11,500 feet), 12; Salazar, 28; north slope Volcan Toluca, 15.

Michoacan: Mount Tancitaro (12,000 feet), 27.

Morelos: Huitzilac, 6.

Puebla: West slope Mount Orizaba (9,500 feet), 7; Mount Orizaba, 15.

Tamaulipas: Miquihuana, 1.

Veracruz: Cofre de Perote (12,500 feet), 10; Las Vigas, 3; Perote, 1; Santa Barbara Camp, Mount Orizaba, 3.

Zacatecas: Valparaiso Mountains, 4.

Key to subspecies of *Peromyscus leucopus*.

a. Habitat north of Mexico.

b. Hairs of underparts chiefly white basally. Monomoy Island, Massachusetts.

P. l. ammodytes

bb. Hairs of underparts chiefly slaty basally.

c. Color largely tawny or ochraceous buff. Chiefly eastern and northern.

d. Size large; hind foot 22-24; greatest length of skull usually more than 27; rostrum and nasals longer. Marthas Vineyard, Massachusetts

P. l. fusus

dd. Size smaller; hind foot 20-23; greatest length of skull usually less than 27; rostrum and nasals shorter.

e. Color darker, usually with a well-differentiated dorsal stripe. Chiefly east of the 100th meridian.

1. Color darker; size smaller. Southern.....*P. l. leucopus*

2. Color paler; size larger. Northern.....*P. l. noveboracensis*

ee. Color paler, usually with dorsal stripe only slightly developed or absent. Chiefly west of the 100th meridian.

1. A slight dorsal stripe usually evident.....*P. l. aridulus*

2. No dorsal stripe evident.....*P. l. ochraceus*

cc. Color largely fawn or vinaceous cinnamon. Chiefly Texas, New Mexico, and Arizona.

d. Size larger; hind foot 21-24; molars larger; maxillary tooththrow about 4.

e. Color paler.....*P. l. tornillo*

ee. Color slightly darker.....*P. l. arizonæ*

dd. Size smaller; hind foot 20-23; molars smaller; maxillary tooththrow less than 4.....*P. l. tezanus*

aa. Habitat Mexico.

b. Color chiefly pale fawn with relatively little dusky mixture.

c. Habitat south of lat. 20° north.....*P. l. affinis*

cc. Habitat north of lat. 20° north.

d. Size larger; molars heavier; maxillary tooththrow about 4. Chiefly north-western.

1. Color paler.....*P. l. tornillo*

2. Color slightly darker.....*P. l. arizonæ*

- dd. Size smaller; molars weaker; maxillary tooththrow less than 4. Chiefly northeastern *P. l. texanus*
- bb. Color chiefly dusky or rich dark fawn largely mixed with dusky.
- c. Color slightly paler; adolescents not very blackish above. Peninsula of Yucatan and adjacent islands.
1. Size larger; skull and teeth heavier. Cozumel Island *P. l. cozumelæ*
2. Size smaller. Mainland of Peninsula of Yucatan *P. l. castaneus*
- cc. Color slightly darker; adolescents with blackish dorsum. Veracruz and Puebla *P. l. mesomelas*

PEROMYSCUS LEUCOPUS (RAFINESQUE).

(Pl. VI, fig. 4.)

Musculus ^a *leucopus* Rafinesque, Am. Monthly Mag., III, p. 446, October, 1818.*Mus leucopus* Desmarest, Mammalogie, II, p. 307, 1822.*Hesperomys leucopus* Le Conte, Proc. Acad. Nat. Sci. Phila., p. 413, 1852.*Hesperomys (Vesperimus) leucopus* Coues, Proc. Acad. Nat. Sci. Phila., p. 178, 1874.*Vesperimus americanus* Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, p. 297, June 30, 1891 (part).*Peromyscus leucopus* Thomas, Ann. & Mag. Nat. Hist., ser. 6, XV, p. 192, footnote, February, 1895.*Type locality*.—Western Kentucky; assumed to be near the mouth of the Ohio River.*Geographic distribution*.—Western Kentucky south to southern Louisiana, west to Indian Territory, and east around the southern end of the Allegheny Mountains to eastern Virginia. Lower Austral zone.*Characters*.—Size medium (hind foot about 20); tail usually shorter than head and body (rarely exceeding 80); tail evenly clothed with short hairs, decidedly less hairy than in *P. m. gracilis*; proximal two-fifths of hind foot hairy; ears medium (about 14 from notch) and thinly haired.*Color*.—No. 132230, Mer Rouge, La., February 12, in new pelage: General color of upperparts Mars brown rather coarsely mixed with dusky; middle of back only slightly darker than remainder of upperparts; ears dusky, very narrowly margined with whitish, no white spots at bases; face like sides, no definite orbital ring, whiskers blackish above, white below; tail dusky brownish above, white below; hands and feet white, upper side of forearm dusky, 'ankles' brownish; underparts white somewhat modified by a slaty undercolor. No. 70984, Avery, La., March 10, pelage beginning to wear: Ground color of upperparts much as in No. 132230 but slightly more reddish; dusky mixture stronger and dark dorsal area more definitely different from

^a The generic name *Musculus* was at one time mentioned by Coues (Monogr. N. Am. Rodentia, p. 46, 1877) as having claims for recognition instead of *Hesperomys*, then in use. It antedates *Peromyscus*, but since it is merely an emended form of *Mus* and was definitely stated to be such by Rafinesque, it has no standing.

sides. No. 71607, Hickman, Ky., April 26, pelage much worn: Sides and head rather dark cinnamon rufous without mixture of dusky, but with occasional brownish hairs: middle of back darker, nearly russet, brownish hairs more numerous. Adolescent, No. 33978,

FIG. 2.—Distribution of *Peromyscus leucopus* and subspecies.

Houma, La., May 14: Upperparts Prout brown heavily mixed with dusky.

Skull.—Averaging slightly smaller than in *P. l. noveboracensis*; decidedly smaller than in *P. gossypinus*; molar teeth and audital bullæ smaller; zygoma less deeply notched by infraorbital foramen;

palatine slits usually narrower at either end than in the middle, thus together being elongate fusiform in shape; palatine slits usually ending well in advance of the plane of the front of first upper molar; premaxilla somewhat swollen laterally in front of infraorbital foramina; interparietal moderate, about three times as long transversely as longitudinally.

Measurements.—Two specimens from Big Sandy, Tennessee: Total length, 180, 175; tail vertebrae, 78, 73; hind foot, 22, 20; ratio of tail vertebrae to total length, 0.433, 0.417. Average of 6 adults from Houma, La.: 166.5 (158–177); 77 (73–80); 20.5 (20–21); ear from notch (dry) 13.7 (13.4–14). One adult from Hickman, Ky.: 168; 73; 19.

Type specimen.—Not known to be in existence.

Remarks.—The species *Peromyscus leucopus*, considered as a group, is naturally divisible into three subspecies in the northeast and several others (*texanus*, etc.) in the southwest. The three forms of the northeast are well characterized at the extreme points of their range, which may be said to represent the apices of a triangle. They range without interruption from one to the other with complete intergradation. If these forms could be redescribed and new types designated, we should take the type of one from central New England, another from eastern Montana, and the third from southern Louisiana. The actual type locality of *leucopus*, however, is between the extremes, and the name must be used for one of two forms neither of which is well developed at this locality. With a rather meager representation of specimens from the type region of *leucopus*, it has seemed best to apply the name to the dark southern form, which is well developed in southern Louisiana and ranges north to western Tennessee and Kentucky, where it begins to show tendencies toward *P. l. noveboracensis*. Rafinesque does not give an exact locality in proposing the name *leucopus*, but in prefacing a number of descriptions, including that of *Musculus leucopus*, says:

I have visited since the lower parts of the Ohio, the Wabash, Green River, Barrens, Prairies, and the States of Indiana, Illinois, etc., where I have added much to my former discoveries.

One of the species (?) (*Gerbillus megalops*) named on the same page with *Musculus leucopus*, is said to be found "in the barrens of Kentucky." No other mention of locality is made. Recent authors have in several instances considered the 'pine barrens of Kentucky' as the type locality. Since, however, the original locality mentioned was inclusive, it seems permissible to select a definite locality from among those known to have been visited by Rafinesque on the trip mentioned above. Apparently the most southern locality visited by him was the mouth of the Ohio River, and as it is desirable to apply the name *leucopus* to the southern form of the group, this may be

considered the type locality. The only specimens I have seen from this region are those of a small series from Hickman, Ky. These, while evidently somewhat intermediate, are nearer to the dark southern form, and therefore the name *leucopus* is applied to this form rather than to the northern one, for which the name *noveboracensis* is available.

The long use of the name *leucopus* warrants its retention, even if it be necessary to construe its author liberally. The applicability of Rafinesque's description, however, is scarcely to be doubted, although he describes absolutely 'impossible' species (?) on the same page. The entire description is as follows:

7. *Musculus leucopus* R. (White feet mouse.) Body brownish, fallow above, white beneath, head fallow, ears large, blackish, tail as long as the body, pale brown above, gray beneath, legs and feet white. Length 5 inches.

The difference between *leucopus* and *noveboracensis* is not sufficiently marked so that individual specimens can be invariably identified. Still, specimens in absolutely comparable pelages are usually noticeably different. The character of *leucopus* consists in a sort of saturate or intensified color. As usual in such cases, there is a tendency toward the extension of the dark body color to parts which are white in paler forms. Thus, a tawny pectoral spot is found frequently in *leucopus*, but rarely or never occurs in *noveboracensis*. The color of the upperparts extends also to the upper side of the forearm in *leucopus*, and to a less degree or not at all in *noveboracensis*. The pelage of *leucopus* is shorter and possibly harsher than that of its northern representative. The winter pelage is not so long and full, and the period is shorter during which it does not show marked effects of abrasion. *P. leucopus* intergrades with *noveboracensis* on the north and probably with *texanus* on the west. Specimens from intermediate points have been referred, sometimes rather arbitrarily, to the form they appear to resemble most. A series from the Dismal Swamp, Virginia, is thus placed with *leucopus*, although it shows decided tendencies toward *noveboracensis*. Specimens from the border region between the Upper and Lower Austral zones are more or less intermediate. The only species of *Peromyscus* found within the range of *leucopus* which is at all likely to be confused with it is *P. gossypinus*, which may be distinguished chiefly by its larger size and usually by its more dusky coloration. The skull of *leucopus* is smaller and less massive than that of *gossypinus*, and the molar teeth are decidedly smaller.

Specimens examined.—Total number 309, from localities as follows:

Alabama: Greensboro, 8.

Georgia: Chickamauga Park, 2 (doubtfully referred).

Kentucky: Hickman, 8; Mammoth Cave, 2 (not typical).

Louisiana: Avery, 1; Houma, 17; Lafayette, 2; Mer Rouge, 4; Tallulah, 5.

Mississippi: Washington, 2.

- North Carolina:** Apex, 6; Chapanoke, 14; Currituck, 14; Raleigh, 52; Raleigh County, 8; Old Richmond, 1; Roanoke Rapids, 5; Rural Hall, 2.
- Oklahoma:** Fort Gibson, 1; Hartshorn, 2; Orlando, 1; Red Oak, 6.
- South Carolina:** Calhoun Falls, 4; Catawba, 3.
- Tennessee:** Arlington, 3; Big Sandy, 10; Briceville, 1; Clarksville, 4; Danville, 1; Dunbar Cave, 1; Nashville, 5; Samburg, 5; Watauga Valley, 5.
- Virginia:** Cappahosie, 4; Dismal Swamp, chiefly from Lake Drummond, 79; Hampton, 9; Newport, 3; Suffolk, 4; Tazewell, 5.

PEROMYSCUS LEUCOPUS NOVEBORACENSIS (FISCHER.)

(Pl. V, fig. 9; Pl. VI, figs. 8-8a; Pl. VII, fig. 3; Pl. VIII, figs. 2, 2A, 2B, 2C.)

Mus agrarius americanus Kerr, Anim. Kingd., p. 231, 1792; not *Mus americanus* Kerr, l. c., p. 227.

Mus xylaticus ♂ *noveboracensis* Fischer, Synopsis Mamm., p. 318, 1829.

Cricetus myoides Gapper, Zool. Journ., V, p. 204, Pl. X, 1830—Between York and Lake Simcoe, Ontario.

Arvicola emmonsii DeKay in Emmons, Rept. Quad. Mass., p. 61, 1840—Massachusetts.

Peromyscus arboreus Gloger, Hand u. Hilfsbuch Naturgesch., I, p. 95, 1841.

Mus michiganensis Audubon and Bachman, Journ. Acad. Nat. Sci., Phila., pp. 304-306, 1842—Erie Co., Mich. (=Ohio).

Hesperomys campestris Le Conte, Proc. Acad. Nat. Sci. Phila., VI (1852-53), p. 413, 1853—New Jersey.

Vesperimus americanus Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, p. 297, June 30, 1891 (part).

Sitomys americanus Miller, Proc. Biol. Soc. Wash., VIII, p. 55, June 20, 1893.

Peromyscus leucopus noveboracensis Miller, Proc. Boston Soc. Nat. Hist., XXVIII, p. 22, April 30, 1897.

Peromyscus leucopus minnesotæ Mearns, Proc. Biol. Soc. Wash., XIV, pp. 154-155, August 9, 1901—Fort Snelling, Minn.

Type locality.—New York.

Characters.—Similar to *P. leucopus*, but averaging paler and slightly larger; pelage longer and softer; tail more thickly clothed with hair.

Geographic distribution.—Upper Austral and Transition zones of the eastern United States and Canada. Extending from Nova Scotia to central Minnesota, thence south through the humid parts of eastern Nebraska and Kansas and eastward to the Atlantic coast, following quite closely the boundary between the Lower and Upper Austral zones on the south and that between the Transition and Canadian on the north.

Color.—Similar to that of *P. leucopus*, but lighter and brighter; underparts usually pure white, entirely concealing undercolor; tail less distinctly bicolor. No. 69902, ♀ adult, November 25, Ossipee, N. H., new winter pelage: Upperparts cinnamon rufous, lightly mixed with dusky lines on sides, more heavily on middle of back; underparts creamy white; hands, feet, and forearms white; 'ankles'

slightly brownish; ears dusky brownish with pale whitish edges; tail white below, dusky above. No. 126310, ♂ adult, April, Newburgh, N. Y., pelage slightly worn: Similar to No. 69902, but sides brighter, less mixed with dusky; dark dorsal area more contrasted with sides. No. 98776, ♂ adult, June 10, Eliot, Me., pelage much worn: General color of upperparts bright tawny, shading to dark cinnamon rufous in middle of back; sides nearly pure tawny with very few dusky tipped hairs and few brownish tipped ones. No. 76386, adolescent ♀, Ossipee, N. H., Dec. 30: Sides, face, etc., fawn color lightly mixed with dusky; middle of back decidedly darker.

Skull.—Practically as in *P. leucopus*; averaging very slightly larger.

Measurements.—Average of 10 adults from Montauk Point, New York: Total length, 173.4 (163–188); tail vertebræ, 77.5 (73–83); hind foot, 21.4 (21–22); ratio of tail vertebræ to total length, 43.5; ear from notch (dry) 14.3 (13.6–14.7). Of 10 adults from Ossipee, N. H.: 166.4 (159–182); 79 (75–88); 21 (20–22). Of 10 adults from Fort Snelling, Minn.: 181.7 (175–187); 77.5 (72–80); 21.4 (20.5–22).

Type specimen.—Not known to be extant.

Remarks.—By restricting the name *leucopus* to the Lower Austral form, the subspecies of the northern and eastern United States which has usually been known as *leucopus*, will be called *noveboracensis*. It is perhaps the best known of the white-footed mice, as it ranges over the most thickly populated part of the United States. Within its range at least two other species are found—*P. gracilis*, which is longer tailed and duller colored, and *P. bairdi*, which is decidedly smaller and usually more dusky in color. The name 'deer mouse' seems to have been given it because of its supposed seasonal change of color, corresponding to that of the Virginia deer. Adult mice, however, do not show such marked seasonal difference in color as the deer. The gray and the 'red' coats of the deer are those of winter and summer, but those of the mice are of the adolescent and the fully mature, regardless of season. The pelage of the adult is almost continually changing, although it appears to be entirely renewed only once a year. The entire new pelage is acquired in late summer or fall, varying from June to November, usually but not always earlier in southern latitudes and later in northern. At first the new coat is rather short, particularly if the change has occurred in midsummer, and the color very uniform, with little or no contrast between sides and back. This coat gradually fills out and black or dusky hairs become more numerous in the mid-dorsal region, until it is somewhat darker than the sides. The dusky, however, is still somewhat mixed with tawny, and the amount of dusky varies in different individuals. This condition remains practically unchanged for the greater part of the winter. In spring (March to May) the pelage becomes

roughened by abrasion and the contrast between back and sides is heightened. The sides become brighter, more tawny, and the tips of the hairs in the middle of the back wear off, exposing more or less of the basal color, which is deep blackish slate. As abrasion continues the tawny hairs become deeper colored, and the dusky fades to cinnamon or tawny, and when the pelage is quite short new hairs begin to come in on the anterior parts. The pelage of the middle of the rump is the last to be renewed, and specimens may often be found in which the pelage is entirely new except a small patch of tawny or cinnamon rufous on the rump. In a general way it may be said that the new fall and winter conditions of pelage are paler and more yellowish, while the partially abraded conditions of spring and summer are brighter and more reddish.

The name *americanus* is the earliest one for this species, but being preoccupied can not be used. *Cricetus myoides* also undoubtedly refers to this mouse. *Arvicola emmonsii* and *Hesperomys campestris*^a are from localities inhabited only by this species, so there is no question of the propriety of placing them in the list of synonyms. The reference of *Mus michiganensis* to this form has been discussed under *P. m. bairdi* (see p. 81). *P. l. minnesotæ* does not seem to be sufficiently characterized to be recognized. It shows some slight average tendency toward *P. l. aridulus*, but is much nearer to typical *noveboracensis*. A very large series from the type region of *minnesotæ* contains a few specimens that are rather larger than the average *noveboracensis* and slightly paler; the rest are indistinguishable from typical *noveboracensis*. This seems to indicate a slight tendency toward *P. l. aridulus*, but since *minnesotæ* is so much nearer *noveboracensis*, and since there is not room for three forms, it seems best to treat *minnesotæ* as a synonym of *noveboracensis*. Specimens from Kansas, Nebraska, Iowa, etc., are not typical, tending toward either *leucopus* or *aridulus* or both. A few specimens from Nova Scotia have rather long tails, but the material is too scanty to warrant their separation.

Specimens examined.—Total number 2,084, from localities as follows:

Arkansas: Fayetteville, 1; Hardy, 4 (aberrant).

Connecticut: East Hartford, 24; Liberty Hill, 12.

District of Columbia: Vicinity of Washington, 155.^b

Illinois: Fox Lake, 1; Henderson County, 30; Parkersburg, 8; Warsaw, 3; West Northfield, 3.

^a The type of *H. campestris* is preserved in the U. S. National Museum (No. 4726), but is in such poor condition as to be little more than generically determinable. It has no skull, and the distorted skin appears to have been preserved originally in alcohol.

^b Including some localities in Virginia and Maryland.

- Indiana:** Bascom, 4; Du Bois County, 1; Denver, 6; Hebron, 4; Laporte, 5; Mitchell, 1; Mount Ayr, 2; New Harmony, 2 (position doubtful).
- Iowa:** Burlington, 57; Council Bluffs, 5; Knoxville, 10; Redfield, 1.
- Kansas:** Fort Leavenworth, 6; Fort Riley, 2; Lawrence, 24; Manhattan, 5; Neosho Falls, 2; Onaga, 7.
- Kentucky:** Eubank, 19; Lexington, 13 (aberrant).
- Maine:** Elliot, 3; Oakland, 1; Small Point, 2.
- Maryland:** Grantsville, 3; Hyattsville, 2; Laurel, 9; Plummer Island, 2; Rawlings, 2; Rockville, 1; Swanton, 3.
- Massachusetts:** Barnstable Neck, 17;^a Bedford, 11; Belmont, 2; Concord, 1; Lexington, 6; Malden, 2; Middleboro, 14; Monomoy Island, 51; Muskeget Island, 17; Nantucket Island, 13; Seehonk, 4; Sheffield, 4; South Hanson, 4; Wareham, 64; West Dedham, 5; Wilmington, 27.
- Michigan:** Ann Arbor, 10; Au Sable River, Oscoda County, 2;^b Grayling, 1;^b Manchester, 2; Spring Lake, 1.^b
- Minnesota:** Elk River, 21; Farmington, 1; Fort Snelling, 88; Hinckley, 1; Minneapolis, 9.
- Missouri:** Bismarck, 3; Hunter, 10; Kimswick, 1; Marble Cave, 2; Piedmont, 1; Stotesbury, 16; Williamsville, 2.
- Nebraska:** Havelock, 1;^c London, 1; Neligh, 1; South Auburn, 4; Verdigris, 2.
- New Hampshire:** Antrim, 5; Ossipee, 31; Summit, Mount Washington, 2 (introduced?); Webster, 11.
- New Jersey:** Alpine, Bergen County, 11; Bridgeton, 22; Cape May, 1; Chairville Bog, Burlington County, 1; Collingwood, Camden County, 12; Culver Lake, Sussex County, 24; Delaware Gap, 6; Fairview, 8; Fort Lee, 1; Granton, 10; Greenwood Lake, 28; Hackensack Marsh, 1; Haddonfield, 48; Lake Hopatcong, 3; Long Lake, Sussex County, 11; Mauricetown, 1; Mays Landing, 20; Nordhoff, 10; Pleasant Valley, 7; Port Norris, 3; Sandy Hook, 5; Sea Girt, 3; Tuckahoe, 23; Tuckerton, 42; Walkill Bottoms, Sussex County, 9.
- New York:** Catskill Mountains, 21; Cornwall, 2; Croton Falls, 1; Elizabethtown, 7; Garrison, 1; Hastings, 40; Highland, 2; Highland Falls, 23; Jamaica, Long Island, 8; Kiskatom, 6; Lake George, 38; Lake Grove, Long Island, 3; Lawyersville, 8; Locust Grove, 5; Miller Place, Long Island, 8; Montauk Point, 27; Newburgh, 2; New Rochelle, 1; Nyack, 40; Ossining, 2; Owego, 5; Peterboro, 8; Plum Island, 1; Schermerus, 1; Shelter Island, 2; Stamford, 8; Syracuse, 3.
- North Carolina:** Magnetic City, 1; Weaverville, 42.
- Nova Scotia:** Digby, 3; Newport, 3.
- Ohio:** Garrettsville, 5; Hicksville, 9; Madisonville, 1; Ravenna, 6; Sandusky, 2.
- Ontario:** Credit, 8; Lorne Park, 20; Toronto, 2; Woodham, 1.
- Pennsylvania:** Aldan, Delaware County, 1; Barren Ridge, 2; Bushkill Creek, Monroe County, 9; Clifton, Delaware County, 1; Cooks Mills, 32; Drury Run, 6; Erie, 2; Germantown, 7; Hopewell, Bedford County, 8; Jenkintown, 1; Keating, Clinton County, 4; Kings, Cambria County, 13; Lehigh Gap, 4; Manoa, 7; Marple, 4; Markleton, 1; Mount Union, 18; North Mountain, 1; Philadelphia (Penny-

^a Including some specimens approaching *ammodytes*.

^b Collection of University of Michigan.

^c Carnegie Museum.

pack Creek), 1; Porter Lake, Pike County, 6; Renovo, 3; Round Island, 10; Thorndale, 5; Tinicum, Delaware County, 16; Tuscarora, Juniata County, 2; Tyrone, 14; Valley Forge, 2; Waynesburg, 3; Westtown, 1; Wynnewood, 1.

Rhode Island: Block Island, 12; Chepachet, 10; Conanicut Island, 5; Fort Adams, 17; Lake Worden, 101; Middletown, 1; Newport, 6.

Vermont: Burlington, 2; Hartland, 12; Rutland, 4.

Virginia: Peaks of Otter, 1.

West Virginia: Franklin, 4; White Sulphur Springs, 67.

Wisconsin: Camp Douglas, 16; Delavan, 7; Milton, 2.

PEROMYSCUS LEUCOPUS AMMODYTES BANGS.

Peromyscus leucopus ammodytes Bangs, Proc. New Eng. Zool. Club, IV, pp. 14-15, Feb. 28, 1905.

Type locality.—Monomoy Island, off coast of Massachusetts.

Characters.—Upperparts decidedly paler than in *P. l. noveboracensis*; underparts pure white to roots of hairs; otherwise similar to *noveboracensis*.

Color.—December specimens: General color of sides pale fawn; middle of back darker, but somewhat mixed with fawn; median underparts pure creamy white to roots of hairs, this sometimes extending laterally almost to lower sides; hands and feet white; tail pale brownish fawn above, white below; ears pale brownish dusky thinly clothed with whitish hairs on the inside and on the marginal part of the outside.

Skull.—Practically as in *P. l. noveboracensis*.

Measurements.—Average of 10 adult topotypes: Total length 173 (161-190); tail vertebræ 79 (71-88); hind foot 20 (19.5-21); ratio of tail vertebræ to total length 45.6.

Type specimen.—In the Museum of Comparative Zoology, Cambridge, Mass. Formerly No. 828 Collection of E. A. and O. Bangs. ♂ adult. Dec. 28, 1893. O. Bangs and G. S. Miller, jr. Specimen nearly perfect.

Remarks.—Monomoy Island is a low, sandy island off the south-east coast of the Cape Cod Peninsula. It is periodically connected with the mainland by a long, narrow stretch of sand. Notwithstanding this, however, the island mice differ more markedly from those of the mainland than do those of any of the other islands in the vicinity, which are permanently cut off from the mainland. Typical *noveboracensis* also occurs on the island, and various intermediate stages between it and *ammodytes* are found. A slight tendency to albinism is noticeable in several specimens. Specimens with nearly white underparts are also found on the mainland at Barnstable Neck. Bangs (supra cit.), in writing of this very interesting mouse, says:

While pale grayish specimens, with pure white bellies, greatly predominate on Monomoy Island, there is still a wide range of variation in color, and a few individuals caught with the others are not distinguishable in any way from

mainland specimens, and between these and the palest examples every degree of intermediate occurs. The reason for this, I think, is very simple. Monomoy, though often in the course of its history an island, has been at other times joined to the mainland by a long beach. At such times skunks, cottontail rabbits, and foxes have worked their way to the island, and have established themselves there for at least a time. The deer mouse from the mainland probably has come in the same way, and from time to time has infused into the island form the very characters it was struggling to eliminate.

Specimens examined.—Total number 25^a, all from the type locality.

PEROMYSCUS LEUCOPUS FUSUS BANGS.

Peromyscus leucopus fusus Bangs, Proc. New Eng. Zool. Club, IV, p. 13, Feb. 28, 1905.

Type locality.—West Tisbury, island of Marthas Vineyard, off south coast of Massachusetts.

Geographic distribution.—Island of Marthas Vineyard, Massachusetts.

Characters.—Similar in general to *P. l. noveboracensis*, but somewhat larger; skull with slightly elongated rostrum.

Color.—As in *P. l. noveboracensis*.

Skull.—Larger and heavier than in *noveboracensis*; nasal and rostral region somewhat more elongated; audital bullæ relatively rather small.

Measurements.—Average of 6 adult topotypes: Total length, 194.4 (190–203); tail vertebræ, 90.7 (85–96); hind foot, 22.4 (21.5–23.5); ratio of tail vertebræ to total length, 46.6.

Type specimen.—No. 9737 Museum of Comparative Zoology, Cambridge, Mass.; formerly same number, collection of E. A. and O. Bangs. ♂ adult. June 17, 1899. O. Bangs. Specimen practically perfect.

Remarks.—The mice from Muskeget, Nantucket, Block Island, and other small islands off the southern coast of New England are somewhat more robust than typical *noveboracensis*, but none of them seem sufficiently characterized for recognition except those from Marthas Vineyard. These, however, are so decidedly larger than *noveboracensis* and their skulls so easily distinguishable by size and other slight peculiarities that they are well deserving of separation.

Specimens examined.—Total number 13, all from the type locality.

PEROMYSCUS LEUCOPUS ARIDULUS subsp. nov.

Type from Fort Custer, Mont. No. 75704 U. S. National Museum, Biological Survey Collection. Adult ♀. Nov. 12, 1895. J. A. Loring.

Geographic distribution.—Upper Sonoran zone of eastern Montana and Wyoming and the adjoining western parts of South Dakota and Nebraska; probably south to Oklahoma and west to eastern Colorado.

^a Of these, 13 are quite typical and 12 are evidently intermediate.

Characters.—Similar to *P. l. noveboracensis*, but larger and paler; somewhat similar to *P. m. nebrascensis*, but larger, with a longer tail; skull with wider braincase, larger audital bullæ, and larger molar teeth.

Color.—Similar to that of *P. l. noveboracensis*, but decidedly paler; dark dorsal area much reduced; ears pale. Type: Upperparts ochraceous buff very lightly mixed with dusky; middle of back somewhat darker than sides, but not sharply contrasted; head and face nearly like sides; underparts creamy white.

Skull.—Similar to that of *P. l. noveboracensis*, but larger and heavier; braincase usually wider; somewhat similar to that of *P. m. nebrascensis*, but braincase larger and wider; nasals broader; rostrum more depressed; premaxillæ less swollen laterally; outer edges of palatine slits less nearly parallel; molar teeth larger; audital bullæ larger.

Measurements.—Type: Total length, 177; tail vertebræ, 73; hind foot, 22; ear from notch (dry), 14.5. Average of 4 topotypes: 169 (160–177); 69 (63–73); 22 (21–23); 14.1 (13.6–15.5). Average of 5 adults from Valentine, Nebr.: 184 (170–196); 86 (75–90); 22.2 (21–23). Adult female from Buffalo Gap, S. Dak.: 205; 93; 22.

Remarks.—The range of this form is probably more extensive than is indicated by the specimens now at hand. It is probable that it extends down through western Kansas and meets that of *P. l. texanus*. Although its range is in the arid subdivision of the Upper Austral zone, it appears that it lives chiefly in the relatively humid parts of this region, that is, along the watercourses and in the slightly wooded places. The more open and relatively more arid parts of the region are inhabited by *P. m. nebrascensis*, which is often very nearly the same color as *P. l. aridulus*. *P. m. nebrascensis* is specifically distinct, however, and may be distinguished from *aridulus* not only by a combination of cranial characters, but also by its smaller size and shorter tail, and by the presence, in most cases, of definite white spots in front of the ears.

Specimens from eastern Nebraska and Kansas are apparently intermediate between *noveboracensis* and *aridulus*, having the darker color of *noveboracensis* and the larger size of *aridulus*.

The reference of specimens from Oklahoma to this form is rather unsatisfactory. There seems to be no other disposition of them, however, so far as can be judged by present material. The localities from which these specimens came are chiefly near the boundary between the humid and arid regions, and they are also near the line between the Upper and Lower Sonoran zones. If we suppose that *leucopus*, *texanus*, etc., have continuous distribution with gradual intergradation (and no doubt this is the case), we should expect to find speci-

mens in central Oklahoma intermediate in character between *aridulus* and *texanus* on the one hand and between *leucopus* and *texanus* on the other. Actual specimens meet all the requirements of the hypothetical case, not being exactly like any of the three species mentioned when compared with specimens from the respective type localities. They are more ochraceous than *texanus*, paler than *leucopus*, and slightly darker and more vinaceous than *aridulus*, and still not the same as *noveboracensis*, although some are quite similar to intermediates between *aridulus* and *noveboracensis* from eastern Kansas and Nebraska. If not referred to *aridulus*, they should be placed with *texanus*.

Specimens examined.—Total number 148, from localities as follows:

Minnesota: Browns Valley, 2 (approaching *noveboracensis*).

Montana: Crow Agency, 2; Custer Station, 2; Fort Custer, 11; Little Bighorn River, 1.

Nebraska: Cody (10 miles south), 4; Valentine, 9; head of Warbonnet Creek, 1.^a

South Dakota: Buffalo Gap, 1; Custer, 1; Spring Creek, 9; Squaw Creek, 6.

Oklahoma: Alva, 11; Apache, 1; Chattanooga, 3; Kiowa Agency (11 miles southeast of Fort Cobb), 1; Lawton, 1; 17 miles southeast of Fort Cobb, 1; Noble, 21; White Horse Spring, 16; Wichita Mountains (chiefly in vicinity of Mount Scott), 44.

PEROMYSCUS LEUCOPUS OCHRACEUS subsp. nov.

Type from Winslow, Ariz. No. 53301 U. S. National Museum, Biological Survey Collection. ♂ adult. Apr. 30, 1893. C. P. Streater.

Characters.—Similar to *P. l. tornillo* and *P. l. arizonæ*, but color ochraceous buff instead of fawn; no obvious dorsal stripe.

Color.—Ground color of upperparts bright ochraceous buff without suggestion of fawn; entire upperparts lightly lined with dusky, slightly more thickly on middle of back than on sides, but not forming a definite dorsal stripe; ears edged with creamy white; no white spots at base of ears; underparts white tinged with ochraceous buff; tail dusky brownish above, buffy white below; feet and hands buffy white; wrists marked with ochraceous buff.

Skull.—Practically as in *P. l. tornillo*; infraorbital part of zygoma very heavy.

Measurements.—Type and one topotype: Total length, 180, 173; tail vertebræ, 82, 82; hind foot, 22.5, 22.5.

Remarks.—This form is most closely similar in color to *P. l. aridulus*, differing in being slightly more ochraceous and in almost totally lacking any dark dorsal stripe. Its color is very much the same as that of highly colored examples of *P. m. nebrascensis*, from which it is distinguished by the numerous external and cranial characters of

the *leucopus* group. Its real relationship is probably with *tornillo* and *arizonæ* rather than *aridulus*. Specimens from Fort Verde, Ariz., are variable, some closely resembling *arizonæ* and others being deep ochraceous, somewhat darker than the type of *ochraceus*.

Specimens examined.—Total number 9, from localities as follows:

Arizona: Baker Butte, Mogollon Mountains, 1; Fort Verde, 6; Winslow, 2.

PEROMYSCUS LEUCOPUS TORNILLO (MEARNS).

(Pl. III, fig. 1.)

Peromyscus tornillo Mearns, Proc. U. S. Nat. Mus. XVIII, pp. 445-446, Mar. 25, 1896.

Peromyscus texanus flaccidus Allen, Bull. Am. Mus. Nat. Hist., N. Y., XIX, pp. 599-600, Nov. 14, 1903—Rio Sestín, Durango, Mexico.

Type locality.—Rio Grande, 6 miles above El Paso, Tex.

Geographic distribution.—Upper Sonoran zone and part of the Lower Sonoran of western Texas and eastern New Mexico; north to southeastern Colorado and south to northern Durango; northeast to western Oklahoma.

Characters.—Size, proportions, and cranial characters about as in *P. l. aridulus*; color very much paler, more fawn; back only slightly or not at all darker than sides; no white at base of ear. Similar to *P. l. arizonæ* but averaging paler. Similar to *P. l. texanus* but averaging larger and slightly paler; skull larger and more angular; molar teeth heavier.

Color.—No. 58379, ♀ adult, February 3, El Paso, Tex., in full winter pelage: Ground color of upperparts fawn color uniformly mixed with fine dusky lines; head and face about like back and sides; no white spot at base of ear; underparts pure creamy white; hands, feet, and arms white; 'ankles' white, except a faint brownish spot on outer side; ears dusky, rather broadly edged with whitish; tail indistinctly bicolor, pale brownish above, white below. Worn pelage: Brighter and more rufescent than winter pelage; general color ranging from pale fawn to vinaceous cinnamon.

Skull.—Practically the same as that of *P. l. aridulus*; averaging larger and more angular than in *P. leucopus* or *P. l. texanus*; molar teeth broader and heavier than in *texanus*. Compared with that of *P. m. blandus* the skull of *tornillo* is larger; braincase relatively wider and lower; nasals narrower, more convex, and more compressed posteriorly; premaxillæ more swollen laterally; palatine slits relatively shorter and with more lateral convexity; mandibles relatively shorter and thicker; lateral protuberance at base of lower incisor more prominent; angle below mandibular condyle shallower and more obtuse.

Measurements.—Average of 10 adults from the vicinity of El Paso, Tex.: Total length, 182 (171–202); tail vertebræ, 82.6 (75–97); hind foot, 22.5 (21–24); ratio of length of tail vertebræ to total length, 45.4; ear from notch (dry), 14.5 (13.9–15.3).

Type specimen.—No. 33333 U. S. National Museum. Adult ♂. Feb. 18, 1893. E. A. Mearns and F. X. Holzner. Specimen in good condition.

Remarks.—This subspecies occupies a considerable range in western Texas, northeastern Mexico, and nearly all of New Mexico, maintaining its characters with great constancy throughout. It intergrades on the west with *P. l. arizonæ* and on the southeast with *P. l. texanus*. Its relationship to *leucopus* is shown by specimens from central Oklahoma, which are evidently intermediate in color, and which have been referred tentatively to *aridulus*. Specimens from the "Panhandle" of Texas and from northeastern New Mexico (Clayton), while distinctly referable to *tornillo*, may be considered slightly intermediate between *tornillo* and *aridulus*; two immature examples from Canyon City, Colo., also approach *aridulus*.

The only synonym is *P. flaccidus* from northwestern Durango described by Allen who did not consider its relationship to *tornillo*, but compared it only with *arizonæ*, mentioning the characters which distinguish *tornillo* and *arizonæ*.

Specimens examined.—Total number 219, from localities as follows:

Chihuahua: Casas Grandes, 7; Chihuahua, 13; near Fort Bliss, Tex., 1; Juarez, 15.

Colorado: Canyon City, 2; Gaume Ranch, Baca County, 1;^a Lamar, 1;^a Monon, 1.^a

Durango: Rancho Santuario, 4; Río Sestín, 29; Río del Bocas, 3; Rosario, 4; San Gabriel, 4.

New Mexico: Cabra Spring, 1; Chamberino, 1; Clapham, 7; Clayton, 5; Corona, 1; Eddy, 1; Fort Sumner, 1; Jarilla, 1; Laguna, 1; La Mesa, 8; Manzano Mountains, 4; Mesa Jumanes, 2; Mesilla, 3; Organ Mountains, 6; Río Puerco, 7; near Roswell, 1; San Andres Mountains, 3; Sandia Mountains, 5; Santa Fe, 1; Santa Rosa, 1; Tularosa, 10.

Texas: Altuda, 2; Canadian, 3; near El Paso, 22; Fort Hancock, 1; Franklin Mountains, 7; Lipscomb, 11; Miami, 3; Mobeetle, 2; Palsano, 1; Sierra Blanca, 10.

United States and Mexican Boundary: 100 m. west of El Paso, 2.

PEROMYSCUS LEUCOPUS ARIZONÆ (ALLEN).

Sitomys americanus arizonæ Allen, Bull. Am. Mus. Nat. Hist., N. Y., VI, p. 321, November 7, 1894.

Peromyscus texanus arizonæ Miller and Rehn, Proc. Boston Soc. Nat. Hist., XXX, p. 84, December, 1901.

Type locality.—Fairbank, Cochise County, Ariz.

^a Collection of E. R. Warren.

Geographic distribution.—Southeastern Arizona and adjacent parts of Mexico and New Mexico.

Characters.—Similar to *P. l. tornillo*, but averaging slightly darker.

Color.—As in *texanus*, but usually slightly darker and with a greater amount of dusky admixture.

Skull.—Practically as in *P. l. tornillo*.

Measurements.—Average of 5 adults from Santa Cruz, Sonora, Mexico: Total length, 186 (178–193); tail vertebrae, 82.6 (78–85); hind foot, 22.6 (22–24). Two adults from San Pedro River, Arizona: 202; 94; 23.5—189; 87; 22.3.

Type specimen.—No. 4414 American Museum of Natural History. Adolescent ♂. March 13, 1894. W. W. Price and B. C. Condit. Specimen in good condition.

Remarks.—Many specimens of *arizonæ* and *tornillo* are absolutely indistinguishable. Large series, however, appear somewhat different when viewed as a whole. Some specimens of *arizonæ* are darker than any of *tornillo*, and conversely some *tornillo* are paler than any *arizonæ*. Darker color, then, may fairly be called an 'average character' of *arizonæ*. It may be distinguished from *sonoriensis*, with which it is often found, by its larger size, longer and less distinctly bicolor tail, by the absence of prominent white spots in front of the ears and by the same cranial characters which distinguish *tornillo* from *blandus*.

Specimens examined.—Total number 103, from localities as follows:

Arizona: Calabasas, 1; Fairbank, 31; Fort Lowell, 1; San Pedro River at Mexican boundary, 9; Tucson, 6; Turkey Tanks, 1.

New Mexico: Deming, 4; Gila, 6; Glenwood, 1; Redrock, 1.

Sonora: San Bernardino Ranch, 4; Santa Cruz, 26; Santa Cruz River, 8; Tubac, 3; Mission of Tumacacori, near Tubac, 1.

PEROMYSCUS LEUCOPUS TEXANUS (WOODHOUSE).

(Pl. III, fig. 12.)

Hesperomys texana Woodhouse, Proc. Acad. Nat. Sci. Phila., VI (1852-3), p. 242, 1853.

Vesperimus meurnsii Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, pp. 300–302, June, 1891.—Brownsville, Tex.

Peromyscus canus Mearns, Proc. U. S. Nat. Mus., XVIII, p. 445, March 25, 1896. Fort Clark, Tex.

Peromyscus texanus Mearns, Bull. U. S. Nat. Mus. No. 56, pp. 404–406, 1907.

Type locality.—Originally stated (probably erroneously) as the "Rio Grande, near El Paso," Texas. Assumed to be the vicinity of Mason, Mason County, Tex. (See Remarks p. 129).

Geographic distribution.—Southern Texas and eastern Mexico, chiefly in the States of Tamaulipas and Nuevo Leon; extending west to the vicinity of the mouth of the Pecos River, north to about lati-

tude 33° north, east to west side of Galveston Bay, and south to State of San Luis Potosi. Lower Sonoran zone.

Characters.—Similar to *P. l. tornillo*, but slightly smaller and darker; pelage usually shorter and more subject to abrasion; tail more scantily haired; skull smaller; molar teeth smaller.

Color.—No. 58580 from Brownsville, Tex. ♂ adult. Feb. 19, unworn pelage: Similar in general to *P. l. tornillo*, but ground color slightly deeper darker fawn, and mixture of dusky more copious; ears darker; tail slightly darker above. No. 30856, August 31, worn pelage: Upperparts pale fawn lightly mixed with cinnamon brown.

Skull.—Similar to that of *P. l. tornillo*, but averaging decidedly smaller; molar teeth particularly small and narrow.

Measurements.—Average of 10 adults from Brownsville, Tex.: Total length, 180 (170-190); tail vertebræ, 84.8 (81-95); hind foot, 20; ear from notch (dry), 14.8 (14.1-15.6). Average of 10 adults from Fort Clark, Tex.: Total length, 178 (160-195); tail vertebræ, 77 (68-91); hind foot, 21.5 (20.5-22.8).

Type specimen.—No type was designated by the original describer, but two of his specimens, supposed to have been the basis of the name, are still in the U. S. National Museum, No. $\frac{3}{2}\frac{7}{1}\frac{2}{1}\frac{5}{8}$, a skin in alcohol, and No. $\frac{3}{4}\frac{7}{1}\frac{1}{4}\frac{5}{8}$, a dry skin. The first of these was examined by Baird and enumerated in his list of specimens (Mamm. N. Am., p. 464, 1857). Later, Coues gives *Hesperomys texana* in synonymy under *H. leucopus* (Mon. N. Am. Rodentia, p. 51, 1877), and in parenthesis after the reference says: "(El Paso, Tex.; type, No. 2559, Mus. Smiths.)" The same specimen was again mentioned by Mearns (Proc. U. S. Nat. Mus., XVIII, p. 446, footnote, Mar., 1896), who says: "Two of Doctor Woodhouse's specimens are still in the U. S. National Museum. One of these, the type, is alcoholic, and the other a skin." These references doubtless account for the fact that No. $\frac{3}{2}\frac{7}{1}\frac{2}{1}\frac{5}{8}$, the alcoholic, now bears a red type label, while the other existing specimen, No. $\frac{3}{4}\frac{7}{1}\frac{1}{4}\frac{5}{8}$, does not. Besides the recent red type label, this specimen bears four others—a metal tag with the number 2559; a paper label, possibly the original collector's, with only the faintest indication of writing; another with the printed legend: "Monograph of American Muridae. Dr. Elliot Coues, U. S. A.," and under it "Type of," followed by the written words "*Hesp. texanus* Woodh. West. Texas. S. W. Woodhouse." On the back of this label we find "*=leucopus*." Still another label, comparatively fresh and in an unknown hand, repeats the ordinary data and gives a new name, from which it is to be inferred that someone considered naming the specimen in honor of Doctor Woodhouse. This specimen then is practically the type, although it might be argued that No. $\frac{3}{4}\frac{7}{1}\frac{1}{4}\frac{5}{8}$ is a cotype of equal importance. Fortunately, the two specimens appear to be conspecific, and the choice between

them is of no importance. The skin of No. $\frac{37}{2} \frac{62}{5} \frac{26}{6}$ is evidently so much shrunk that none of its dimensions can be relied upon. Its original color also has been altered beyond recognition. At present it is dark cinnamon above and dark dirty clay color below. The skull consists of seven separate fragments. The largest of these contains the nasals, part of the premaxillae, and both upper incisors. Both mandibles are present, and only slightly broken, all the teeth being intact. Three small bits of the maxillaries hold five of the upper molars. The braincase, bullae, palate, etc., are entirely absent. The skin of No. $\frac{34}{4} \frac{11}{1} \frac{55}{8}$ has been taken from alcohol and remodeled and dried. In color it is slightly lighter below and more reddish brown above than the other specimen, but it plainly shows the effect of a long immersion in alcohol. Its skull is slightly more complete, although very much shattered. The mandibles are perfect, and both upper and lower teeth are all present. It comprises 19 distinct fragments.

Remarks.—Waterhouse, in the original description of *Hesperomys texana*, says, "Habitat.—Western Texas," and in the same signature, under "Observations":

I procured this little animal on the Rio Grande near El Paso, while attached to the party under the command of Capt. L. Sitgreaves, U. S. Topographical Engineers, on our way to explore the Zuni and Colorado rivers.

In the introduction to his complete report,^a he says:

The party left San Antonio on the 7th of May passing over the road laid out under the direction of Bvt. Lieut. Col. J. E. Johnston, U. S. Topographical Engineers, in the year 1849, from San Antonio to El Paso, along which I made collections of considerable interest in the different departments of natural history.

The route laid out by Lieutenant-Colonel Johnston we find was as follows:^b

From San Antonio northwest to the San Saba River, via Fredericksburg, then westward to its source, from which he passed over to the Pecos at Live Oak Creek. He then proceeded to the Limpia River, and made his way to the Rio Grande by the road which strikes it about latitude 30° 33', thence he traveled to El Paso.

This exact definition of the route is of considerable importance in determining Woodhouse's material.

Among several forms of *Peromyscus* found in western Texas are three having relatively short tails, two of them belonging with the *leucopus* series and the third an eastern relative of *sonoriensis*. By the original description alone it would be extremely difficult to determine to which the name was applied, but fortunately the existence of

^a Sitgreave's Exped. Zuni and Colo. Rivers, p. 33, 1853.

^b Pac. R. R. Reports, XI, p. 60, 1853.

specimens supposed to be cotypes renders possible a fairly satisfactory conclusion. Although in a poor state of preservation, these specimens are identifiable by means of numerous slight but convincing cranial characters with the forms (*mearnsi* and *tornillo* of authors) related to *leucopus* rather than with the one belonging to the *maniculatus* group (*P. m. blandus*). The most important of these characters are found in the rostrum and the mandible. In No. ~~37034~~³⁷⁰³³ the rostral part of the skull is fairly well preserved and extremely characteristic, having the narrow nasals and laterally swollen premaxillæ never found in *P. m. blandus*, but usually present in the forms represented by the names *mearnsi* and *tornillo*; the mandibles are relatively short and broad, unlike the slender ones of *blandus*, but exactly matching in proportions those of the two other forms. These characters alone are amply sufficient to eliminate *blandus* from the possibilities, and it therefore remains to decide to which of the other two the name shall be applied. The color and measurements of the cotypes are of almost no value on account of the immaturity of the specimens and the length of time they have remained in alcohol. Also, Woodhouse's original description and measurements were evidently taken from the alcoholics and not from the fresh specimens, so these offer little or no assistance, at least none in determining between two forms which have all general characters in common.

One of the two forms under consideration (*tornillo*) occurs on the "Rio Grande near El Paso," while the other occurs south and east of the Pecos River. The chief distinguishing character is the size of the molar teeth, which are larger and broader in *tornillo*. The cotypes have small, narrow teeth, exactly like those of the southern form and decidedly different from those of the majority of specimens of *tornillo*. There is some variation in the size of the teeth in both forms, and it was at first thought that the cotypes were exceptionally small individuals of the northern form, but careful search and comparison among a considerable series from the "Rio Grande near El Paso" fails to reveal a single specimen of any age with teeth so small and narrow as those of the cotypes, while they may be matched with ease by specimens from any part of the range of the southern form. Therefore, there seems to be no alternative but to apply the name to the form with which the cotypes agree and consequently to assume that Woodhouse was mistaken as to the locality from which they came. Considering the known laxity in such matters on the early expeditions, it is not difficult to believe that a slight error in labeling was made. The view is somewhat strengthened by the fact that only a few days before he reached the "Rio Grande near El Paso" Woodhouse passed through country (San Antonio to San Saba River) in which we now find specimens matching his co-

types. For example, specimens from Mason, Tex. (practically Fort McKavett), agree with them and the locality is on the route, so if a new type locality is necessary, this may be chosen.

The average difference between *P. l. texanus* and *P. l. tornillo* is fairly marked, but certain individuals may be found that are indistinguishable. As a rule, however, the small size of the teeth in *texanus* serves to distinguish it. Specimens from the vicinity of the mouth of the Pecos River are intermediate between *texanus* and *tornillo*, but the majority are nearer *texanus*, having small teeth and averaging darker than *tornillo*. Among specimens of this class are those from Fort Clark which have been called 'canus.' On the south intergradation with *P. l. mesomelas* is indicated by specimens from Rio Verde and Valles, San Luis Potosi, Mexico. These also, however, are nearer *texanus*. Certain specimens in full winter pelage are somewhat more grayish than others, possibly representing a slight color phase. In general the pelage differences are more marked than in *tornillo*, and summer specimens are usually very short-haired. The gap between the easternmost localities for *texanus* (vicinity of Galveston Bay) and the most southwestern localities for *leucopus* (southern Louisiana) is not very wide, and intermediate specimens are to be expected from this region. The material from the eastern part of the range is rather unsatisfactory, but the best adults are referable to *texanus*, although some tendencies toward *leucopus* are exhibited. Three specimens from north central Texas (Decatur, Benbrook, and Gainesville) are practically indistinguishable from typical *texanus*. Another from Henrietta in the same general region apparently is intermediate between *texanus* and *tornillo*.

Specimens examined.—Total number 572, from localities as follows:

Coahuila: Sabinas, 3.

Nuevo Leon: Cerro de la Silla, 4; 15 leagues south of China, 1; Lampazos, 2; Linares, 4; Montemorelos, 6; Monterey, 28; Rodriguez, 2; Santa Catarina, 2.

San Luis Potosi: Rio Verde, 15; Valles, 5.

Tamaulipas: Alta Mira, 15; near Bagdad, 2; Camargo, 24; Hidalgo, 11; Jaumave, 3; Matamoros, 23; Mier, 1; Nuevo Laredo, 5; Soto la Marina, 11; Tampico, 1; Victoria, 38.

Texas: Arcadia, 1; Austin Bayou, near Alvin, 2; Bee County, 1; Beeville, 1; Benbrook, 1; Blocker Ranch, 1; Brownsville, 82; East Caranchua Creek, 1; Comstock, 4; Concho County, 3; Corpus Christi, 1; Decatur, 1; Del Rio, 9; Deming Station, 3; Dickinson Bayou, 2; Eagle Pass, 7; El Blanco, 1; Elliotts, 1; Fort Clark, 69; Fort Lancaster, 5 (aberrant); Gainesville, 3; Henrietta, 1; Juno, 1; Langtry, 2; Laredo, 2; 35 miles northwest of Laredo, 1; Lomita Ranch, 1; Mason, 7; Matagorda, 5; Nueces Bay, 7; Oconnorport, 1; Presidio, County, 4; Rio Grande City, 1; Rockport, 40; Rock Springs, 7; 22 miles west of Rock Springs, 2; Runge, 1; San Antonio, 63; San Diego, 3; Santa Tomas, 9; Velasco, 8; Waring, 1.

PEROMYSCUS LEUCOPUS MESOMELAS Osgood.

(Pl. III, fig. 4.)

Peromyscus texanus mesomelas Osgood, Proc. Biol. Soc. Wash., XVII, pp. 57-58, March 21, 1904.

Type locality.—Orizaba, Veracruz, Mexico.

Geographic distribution.—Humid tropics of central Veracruz and northern Puebla, Mexico.

Characters.—Most similar to *P. l. texanus*; color darker; tail shorter; hind foot larger; a small pectoral spot present; adolescents with an intense black dorsal stripe.

Color.—Adult: General effect of upperparts pale Prout brown, produced by fawn ground color with a liberal mixture of dusky; sides practically unicolor with back; no definite dusky markings about head; underparts creamy white, except a small but distinct pectoral spot of fawn color; ears dusky with whitish edges; feet white, 'ankles' dusky brownish; tail bicolor. Immature: Similar in general to adult, but more sooty; sides dark mouse gray, tinged with fawn and bordered by a narrow fawn-colored lateral line; a broad stripe in median dorsal region intense black; 'ankles' sooty; tail indistinctly bicolor.

Skull.—Similar to that of *P. l. texanus*, but with braincase averaging slightly larger and wider; nasals rather long and palatine slits usually corresponding.

Measurements.—Type: Total length, 169; tail vertebræ, 76; hind foot, 23; ear from notch (dry), 13.5.

Type specimen.—No. 58210 U. S. National Museum, Biological Survey Collection. ♂ adult. Jan. 20, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—Although this form is very well characterized, there seems to be no doubt that it is connected, through *P. l. texanus*, with *P. l. tornillo* and others of the same group. Specimens from Rio Verde, San Luis Potosi, are quite evidently intermediate, and a series from Metlatoyuca, Puebla, while distinctly referable to *mesomelas*, shows some tendencies toward *texanus*. *P. mesomelas* is also related to *P. affinis*, which is a much paler form and not apt to be confused with it. Like *texanus* and *affinis*, it has short and relatively harsh pelage somewhat different from that of most other Mexican species.

Specimens examined.—Total number 34, from localities in Mexico, as follows:

Puebla: Metlatoyuca, 15.

Veracruz: Mirador, 1; "Mexico" (Salle) 5; Orizaba, 10; Rio Blanco, 2 (not typical); San Andres Tuxtla, 1.

PEROMYSCUS LEUCOPUS CASTANEUS Osgood.

Peromyscus texanus castaneus Osgood, Proc. Biol. Soc. Wash., XVII, pp. 58-59, Mar. 21, 1904.

Type locality.—Vicinity of Yohaltun, Campeche, Peninsula of Yucatan, Mexico.

Geographic distribution.—Known only from the vicinity of the type locality.

Characters.—Similar to *P. l. mesomelas*, but smaller and more ferruginous; underparts without pectoral spot; adolescents without black dorsal stripe; skull and teeth small.

Color.—Type, in fresh pelage: General color of upperparts between Prout brown and burnt umber, clearer on sides, darker on back; ground color rich dark fawn; no definite lateral line; underparts pure white; feet white, 'ankles' brownish. Topotype No. 107982, in slightly worn pelage: Sides and upperparts nearly uniform cinnamon rufous, with scarcely any dusky admixture and only a narrow line on back somewhat deeper colored than rest of upperparts. Immature: As in adult, but grayer.

Skull.—Rather small and light; braincase relatively narrow; nasals and palatine slits short; molar teeth small; otherwise similar to *P. l. mesomelas*.

Measurements.—Average of 10 adult topotypes: Total length, 163 (156-169); tail vertebrae, 73 (68-79); hind foot, 21.5 (20-22); ear from notch (dry), 12.5 (11.3-13.6).

Type specimen.—No. 107980 U. S. National Museum, Biological Survey Collection. ♂ adult. December 19, 1900. E. W. Nelson and E. A. Goldman. Specimen practically perfect.

Remarks.—*P. l. castaneus* is slightly darker than *P. l. cozumelae*, which is closely related. *P. cozumelae* differs chiefly in larger size and heavier teeth. No satisfactory specimens from the humid tropical region between Orizaba and Yohaltun are at hand, but *castaneus* is not sufficiently different from *mesomelas* to warrant full specific rank. *P. affinis* is a related form of the adjacent arid tropics, and much paler than either *castaneus* or *mesomelas*.

Specimens examined.—Total number 25, all from the type locality.

PEROMYSCUS LEUCOPUS AFFINIS (ALLEN).

Hesperomys (Vesperimus) affinis Allen, Proc. U. S. Nat. Mus., XIV, pp. 195-196, July 24, 1891.

Peromyscus affinis Allen and Chapman, Bull. Am. Mus. Nat. Hist., N. Y., IX, p. 7, Feb. 23, 1897.

Peromyscus musculoides Merriam, Proc. Biol. Soc. Wash., XII, p. 124, Apr. 30, 1898.—Culcatlan, Oaxaca, Mexico.

Type locality.—Barrio,* Isthmus of Tehuantepec, Oaxaca, Mexico.

Geographic distribution.—Arid tropical parts of southern and central Oaxaca; northeast to southern Veracruz and parts of Yucatan.

Characters.—Similar to *P. l. texanus* and *P. l. mesomelas*, but slightly larger; color much as in *texanus*, decidedly paler than in *mesomelas* or *castaneus*; skull slightly larger and heavier than in *mesomelas*.

Color.—Almost exactly as in *P. l. texanus*; general color of upper parts fawn, in fresh pelage mixed with dusky, forming an imperfect dark dorsal stripe, and in worn pelage mixed with cinnamon; underparts creamy white, rarely with a small fawn pectoral spot; feet white, ankles pale brownish; tail brownish fawn above, white below.

Skull.—Similar to that of *P. l. mesomelas*, but somewhat larger; anterior part of zygoma heavier; infraorbital plate of zygoma wider; interorbital constriction averaging wider.

Measurements.—Two adult males from Tehuantepec, Oaxaca: Total length, 182, 180; tail vertebræ, 84, 81; hind foot, 24, 22. Average of 10 adults from Cuicatlan, Oaxaca: 185; 84.5; 22.5; ear from notch (dry), 14.3 (13.5–15).

Type specimen.—No. 2333 U. S. National Museum. ♀ adult. Oct. 30, 1868. F. Sumichrast. Skin soiled and discolored, particularly on underparts; right hind foot broken off and tied on with thread; tail vertebræ not removed. Labeled in Coues's hand "*melanophrys*?" and later "*mexicanus*?" by someone else. Skull in fair condition, but still with considerable flesh adhering to it; right zygoma slightly broken.

Remarks.—Externally, this form is scarcely distinguishable from *P. l. texanus*. It averages slightly larger, and its skull is more elongate, besides being decidedly heavier in the infraorbital region. Its intergradation with *P. l. mesomelas*, the form of the adjacent humid tropics, is scarcely to be doubted. However, two specimens from Otatitlan, Veracruz, near the edge of the humid region, seem distinctly referable to *affinis*.

Specimens examined.—Total number 76, from localities in Mexico as follows:

Oaxaca: Barrio, 3; Cuicatlan, 16; Guichicovi, 1; Huilotepec, 5; Reforma, 10; Santa Efigenia, 1; Tehuantepec, 5.

Veracruz: Otatitlan, 2; Pasa Nueva, 22.

Yucatan: Chichenitza, 11 (approaching *castaneus*).

* Barrio usually means a suburb. Sumichrast's specimens are labeled thus: "Tehuantepec (Barrio)." This might mean a suburb of the city of Tehuantepec, but since there is a town called Barrio near the middle of the Isthmus of Tehuantepec, and since Sumichrast labeled specimens from other towns in Oaxaca in this manner, it seems probable that the town of Barrio was meant. As the same species occurs at both places the question is not important.

PEROMYSCUS LEUCOPUS COZUMELAE (MERRIAM).

(Pl. III, fig. 3.)

Peromyscus cozumelae Merriam, Proc. Biol. Soc. Wash., XIV, p. 103, July 19, 1901.

Type locality.—Cozumel Island, off coast of Yucatan, Mexico.

Geographic distribution.—Cozumel Island.

Characters.—Size about as in *P. l. affinis*; color about intermediate between that of *affinis* and of *castaneus*; skull larger and heavier than in *castaneus*; teeth heavier than in *affinis*.

Color.—Slightly duller and paler than in *P. l. castaneus*; otherwise similar; slightly darker and more ferruginous than in *P. l. affinis*.

Skull.—Decidedly larger and heavier than in *P. l. castaneus*; teeth heavier; audital bullæ larger; infraorbital region heavier. Most similar to that of *P. l. affinis*; teeth averaging slightly larger; brain-case averaging a trifle shallower; audital bullæ usually a trifle larger.

Measurements.—Average of 10 adult topotypes: Total length, 184 (163–198); tail vertebrae, 83.8 (76–90); hind foot, 23.3 (22–24); ear from notch (dry) 14.6 (13.7–15.7).

Type specimen.—No. 108449 U. S. National Museum, Biological Survey Collection. ♂ adult. Apr. 11, 1901. E. W. Nelson and E. A. Goldman. Specimen in perfect condition.

Remarks.—*P. l. cozumelae* is so closely related to *P. l. castaneus* and *P. l. affinis* that it seems best to treat it as a subspecies. It is most closely similar to *P. l. affinis*, being only a shade darker and having no constant cranial distinctions. Some skulls of *cozumelae* are absolutely indistinguishable from others of *affinis*.

Specimens examined.—Total number 19, all from the type locality.

Key to subspecies of *Peromyscus gossypinus*.

Size large; hind foot 22–26. Chiefly north of peninsular Florida.

Size very large; color averaging paler. Northern Alabama to eastern Texas.

P. g. megalcephalus.

Size not so large; color averaging darker. Southern Virginia to northern Florida, west to Louisiana.

P. gossypinus.

Size smaller; hind foot 20–22. Chiefly peninsular Florida and adjacent islands.

Darker. Mainland.

P. g. palmarum.

Paler. Insular.

P. g. anastasicus.

PEROMYSCUS GOSSYPINUS (LE CONTE). COTTON MOUSE.

(Pl. III, fig. 2.)

Hyp [udacus] gossypinus Le Conte. McMurtrie's Cuvier's Animal Kingdom, I, append., p. 434, 1831—*nomen nudum*.

Mus carolinensis Aud. & Bach., Jour. Acad. Nat. Sci. Phila., pp. 306–307. 1841. South Carolina. (Indeterminate.)

Hesperomys gossypinus Le Conte, Proc. Acad. Nat. Sci. Phila., VI, pp. 411–412, 1853.

Hesperomys cognatus Le Conte, Proc. Acad. Nat. Sci. Phila., p. 442, 1855, Georgia.

Peromyscus gossypinus Rhoads, Proc. Acad. Nat. Sci. Phila., p. 189, 1896.

Peromyscus gossypinus nigriculus Bangs, Proc. Biol. Soc. Wash., X, pp. 124-125, Nov. 5, 1896.—Burbridge, Plaquemines Parish, Louisiana.

Type locality.—Le Conte Plantation, near Riceboro, Liberty County, Ga.

Geographic distribution.—Lowlands of the southeastern United States from the Dismal Swamp, Virginia, to northern Florida and west to Louisiana. Lower Austral zone.

Characters.—Size medium or rather large (hind foot 22-24); tail shorter than head and body, not very sharply bicolor, clothed with rather short hairs; color rather dark, in most pelages with an extensive dark dorsal area. Most similar in general appearance and character of pelage to *P. leucopus*, but larger and darker.

Color.—Unworn pelage: Ground color of upperparts bright rufescent cinnamon between the cinnamon and cinnamon rufous of Ridgway; entire upperparts heavily mixed with blackish appearing as coarse lines which, al-

though close together, do not blend with the ground color; dusky mixture predominating on middle of back, appearing as a broad stripe from the shoulders to the base of the tail; top of head and shoulders somewhat grayer than sides; a narrow orbital ring slightly widened anteriorly and posteriorly; ears dusky brownish, scarcely or not at all edged with whitish; underparts white or creamy white usually with a very strong creamy tinge in pectoral region; feet white; forearm often dusky or slightly rufescent and dusky; tail blackish brown above, white below. Worn pelage: Sides bright cinnamon rufous or deep russet slightly toned down by a thin mixture of darker pale-brownish hairs; middle of back darker, varying from russet to Prout brown. Adolescent pelage: Ground color of upperparts pale cinnamon or isabella color thickly mixed with blackish which predominates on dorsum and is rather sharply contrasted with the sides.

FIG. 3.—Distribution of *Peromyscus gossypinus* and subspecies.

Skull.—Rather large and heavy; zygomatic heavy anteriorly; premaxillae slightly expanded laterally; palatine slits rather broadly open, their outer sides not parallel; interpterygoid fossa broad and square anteriorly. Similar in general to that of *leucopus*, but larger throughout; teeth decidedly longer.

Measurements.—Two adult topotypes: Total length, 160, 171; tail vertebrae, 72, 71; hind foot, 24, 23; ear from notch (dry), 15.7. Average of 12 adults from St. Marys, Ga.: 177.6; 70; 22.3. Of 10 adults from Dismal Swamp, Virginia: 181.6 (175–190); 81 (70–88); 22.9 (22–24). Of 5 adults from Belair, La.: 178 (170–184); 74.6 (71–78); 22.7 (22–23).

Type specimen.—No type was designated in the original description. Several specimens collected in Georgia by Le Conte have been in the U. S. National Museum. No. 4704 remains there still and may perhaps be regarded as a cotype, though there is no positive evidence that it was in Le Conte's hands at the time the description was written. It is in fair condition. The skull and tail vertebrae are inside the skin. It was catalogued April 3, 1861. No. 752 Collection of Academy of Natural Sciences, Philadelphia, also has claims. It is labeled, "Georgia Dr. Le Conte," and was catalogued January, 1860. No. 5275, Museum of Comparative Zoology, Cambridge, Mass., is still another.

Remarks.—Although evidently very closely related to *leucopus*, *P. gossypinus* appears to be distinct. Both occur at the same localities through much of the northern part of the range of *gossypinus* and everywhere seem to maintain themselves distinct. The only certain character for distinguishing them in all conditions of pelage is that of size, for although *gossypinus* is almost always darker in unworn pelage, specimens occur which are very similar to *leucopus* in certain stages of worn pelage. The skull and teeth of *gossypinus* are of the same general character as those of typical *leucopus* but decidedly larger, although if specimens of the smaller forms of *gossypinus* be compared with those of larger forms of *leucopus* scarcely any difference in size appears. The subspecies of *gossypinus* are all slight, differing mainly by average characters of size and amount of dusky mixture in the pelage. Typical *gossypinus* itself is the darkest form and '*nigriculus*' does not appear to differ from it. A single specimen from Bogue Beach, N. C., is very pale and may represent a slight coast form.

Two specimens now in the British Museum and recently received in the Tomes collection may perhaps be considered as paratypes of Le Conte's *Hesperomys cognatus*. On the old labels is written "From Major Le Conte, Feb. 1858. *Hesperomys cognatus*." Both are typical examples of *Peromyscus gossypinus*.

Specimens examined.—Total number 450, from localities as follows:

Alabama: Castleberry, 3; Elmore, 1; Mobile Bay, 10; Montgomery, 2.

Florida: Amelia Island, 1; Burnside Beach, 7; Cartersville, 3; Gainesville, 58; Jacksonville, 1; Milton, 1; New Berlin, 35; Summer Haven, 1; Whitfield, 14.^a

Georgia: Augusta, 3; Barrington, 6; Butler, 4; Hursman Lake, 2; Montgomery, 9; Pinetucky, 22; Riceboro, 21; St. Marys, 36; Savannah, 2; Sterling, 16.

Louisiana: Belair, 6; Burbridge, 5; Gibson, Terre Bonne Parish, 56; Lecompte, 4; Powhatan Plantation, near Gibson, 28; Houma, 7; Lake Charles, 2; Tallulah, 5.

Mississippi: Bay St. Louis, 7; Washington, 13.

North Carolina: Bertie County, 3; Bogue Beach, 1 (aberrant); Currituck, 2.

South Carolina: Columbia, 2; Georgetown, 1; "South Carolina" (Le Conte), 6.

Virginia: Dismal Swamp, 44.

PEROMYSCUS GOSSYPINUS MEGACEPHALUS (Rhoads).

Sitomys megacephalus Rhoads, Proc. Acad. Nat. Sci. Phila., pp. 254–256, Sept. 25, 1894.

Peromyscus gossypinus mississippiensis Rhoads, Proc. Acad. Nat. Sci., Phila., p. 189, 1896.—Samburg, Tennessee.

Peromyscus gossypinus Bangs, Proc. Biol. Soc. Wash., X, pp. 119–125, Nov. 5, 1896.

Type locality.—Woodville, Ala.

Geographic distribution.—Northern Alabama and western Tennessee, west through Arkansas to eastern Oklahoma, and thence south through eastern Texas and western Louisiana.

Characters.—Similar to *gossypinus* but averaging larger and paler.

Color.—Unworn pelage: Ground color of upperparts slightly lighter than in *gossypinus*; dusky mixture less abundant on sides and less concentrated in middle of back; orbital ring very narrow or obsolete; underparts creamy white. Worn pelage: Slightly paler than in *gossypinus*; sides a lighter shade of russet; dorsum Mars brown to mummy brown, but this less extensive than in *gossypinus*. Adolescent pelage: Quite decidedly paler than in *gossypinus*; sides isabella color mixed with dusky, producing a general effect of brocoli brown tinged with fulvous; dorsum distinctly dusky, but less so than in *gossypinus*.

Skull.—Similar to that of *gossypinus*, but decidedly larger and more elongate; rostrum and nasals longer.

Measurements.—Average of 6 adults from Tennessee: Total length, 183; tail vertebræ, 79.5; hind foot, 24.5; ear from notch (dry), 15.5

^a Carnegie Museum.

(15-16.3). Of 6 adults from eastern Texas: 196 (188-205); 84 (78-90); 24 (23-26).

Type specimen.—No. 3585 Collection of Academy of Natural Sciences, Philadelphia. ♂ (?) adult. H. E. Sargent. Specimen in alcohol, except the skull, which has been removed, and which is in fair condition, although not very thoroughly cleaned and somewhat broken about the foramen magnum.

Remarks.—The largest specimens of this form (and perhaps also the palest) come from eastern Texas and Oklahoma. It would therefore be more satisfactory if the type had been obtained from this region. However, the type and specimens from western Tennessee are obviously nearer to the western form than to typical *gossypinus*. Specimens from central Mississippi appear to be intermediate between *megacephalus* and *gossypinus*. The name *megacephalus* was referred to the synonymy of *gossypinus* by Bangs (l. c.), although the type specimen was not examined by him. The skull of this type proves to be too large to belong with *gossypinus*, and although the skin in alcohol can not be trusted for color characters, there seems little doubt that it represents the form recognized by Bangs under the name *mississippiensis*.

Specimens examined.—Total number 62, from localities as follows:

Alabama: Scottsboro, 1; Woodville, 3.

Louisiana: Clarks, 1; Foster, 4.

Oklahoma: Red Oak, 1.

Tennessee: Arlington, 10; Big Sandy, 3; Clarksville, 3; High Cliff, 1; Lawrenceburg, 1; Samburg, 17.

Texas: Jasper, 3; Jefferson, 1; Long Lake, 1; Sour Lake, 11; Texasiana, 1.

PEROMYSCUS GOSSYPINUS PALMARIUS BANGS.

Peromyscus gossypinus palmarius Bangs, Proc. Biol. Soc. Wash., X, p. 124, Nov. 5, 1896.

Type locality.—Oak Lodge, east peninsula, opposite Micco, Brevard County, Florida.

Geographic distribution.—Peninsular Florida.

Characters.—Similar to *gossypinus*, but averaging smaller and paler.

Color.—Unworn pelage: Similar to that of *gossypinus*, but paler: ground color a shade lighter and dusky mixture more sparse, as a rule not so heavily concentrated in the middle of the back; orbital ring very narrow; underparts grayish white to creamy or even yellowish white, rarely with a small fulvous pectoral spot.

Skull.—Similar to that of *gossypinus*, but averaging decidedly smaller; rostrum and infraorbital region lighter; teeth slightly smaller.

Measurements.—Average of 7 topotypes:^a Total length, 178.8 (172–183); tail vertebrae, 74.5 (69–78); hind foot, 21.1 (20–22); ear from notch (dry), 14.7 (14–15). Of 20 topotypes:^b 181; 71.8; 21.5.

Type specimen.—No. 3224 Museum of Comparative Zoology, Cambridge, Mass., formerly in collection of E. A. and O. Bangs. ♀ adult. Feb. 23, 1895. O. Bangs. Specimen in good condition.

Remarks.—Specimens from various parts of peninsular Florida are constantly smaller than typical *gossypinus*. The pale color shown by many specimens is not so constant and can be considered only an average character. It is more pronounced in specimens from the coast beaches than in those from the interior, but on the whole it seems best to refer all the material from peninsular Florida to one form.

The type of *palmarius* and a very small percentage of the large series of topotypes are unusually pale and scarcely distinguishable from comparable specimens of *anastasae*. If further study of local conditions at the type locality should prove that two forms occupying different habitats are found together there, it would then seem to be necessary to use the name *palmarius* for the pale form now called *anastasae* and supply a new name for the darker and more widely distributed form. However, the great preponderance of dark specimens from the type locality tends to indicate that the type is probably an aberrant specimen rather than the representative of a well-defined form. The case might be construed also to the effect that pale coast forms are undergoing parallel differentiation at several points and that the same character (paleness) has been established independently on Anastasia and Cumberland islands and is only in its incipency on the peninsula opposite Micco.

Specimens examined.—Total number 523, from localities as follows:

Florida: Anclote River, 32 (head 30, 12 miles up 2); Argo, 3; Auburn-dale, 3; Blitch Ferry, Citrus County, 21; Canaveral, 18; Cape Canaveral, 2; Catfish Creek, 4; Charlotte Harbor, 2; Citronelle, 3; Crystal River, 13; Eden, 1; Enterprise, 33; Eau Gallie, 2; Flamingo, 26; Fort Kissimmee, 8; Glenwood, 1; Georgiana, 2; Gulf Hammock, 2; Jupiter Island, 4; Kissimmee, 9; Lake Arbuckle, 1; Lake Harney, 24; Lake Hatchewaw, 4; Lake Kissimmee, 3; Lake Worth, 7; Miami, 51; Micco, 13; Mullet Lake, 25; Oak Lodge, opposite Micco, 161; Planter, 2; Port Richey, 2; Sawgrass Island, 4; Sebastian, 5; Tarpon Springs, 32.

^a Biological Survey Collection.

^b Bangs collection.

PEROMYSCUS GOSSYPINUS ANASTASAE (Bangs).

Peromyscus anastasae Bangs, Proc. Bost. Soc. Nat. Hist., XXVIII, pp. 195–196, March, 1898.

Peromyscus insularis Bangs, *supra cit.*, pp. 196–197—Cumberland Island, Georgia.

Type locality.—Point Romo, Anastasia Island, Florida.

Geographic distribution.—Sandy islands (possibly also parts of the mainland) of the eastern coast of Georgia and Florida.

Characters.—Size about as in *palmaris*; color paler than in *gossypinus* or *palmaris*.

Color.—Upperparts pale ochraceous buff rather lightly mixed with dusky, which is slightly or not at all concentrated in the mid-dorsal region; orbital ring nearly or quite obsolete; underparts white almost entirely concealing undercolor; ears dusky; tail bicolor, brownish dusky above, white below. Adolescents paler, more drabby, than in *palmaris*.

Skull.—Practically as in *palmaris*, somewhat smaller than in *gossypinus*.

Measurements.—Type: Total length, 165; tail vertebrae, 69.5; hind foot, 21; ear from notch, 16.5. Average of 6 adult topotypes: 167.5; 69.5; 21.4. Average of 3 adults from Cumberland Island, Georgia: 171.7; 68; 21.6.

Type specimen.—No. 7179 Museum of Comparative Zoology, Cambridge, Mass., formerly in collection of E. A. and O. Bangs. ♀ adult. Feb. 15, 1897. O. Bangs. Specimen in good condition.

Remarks.—Although the pale forms from Anastasia and Cumberland islands, respectively, are entirely isolated from each other and from the mainland forms, they seem to be absolutely alike and also are not different from certain aberrant (intermediate?) specimens from the mainland. Moreover, the mainland specimens most similar to them are not from localities immediately adjacent to the islands in question, specimens from St. Marys, Ga., Burnside Beach, Fla., etc., being typical *gossypinus*.

Specimens examined.—Total number 54, from localities as follows:

Florida: Anastasia Island, 18.

Georgia: Cumberland Island, 36.

Key to subspecies of *Peromyscus boyleyi*.

a. Habitat western United States and northern Lower California.

b. Size smaller; hind foot 21–23. Western Texas to Pacific coast.

1. Color darker. Northern Sierra Nevada Mountains and coast ranges north of San Francisco Bay.....*P. boyleyi*

2. Color paler. Coast region of southern California to northern Lower California; east to Colorado and western Texas.....*P. b. rowleyi*

bb. Size larger; hind foot 22–25. Arkansas to central Texas.....*P. b. attwateri*

aa. Habitat Mexico (except Lower California) and Guatemala.

b. Habitat western Mexico and adjacent islands, chiefly west of the 102d meridian.

c. Size smaller; hind foot 21–23; color paler, chiefly grayish isabella color or pale ochraceous buff.....*P. b. rowleyi*

- cc. Size larger; hind foot 22-26; color darker, chiefly rich tawny or ochraceous.
 d. Larger. Tres Marias Islands.....*P. b. madrensis*
 dd. Not so large. Mainland of Mexico.
 1. Molars large; maxillary tooththrow about 5; hind foot extensively dusky.
 Oaxaca and Guerrero.....*P. b. evides*
 2. Molars moderate; maxillary tooththrow less than 5; hind foot less extensively dusky. Southern Sonora to Jalisco.....*P. b. spicilegus*
 bb. Habitat eastern and southern Mexico and Guatemala, chiefly east of the 102d meridian.
 c. Color largely rich tawny or ochraceous; hind foot extensively dusky; molars large; maxillary tooththrow about 5.
 1. Color darker and richer. Veracruz and Puebla.....*P. b. aztecus*
 2. Color paler. Oaxaca and Guerrero.....*P. b. evides*
 cc. Color duller and more mixed with dusky; hind foot less extensively dusky (usually white except tarsal joint); molars smaller; maxillary tooththrow less than 5.....*P. b. levipes*

PEROMYSCUS BOYLEI (BAIRD).

(Pl. IV, fig. 1; pl. VII, fig. 9.)

Hesperomys boylii Baird, Proc. Acad. Nat. Sci. Phila., VII, pp. 335-336, April, 1855.

Sitomys robustus Allen, Bull. Am. Mus. Nat. Hist., V, pp. 335-336, Dec. 16, 1893—Lakeport, Lake County, Calif.

Peromyscus boylii Mearns, Proc. U. S. Nat. Mus., XIX, p. 139, May 25, 1896.

Type locality.—Middle Fork American River, Eldorado County, Calif., near site of present town of Auburn.

Geographic distribution.—West slopes of the Sierra Nevada mountains from the vicinity of Yosemite north to Mount Shasta, thence along the east slopes of the coast ranges nearly to San Francisco Bay. Upper Sonoran and Transition zones.

Characters.—Size medium (hind foot 21-23), about as in *truei*, larger than in *gambeli*; tail long, equal to or longer than head and body, somewhat penicillate and rather coarsely hairy throughout, the annulations usually being obvious; ears medium, smaller than in *truei* and *gilberti*; proximal two-fifths of under side of hind foot hairy; coloration not peculiar, much as in *gilberti* and *gambeli*; preauricular tufts without white.

Color.—Unworn pelage: General effect of upperparts hair brown to sepia; ground color pale buffy cinnamon heavily and uniformly mixed with dusky without any decided concentration in middle of back; lower face, arms, and narrow lateral line nearly clear pale ochraceous buff; a narrow blackish orbital ring; ear tufts same as upperparts, never containing white hairs, but often showing a soft blackish tuft at the base of the upper margin of the ear; ears dusky narrowly edged with whitish; underparts creamy white; feet white, 'ankles' rather extensively dusky; tail brownish above, white below. Worn pelage: Upperparts varying from Mars brown and russet to pale cinnamon uniformly mixed with brownish dusky, which varies in amount according to degree of wear; orbital ring, dark marking on hind legs and 'ankles,' and upper side of tail paler, more brown-

ish, than in unworn pelage. Adolescent pelage: General effect of upperparts varying from drab to hair brown with a tinge of fawn, a pale ochraceous buff lateral-line usually evident.

Skull.—Size medium, decidedly larger than in *gambeli* and *rubidus* but somewhat smaller than in *truei* and *gilberti*; rostrum depressed

FIG. 4.—Distribution of *Peromyscus boylei* and subspecies.

anteriorly; zygomatic width least anteriorly; infraorbital region relatively weak; braincase somewhat rounded but smaller and less inflated than in *truei*; audital bullae decidedly smaller and less orbicular than in *truei*; teeth medium, much larger than in *gambeli* and *rubidus*, about equaling those of *truei*.

Measurements.—Average of 10 adult topotypes: Total length, 197 (183–202); tail vertebræ, 103 (92–112); hind foot, 22 (21–23); ear from notch (dry), 16.4 (15.3–17.5).

Type specimen.—No. $\frac{1349}{176}$ U. S. National Museum. Collected by Dr. C. C. Boyle. Entered in Museum catalogue in 1854. Skin formerly in exhibition series, now removed from stand but still in crouching position, as originally mounted, with tail raised over back. Color much faded from exposure to light, chiefly pale buffy cinnamon. Tail somewhat cracked, but coarse annulations and hairy covering distinct. A large patch of fur gone from right side of body. Skull with zygomata somewhat broken, otherwise perfect. Tail vertebræ preserved with skull.

Remarks.—Typical *P. boylei* appears to be confined to the State of California. There is no obvious reason why it should not occur also in the mountains of southern Oregon, but considerable collecting there has failed to reveal it. However, although it sometimes ranges into the Canadian zone, it is evidently of southern extraction and is connected with various intergrading forms which range throughout most of Mexico and even into Guatemala. Although occasionally found in the valleys, it is much more common in the mountains. From other species of California, it may be recognized usually by its coarsely haired penicillate tail, medium-sized ears, and cranial characters. *P. boylei* is perhaps most apt to be confused with *gilberti*, which approaches it in size and color very closely. Its ears average smaller than in *gilberti*, its tail is more coarsely haired, and the coarser annulations are more exposed. If external characters fail, it may be distinguished from *gilberti* with certainty by its decidedly smaller audital bullæ.

In the southern Sierra region *boylei* intergrades with the paler form *rowleyi*, and many specimens may be found that resemble one about as much as the other. A series from the lava beds of Fall River Valley, Shasta County, are unusually dark colored, but the divergence is slight.

Specimens examined.—Total number 254, from localities as follows:

California: Middle Fork American River, near Auburn, 34; Baird, 4; Bartlett Springs, 2; Battle Creek, 4; Berger Creek, 1; Beswick, 6; Bully Choop Mountains, 5; Cassel, 2; Chico (10 miles northeast), 9; Chinese, 2; Coarsegold, 2; Coulterville, 1; Dana, 2; Downieville, 3; Eel River, 4; Eel River, near South Yolla Bolly Mountain, 19; Etna, Salmon Mountains, 6; Fall Lake, Fall River Valley, 6 (aberrant); Forest Hill, Placer County, 2; Fresno Flat, 7; Fyffe, 4; Guenoc, 2; Hurlston, 10; Lakeport, 1; ^a Leesville, 8; Lower Lake, 14; Milford, 3; Montgomery, 1; Mount Shasta, 1; Mountain House, Butte County, 4; Oroville, 2; Quincy, 2; Salt Springs, 6; Scott Valley, 4; Sierra

^a Collection of Leland Stanford, Jr., University. Type of '*robustus*.'

City, 1; Slippery Ford, 10; Snow Mountain, Colusa County, 36; Stillwater, 2; Susanville, 1; Tower House, 1; Upper Lake, 2; Yosemite, 18.

PEROMYSCUS BOYLEI ROWLEYI (ALLEN).

Sitomys rowleyi Allen, Bull. Am. Mus. Nat. Hist., N. Y., V, pp. 76-78, Apr. 28, 1893.

Sitomys major Rhoads, Am. Naturalist, XXVII, p. 831, Sept., 1893.—Squirrel Inn, San Bernardino County, Calif.

Sitomys rowleyi pinalis Miller, Bull. Am. Mus. Nat. Hist., N. Y., V, pp. 331-334, Dec. 16, 1893.—Granite Gap, Grant County, N. Mex.

Peromyscus boylii rowleyi Mearns, Proc. U. S. Nat. Mus., XIX, p. 139, May 25, 1896.

Peromyscus boylii penicillatus Mearns, Proc. U. S. Nat. Mus., XIX, p. 139, May 25, 1896.—Franklin Mountains, near El Paso, Tex.

Peromyscus gaurus Elliot, Field Columbian Museum, Chicago, Zool. Ser., III, pp. 157-158, Apr., 1903.—San Antonio, San Pedro Martir Mountains, Lower California.

Peromyscus parasiticus Elliot, Field Columbian Museum, Chicago, Zool. Ser., III, p. 244, Jan., 1904.—Lone Pine, Calif.

Peromyscus metallicola Elliot, Field Columbian Museum, Chicago, Zool. Ser., III, p. 245, Jan., 1904.—Providencia Mines, Sonora, Mexico.

Type locality.—Noland Ranch, San Juan River, Utah.

Geographic distribution.—Mountains of southern California, northern Lower California, southern Nevada, Utah, Colorado, Arizona, New Mexico, western Texas, and south in Mexico chiefly on the eastern slopes of the Sierra Madre to central Zacatecas and northwestern San Luis Potosi.

Characters.—Size, proportions, and cranial characters practically as in *P. boylei*; color paler.

Color.—Unworn pelage: General effect of upperparts wood brown to isabella color; ground color ochraceous buff uniformly sprinkled with dusky; sides like back, except a relatively broad lateral line of ochraceous buff unmingled with dusky; nose and postorbital region grayish; narrow orbital ring blackish; ears dusky, faintly edged with whitish; underparts cream white; tail dusky brownish above, white below; feet white, dusky of hind legs extending to tarsal joints, but not sharply contrasted. Worn pelage: General effect of upperparts varying from clay color to vinaceous cinnamon and from that to cinnamon (No. 20, Pl. III, Ridgway), quite decidedly paler than in *boylei*.

Skull.—Practically as in *boylei*, possibly averaging a trifle larger.

Measurements.—Average of 10 adults from Bluff City, San Juan River, Utah: Total length, 191 (180-207); tail vertebrae, 99 (91-109); hind foot, 21.6 (21-23); ear from notch (dry), 17.2 (16.6-18).

Type specimen.—No. 4433 American Museum of Natural History, New York. ♀ adult. April 20, 1892. Chas. P. Rowley. Skin in

fair condition, in bright slightly worn pelage; end of tail slightly injured. Skull in good condition.

Remarks.—This pale form of *boylei* has a wide range throughout which it shows comparatively little variation. Nearly all California series of *rowleyi* are the merest shade deeper colored than typical, thus being intermediate between *boylei* and *rowleyi*. This includes especially specimens from the coast valleys and low ranges of mountains from Monterey County to northwestern Lower California. The difference is so slight, however, that it can scarcely be detected in small series or individuals and is apparent only on comparison of very large series. Specimens from the east side of the southern Sierras and also those from the San Bernardino Mountains, including the type of '*major*,' do not show the slightest tendency toward *boylei*, but are practically identical with *rowleyi*. On the whole it seems best to include all southwestern specimens of this group under the name *rowleyi*. The difference between typical *boylei* and *rowleyi* is only in shade of color, and the attempt to recognize an intermediate shade does not seem advisable. Intergradation with *attwateri* is shown by specimens from western Texas, which are large but pale colored. The type of '*penicillatus*' is an abnormally pale individual, but a series from the Franklin Mountains near the type locality does not differ from typical *rowleyi*. Specimens from the type locality of '*pinalis*' do not differ from others in comparable condition from the vicinity of the type locality of *rowleyi*.

Most Mexican specimens of *rowleyi* show slight tendencies toward *spicilegus*, being slightly deeper colored. Specimens from Lower California ('*gaurus*') have rather long tails but no longer than are often found in various other parts of the range of the form.

As *boylei* is apt to be confused with *gilberti*, so also is *rowleyi* similar to *truei*. As a rule, however, *rowleyi* has decidedly smaller ears, less silky pelage, and a coarser tail than *truei* and hence may be distinguished without recourse to the skull, in which the audital bullæ are much smaller than in *truei*. It also much resembles *nasutus*, which is a larger species with a longer rostrum.

Specimens examined.—Total number 1,270, from localities as follows:

Arizona: Apache County, 1; Bradshaw City, 13; Chiricahua Mountains, 39; Fort Bowie, 5; Fort Huachuca, 6; Fort Whipple, 1; Grand Canyon, 6; Holbrook, 1; Huachuca Mountains, 133; Hualpai Mountains, 8; Nogales, 6; Oracle, 1; Painted Desert, Little Colorado River, 1; Pinal County, 14; Prescott, 5; Santa Catalina Mountains, 8; Show Low, 2; Walnut, 1; Warsaw, 1; White Mountains, 2.

California: Aguanga, 2; Arroyo Seco, near Paraiso Springs, 6; Ballena, 4; Bergman, 2; Balcon Mountain, 1; Camp Badger, 4; Carmel River, 40; Carpinteria, 2; Chihuahu Mountains, San Diego County, 2; Coahuila Mountains, Riverside County, 1; east base Coast Range, San Diego County, 1; Cone Peak, Monterey County, 4; Cuyamaca, 7;

- Densmores, Riverside County, 7; Dulzura, 2; Fathom Valley, Tulare County, 2; Gaylota Pass, 11; Glendora, 1; Hemet Mountain, 3; Independence Creek, 2; Jacumba, 3; Julian, 1; Kaweah, 1; Kaweah River, 2; Kern River, 13; Kern River Lakes, 1; Laguna Mountains, San Diego County, 6; Laguna, 11; Las Virgenes Creek, 1; Lone Pine, 18; Milo, 2; Mission Santa Ynez, 7; Mohave, 1; Mono Flats, Santa Barbara County, 4; Morans, 1; Mountain Spring, San Diego County, 1; Nellie, 2; Nordhoff, 6; Oak Grove, 1; Olancha Creek, 2; Owens Lake, 15; Pine Valley, Monterey County, 8; Piute Mountains, 2; Pleyto, 1; Porterville, 3; Pozo, 10; Providence Mountains, 3; San Bernardino Mountains, 37; San Emigdio Canyon, 7; San Gabriel Mountains (Strain Camp), 12; San Jacinto Mountains, 20; San Miguelito, 1; San Rafael Mountains, Santa Barbara County, 18; San Simeon, 11; Santa Ana Mountains, 2; Santa Lucia Peak, 3; Santa Paula, 1; Santa Ynez River, 6; Santa Ysabel, 27; Smith Mountain, San Diego County, 1; south fork Kern River, 13; Springville, 5; Sur River, 4; Tassajara Creek, 22; Tehachapi, 4; Tejon Canyon, 4; Three Rivers, 23; Ventura River, 14; Walker Pass, 2; Witch Creek, 6; Zaca Lake, 6.
- Chihuahua:** Balleza, 3; Colonia Garcia, 11; Colonia Juarez, 2; Parral, 5; San Luis Mountains, 2.
- Colorado:** Arboles, 1; Cortez, 2;^a Covenary, 5; Mesa Verde, 2; Salida, 1.^a
- Durango:** Arroyo de Bucy, 1; Cienega de las Vacas, 8; Durango, 1; La Boquilla, 6; Matalotes, 7; Rancho Santuario, 24; San Gabriel, 16.
- Lower California:** Aguaje de las Presas, 7; Hanson Laguna, 10; La Grulla, 3; Nachoguero Valley, 10; Palomar, 3; Rancho San Antonio, 16; San Matias Pass, 2; San Pedro Martir Mountains, 6.
- Nevada:** Charleston Mountains, 5.
- New Mexico:** Alma, 4; Animas Peak, 17; Animas Valley, 4; Aztec, 12; Big Hatchet Mountains, 16; Burro Mountains, 6; Capitan Mountains, 23; Clayton, 4; Copperton, 1; Corona, 12; Dry Creek, Socorro County, 2; Emery Peak, 4; Florida Mountains, 3; Folsom, 6; Fort Wingate, 1; Gallo Canyon, 2; Gallup, 1; Gila National Forest, 2; Glenwood, 1; Glorieta, 1; Granite Gap, 1; Jicarilla Mountains, 23; La Plata, 1; Las Vegas, 5; Manzano Mountains, 40; Mogollon Mountains, 2; Organ City, 2; Organ Mountains, 8; Raton Range, 4; San Andres Mountains, 7; Sandia Mountains, 17; San Pedro, 3; Santa Rosa, 8; Sierra Grande, 5; Silver City, 1; Tucumcari, 1.
- San Luis Potosi:** Mountains near Jesus Maria, 4.
- Sonora:** Huasavos Mountains, 10; Providencia Mines, 7; San Luis Mountains, 4; San José Mountains, 4; Santa Cruz River, 2; Sierra Patagones, 20.
- Texas:**^b Big Spring, 1; Franklin Mountains, 12; Ozona, 3; Rock Springs, 1.
- Utah:** Bluff, 45; Noland Ranch, 10; Ogden, 2; Santa Clara Creek, 2.

PEROMYSCUS BOYLEI ATTWATERI ALLEN.

Peromyscus attwateri Allen, Bull. Am. Mus. Nat. Hist., N. Y., VII, pp. 330-331, Nov. 8, 1895.

Peromyscus bellus Bangs, Proc. Biol. Soc. Wash., X, p. 137, Dec. 28, 1896.—Stillwell, Okla.

^a Collection of E. R. Warren.

^b All approaching *attwateri*.

Peromyscus boylei laceyi Bailey, N. Am. Fauna No. 25, pp. 99-100, Oct. 24, 1905—Turtle Creek, Kerr County, Tex.

Peromyscus boylii attwateri Mearns, Bull. U. S. Nat. Mus. No. 56, p. 423, April 13, 1907.

Type locality.—Turtle Creek, Kerr County, Tex.

Geographic distribution.—South central and parts of western Texas; north to eastern Oklahoma, central Missouri, and southern Kansas. Chiefly confined to rocky cliffs in upper Sonoran zone.

Characters.—Similar to *rowleyi* but larger (hind foot 22-25); color darker and richer, practically as in *boylei*. Similar to *laceyanus* but larger and darker and always with a distinct dusky marking on the tarsal joint; skull and molar teeth smaller.

Color.—Unworn pelage: Almost exactly as in *boylei*; ground color of upperparts pale cinnamon, thoroughly mixed with fine lines of dusky; head, particularly about nose and orbital region, somewhat grayish; dusky orbital ring rather narrow; lower sides of face, axillary region, and narrow lateral line ochraceous buff; dusky of hind leg continued over tarsal joint and encroaching slightly on upper side of hind foot; underparts creamy white, occasionally with an ochraceous buff pectoral spot. Worn pelage: Upperparts varying from cinnamon to russet and pale cinnamon rufous, variously mixed with dusky or brownish.

Skull.—Similar to that of *boylei* and *rowleyi* but larger; braincase higher, more inflated; audital bullæ and molar teeth decidedly larger.

Measurements.—Average of 10 topotypes: ^a Total length, 196 (187-216); tail vertebræ, 100 (96-110); hind foot, 21 (20-23). Hind foot of type (dry), 23.5. Average of 10 adults from Stilwell, Okla.: Total length, 205 (196-218); tail vertebræ, 103 (97-112); hind foot, 24.3 (23-25); ear from notch (dry), 16.2 (15.5-17.2).

Type specimen.—No. 18449^a American Museum of Natural History, New York. ♀ adult. Mar. 12, 1895. H. P. Attwater. Skin in good condition. Skull with zygomata and pterygoids slightly broken; last left upper molar missing.

Remarks.—Although the wide range of the pale form *rowleyi* is interposed between that of typical *boylei* and of *attwateri*, the latter two are very similar. In general, *attwateri* has a somewhat grayer face than *boylei*, and the dusky hairs of the back show more distinctly as lines, but many specimens of each are practically indistinguishable by color alone. The large size and rather rich color of *attwateri* are most developed in the northern part of its range, in the Wichita and Ozark mountains. Specimens from western Texas in the Davis Mountains and vicinity seem referable to *attwateri*, but do not differ greatly from others from Colonia Garcia, Chihuahua, which have

^a From original description.

been referred to *rowleyi*, and which may be considered as approaching either *attwateri* or *spicilegus*.

It does not seem possible to recognize '*P. bellus*,' for though it may differ by extremely slight average characters from *attwateri* from the type locality, it merely represents the extreme of a differentiation away from *rowleyi* which is well established at the type locality of *attwateri*. The recognition of both *attwateri* and '*bellus*' would therefore make *attwateri* an extremely slight and practically indefinable intermediate between *rowleyi* and '*bellus*.' The name *laceyi* is a pure synonym of *attwateri*, having been based upon the same species from the same locality on the supposition that the name *attwateri* applied to the form of *pectoralis* now called *laceianus*.

Specimens examined.—Total number 273, from localities as follows:

Arkansas: Batesville, 3.

Kansas: Cedarvale, 4.

Oklahoma: Dougherty, 21; Redland, 2; Red Oak, 8; Stilwell, 37; Wichita Mountains (vicinity of Mount Scott and Mount Sheridan), 110.

Texas: Boerne, 4; Chinati Mountains, 4; Davis Mountains, 6; Fort Davis, 10; Ingram, 1; Kerrville, 1; Mason, 30; Paisano, 13; Turtle Creek, Kerr County, 17; Waring, 2.

PEROMYSCUS BOYLEI SPICILEGUS (ALLEN).

(Pl. IV, fig. 3.)

Peromyscus spicilegus Allen, Bull. Am. Mus. Nat. Hist., N. Y., IX, pp. 50-51, March 15, 1897.

Type locality.—Mineral San Sebastian, Mascota, Jalisco, Mexico.

Geographic distribution.—Western slopes of the Sierra Madre of Mexico from southern Sonora south to southern Jalisco.

Characters.—Somewhat similar to *rowleyi*, but size larger and color richer; prevailing color rich tawny ochraceous, with blackish ears in strong contrast; skull similar to those of *boylei*, *rowleyi*, etc., but braincase usually more expanded anteriorly forming an incipient supraorbital shelf.

Color.—Unworn pelage: Upperparts rich tawny, sometimes approximating ochraceous rufous: dusky and dusky-tipped hairs uniformly distributed throughout upperparts, but only slightly modifying the predominating tawny, sometimes slightly concentrated on dorsum, forming a poorly defined stripe of blackish; sides like back, lateral line rather broad but not strongly contrasted; a black or nearly black orbital ring slightly extended posteriorly into a grizzled area between the eye and the base of the ear; ears dusky, very narrowly or not at all edged with yellowish white; tufts of partly concealed soft black hairs at the anterior bases of the ears; feet white;

dusky of hind leg extending to and slightly beyond metatarsal joint; underparts creamy white usually with a grayish cast caused by the slaty undercolor; a large tawny pectoral spot frequently present; tail blackish brown above, white below, the rather coarse annulations usually obvious. Worn pelage: More similar to unworn pelage than usual in the genus; upperparts rather duller, more nearly ochraceous buff, with dusky mixture minimized or changed to pale brownish which appears in general effect like fine vermiculation; middle of back often nearly cinnamon. Adolescent pelage: General effect of upperparts nearly sepia with a strong tinge of fawn; lateral line of pale ochraceous buff obvious.

Skull.—Size about as in *boylei*; braincase rather more flattened anteriorly; suborbital border usually sharp-angled from parieto-frontal suture to lachrymal expansion, almost forming a shelf; palatine slits laterally expanded; interpterygoid fossa relatively wide; audital bullæ rather small.

Measurements.—Average of 8 adult topotypes: Total length, 198 (189–210); tail vertebræ, 101, (95–108); hind foot, 23.4 (23–25); ear from notch (dry), 16.3 (15.4–17.3).

Type specimen.—No. 3333 American Museum of Natural History, New York. ♂ adult. Dec. 2, 1893. Audley C. Buller. Skin in fair condition; feet and tail somewhat twisted; pelage smooth and clean. Skull practically perfect.

Remarks.—*P. b. spicilegus* and its near relatives *levipes*, *aztecus*, etc., are among the most common of Mexican mice. As members of a group they are quite easily recognizable, although it is rather difficult to formulate a set of characters peculiar to them, and the distinguishing of different forms within the group is extremely perplexing. *P. spicilegus* is fairly well restricted to the mountains of western Mexico, although within this range variations occur that more or less definitely approach *rowleyi*, *levipes*, *simulus*, or *evides*. Its bright tawny color, blackish ears, etc., distinguish it from *rowleyi*; its smaller audital bullæ and flattened supraorbital border distinguish it from most specimens of *levipes*; its larger teeth and longer nasals from *simulus*; and its smaller teeth and less extensively dusky hind feet from *evides*. There is much local variation throughout the group, and although the forms mentioned above are fairly well marked, the great majority of specimens examined combine the characters of two or more of them and have been referred to the ones they resemble most closely.

Specimens examined.—Total number 232, from localities as follows:

Chihuahua: Sierra Madre, 65 miles east of Batopilas, 7; Sierra Madre, near Guadalupe y Calvo, 5.

Colima: Hacienda San Antonio, 5.

Durango: Chacala, 10; Coyotes, 12; El Salto, 11; Huasamota, 2.

Jalisco: Ameca, 17; Arroyo de Gabalan, 3; Barranca Ibarra, 6 (approaching *cvides*); Bolaños, 10; Estancia Jalisco, 1; Etzatlan, 13; Jacala, 2; La Cienega, 4; La Laguna, 8; La Laja, 3; Mascota, 1; Sal si Puedes, 1; San Sebastian, 23; Sierra de Juanacatlan, 5; Talpa, 3; Wakenakili Mountains, 13.

Sinaloa: Plomosas, 6 (approaching *cvides*); Sierra de Choix, 50 miles northeast of Choix, 14.

Sonora: Mountains near Alamos, 18.

Tepic: Jalisco, 2; Pedro Pablo, 1; Santa Teresa, 10 (approaching *simulus*).

Zacatecas: Monte Escobedo, 2; Plateado, 4; Sierra Madre, 10.

PEROMYSCUS BOYLEI SIMULUS Osgood.

(Pl. IV, fig. 4.)

Peromyscus spicilegus simulus Osgood. Proc. Biol. Soc. Wash., XVII, pp. 64-65, Mar. 21, 1904.

Type locality.—San Blas, Tepic, Mexico.

Geographic distribution.—Lowlands of the west coast of Mexico, in Sinaloa and Tepic.

Characters.—Similar to *spicilegus*, but smaller and averaging paler; nasals shorter; teeth much smaller.

Color.—Almost as in *spicilegus*, but averaging slightly paler, as indicated by a few specimens in new pelage that are more nearly ochraceous buff than tawny; tail in some specimens blackish all around, not sharply bicolor; pectoral spot frequently present.

Skull.—Somewhat similar to that of *spicilegus*, but smaller and more angular; nasals and rostral part of skull decidedly shorter; parietal narrower and less shelf like; premaxillæ not exceeding nasals; zygomata relatively heavy and squared anteriorly; molar teeth very small; bony palate short.

Measurements.—Average of three adult topotypes: Total length, 208; tail vertebrae, 111; hind foot, 23; ear from notch (dry), 15.

Type specimen.—No. 88088 U. S. National Museum, Biological Survey Collection. ♂ adult. Apr. 18, 1897. E. W. Nelson. Skin in good condition. Skull with last right upper molar missing; otherwise perfect.

Remarks.—This is a well-marked form, a coast representative of the mountain animal *spicilegus*. Specimens from Rosario and near Mazatlan are in nearly unworn pelage and perhaps represent the extreme of the form, in which the color is somewhat paler than in *spicilegus*. The type of *simulus*, which was selected with particular reference to its cranial characters, is somewhat darker and nearly the same color as *spicilegus*. It may therefore be regarded as slightly intermediate.

Specimens examined.—Total number 45, from localities as follows:

Sinaloa: Escuinapa, 20; near Mazatlan, 6.

Tepic: Navarrete, 3; Rosario, 10; San Blas, 6.

PEROMYSCUS BOYLEI MADRENSIS MERRIAM.

Peromyscus madrensis Merriam, Proc. Biol. Soc. Wash., XII, p. 16, Jan. 27, 1898.

Type locality.—Maria Madre Island, Tres Marias Islands, Mexico.

Geographic distribution.—Confined to the Tres Marias Islands.

Characters.—Similar to *P. b. spicilegus*, but averaging larger and paler; ears averaging slightly smaller.

Color.—Worn pelage: Upperparts chiefly dull ochraceous buff more or less 'peppered' and vermiculated with brownish cinnamon, the latter most abundant in the middle of the back; lateral line rather indefinite, nearly clear ochraceous buff; ears dusky brownish; narrow orbital ring and spot at base of whiskers blackish; underparts creamy or yellowish white, often with a prominent ochraceous buff pectoral spot; feet dull white, tarsal joint dusky; tail very indistinctly bicolor or almost unicolor, in some specimens dusky above and dull whitish below, in others nearly uniform dusky all around except proximally where it is always somewhat paler below.

Skull.—Practically as in *spicilegus*, but averaging quite decidedly larger; skull in general rather more elongate; audital bullæ and molar teeth actually about as in *spicilegus*, relatively smaller.

Measurements.—Average of 12 adult topotypes: Total length, 224; tail vertebrae, 120; hind foot, 26; ear from notch (dry), 15.6 (14.7–17.2).

Type specimen.—No. 89223 U. S. National Museum, Biological Survey Collection. ♂ adult. May 18, 1897. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—Although this is a well-marked form, it seems best to treat it, as well as its near relative *spicilegus*, as a subspecies of *boylei*. Individual variation in *madrensis* and *spicilegus* practically covers the difference between them. Skulls from Maria Cleofa and Maria Magdalena are somewhat larger than those from Maria Madre and one might almost consider the Maria Madre ones as intermediates. Certain of the Maria Madre skulls are exactly like skulls of *spicilegus* from the mainland.

The series from the islands are in rather worn pelage, and when compared with unworn specimens of *spicilegus* appear very pale, but are only slightly paler than similarly worn examples of *spicilegus*.

Specimens examined: Total number 18, from localities as follows:

Mexico: Maria Cleofa Island, 3; Maria Madre Island, 14; Maria Magdalena Island, 1.

PEROMYSCUS BOYLEI EVIDES OSGOOD.

Peromyscus spicilegus evides Osgood, Proc. Biol. Soc. Wash., XVII, p. 64, Mar. 21, 1904.

Type locality.—Juquila, Oaxaca, Mexico.

Geographic distribution.—Western Mexico at lower altitudes than *P. b. spicilegus*; known from localities in the States of Guerrero, Oaxaca, and Michoacan.

Characters.—Color as in *spicilegus*, except upper side of hind foot, which usually has a wedge-shaped dusky area extending from the leg across the tarsal joint nearly to the base of the toes; skull and teeth decidedly larger and heavier.

Color.—Upperparts tawny ochraceous slightly mixed with dusky, this slightly or scarcely concentrated medially; a narrow black orbital ring and spot at base of whiskers; underparts creamy white usually with a tawny pectoral spot; tail blackish above, white below; forearm sooty to wrist, hands white; tarsal joint and proximal half of hind foot usually dusky except on sides.

Skull.—Similar to that of *spicilegus* but larger and heavier; supra-orbital border, quite shelf like; molar teeth larger and heavier; also similar to that of *aztecus*, but averaging slightly shorter and broader.

Measurements.—Average of 5 topotypes: Total length, 208; tail vertebræ, 111; hind foot, 23; ear from notch (dry), 13.6 (12.6–14.5). Of 10 adults from Los Reyes, Michoacan: 222 (212–230); 112 (105–122); 23.6 (23–25).

Type specimen.—No. 71426 U. S. National Museum, Biological Survey Collection. ♂ yg. adult. Feb. 28, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This form appears to be the western representative of *aztecus*, from which it differs chiefly in its paler color. Although no unquestionable intergrades between *aztecus* and *evides* are at hand, nor any specimens from intermediate localities, the difference between the two is so slight and so nearly bridged by individual variation, that the existence of intergrades is scarcely to be doubted. Intergrades between *evides* and *spicilegus* have been examined from Plomosas, Sinaloa and Barranca Ibarra, Jalisco, and even from San Sebastian, the type locality of *spicilegus*.

Specimens examined.—Total number 47, from localities as follows:

Guerrero: Omiteme, 11.

Michoacan: Los Reyes, 31.

Oaxaca: Juquila, 5.

PEROMYSCUS BOYLEI LEVIPES (MERRIAM).

(Pl. IV, fig. 2.)

Peromyscus levipes Merriam, Proc. Biol. Soc. Wash., XII, pp. 123–124, Apr. 30, 1898.

Peromyscus beatae Thomas, Ann. & Mag. Nat. Hist., London, Ser. 7, XI, pp. 485–486, May, 1903.—Mount Orizaba, Mexico.

Type locality.—Mount Malinche, Tlaxcala, Mexico.

Geographic distribution.—Eastern and southwestern Mexico and western Guatemala, chiefly in mountainous regions from central Nuevo Leon south through San Luis Potosi, Hidalgo, Veracruz,

etc., to southern Oaxaca; reappearing in the highlands of Chiapas and western Guatemala.

Characters.—Similar to *spicilegus*, but somewhat larger and darker colored; dusky mixture in upperparts more copious; pelage usually longer and softer; skull usually broader; supraorbital border not so sharp-angled; audital bullæ larger. Similar to *aztecus*, but color much duller and more dusky.

Color.—Unworn pelage: Ground color of upperparts varying from rich ochraceous buff to tawny always strongly modified by dusky, producing a general effect that varies from russet to Prout brown; sides with tawny rather predominating; lateral line not sharply marked; back with dusky usually predominating, sometimes forming a blackish diffuse stripe, often taking the form of close lines; orbital ring blackish, slightly produced posteriorly toward a grizzled area between the eye and the base of the ear; ears dusky, scarcely edged with whitish; a tuft of soft blackish slate hairs at the anterior base of the ear; underparts creamy white, never thoroughly concealing the slaty undercolor; a pectoral spot sometimes present; feet white, tarsal joint sharply marked with dusky; tail bicolor, brownish dusky above, white below, under side sometimes flecked with dusky. Worn pelage: General effect of sides and upperparts bright cinnamon or ochraceous buff to tawny usually with a darker middorsal area of russet or Prout brown; dusky markings reduced throughout and more brownish than blackish.

Skull.—Quite variable; usually larger, shorter, broader, and with larger audital bullæ and molar teeth than in *spicilegus*; supraorbital border not so sharp-angled and seldom showing much tendency to the development of a shelf; infraorbital notch slight or scarcely evident. Similar to that of *aztecus* but usually shorter and broader; audital bullæ averaging larger; supraorbital border not so sharp-angled.

Measurements.—Type and 1 topotype, respectively: Total length, 200, 184; tail vertebrae, 102, 93; hind foot, 23.5; 22. Two adults from Maltrata, Veracruz: 212, 192; 114, 102; 25, 22. Average of ten adults from Encarnacion, Hidalgo: 208 (198–234); 108 (97–123); 24 (23–25); ear from notch (dry) 16.2 (15.6–16.7). Average of seven adults from Zunil, Guatemala, 212 (204–227); 110 (103–123); 23.9 (23.5–25).

Type specimen.—No. 53673 U. S. National Museum. Biological Survey Collection. ♂ adult, old. May 12, 1893. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This is a common and widely distributed form throughout most of the mountainous parts of eastern, central, and southern Mexico and Guatemala. Although doubtless many mountain colonies are quite isolated, there is comparatively little local variation. Thus, those of the highlands of Chiapas and Guatemala are separated from those of more northern localities by the low and relatively

arid region of the Isthmus of Tehuantepec. Yet series from Guatemala do not differ from comparable series from Hidalgo, for example; or if there is any difference between selected specimens it is no greater and is usually less than individual variation in each of the series concerned. Individual variation is relatively great, especially in size and cranial characters. The size of the audital bullæ, while averaging greater than in *spicilegus*, *aztecus*, etc., is extremely variable, and often each specimen of a considerable series from one locality has slightly peculiar bullæ. The size of the molar teeth also varies, and in some cases to such an extent that suspicion arises that two distinct species are being confused. Nevertheless, it does not seem possible to prove this. Color variation runs from specimens as bright as *spicilegus* to others almost as dark as *lepturus*.

Certain individuals in almost every series can scarcely be duplicated elsewhere, and even the type of *levipes* is not exactly like any of several topotypes. Under these circumstances, the only logical course seems to be to unite all of one general type under the name *levipes*. Specimens from Nuevo Leon average rather smaller than usual and show much resemblance to *spicilegus* in color, but they may be exactly matched among specimens from the general vicinity of the type locality. At other localities the average size may be large, but this again is nearly or quite covered by individual variation. '*P. beatae*', described from Mount Orizaba, relatively very near Mount Malinche, is an undoubted synonym, being well within the range of variation ordinarily found in the *boylei* group. Mr. Thomas had no specimens of *levipes* and attempted no comparisons with it at the time he proposed the name *beatae*.

Specimens examined: Total number 402, from localities as follows:

Chiapas: Canjob, 4; Comitán, 16; mountains near Comitán, 3; Valley of Comitán, 18; San Cristóbal, 22; Teopisca (20 m. southeast), 6.

Guatemala: Calel, 6; Hacienda Chancol, 21; Todos Santos, 4; Volcan Santa María, 13; Zúmil, 23.

Guerrero: Ayusinapa, 4 (approaching *spicilegus*?); mountains near Chilpancingo, 38.

Hidalgo: El Chico, 17; Encarnación, 25; Pinal de Amoles, 10; Real del Monte, 7; Tulancingo, 4.

Jalisco: Ocotlán, 1; Zapotlán, 1.

Mexico: Tlalpam, 1.

Michoacan: Patzenaro, 1.

Morelos: Cuernavaca, 1; Tetela del Volcan, 3 (aberrant).

Nuevo Leon: Cerro de la Silla, 18; Monterey, 37 (aberrant).

Oaxaca: Cerro San Felipe, 4; Mount Zempoaltepec, 3; mountains west of Oaxaca, 8; mountains near Ozolotepec, 11; Reyes, 20; San Miguel, 5; Tamazulapam, 1.

Puebla: Atlixco, 2; San Martín, 1; Tochimilco, 4 (aberrant).

San Luis Potosí: Villar, 11.

Tlaxcala: Mount Malinche, 4.

Veracruz: Maltrata, 6; Orizaba, 2; Perote, 4; Xometla Camp, Mount Orizaba, 6; Xuchil, 6.

PEROMYSCUS BOYLEI AZTECUS (SAUSSURE).

(Pl. IV, fig. 5.)

Hesperomys aztecus Saussure, Rev. et Mag. de Zool., Paris, XII, pp. 105-106, pl. IX, fig. 4, Mar., 1860.

P[eromyscus] aztecus Thomas, Ann. & Mag. Nat. Hist., ser. 6, XIV, p. 365, Nov., 1894.

Type locality.—Mexico; probably the vicinity of Mirador, Veracruz.

Geographic distribution.—Lower austral zone (and possibly part of humid tropical) of parts of the States of Veracruz and Puebla.

Characters.—Size medium (hind foot 23-26), slightly larger than *levipes*, smaller than *mexicanus* and *oaxacensis*; tail about equal to head and body, rather coarsely hairy and usually decidedly bicolor; ears moderate, very thinly haired; color very rich, chiefly deep tawny; most similar to *P. b. evides* but size slightly larger; ears larger, and color richer; skull with supraorbital border sharp-angled but not definitely beaded.

Color.—Upperparts deep rich tawny with light mixture of blackish on sides and heavier on dorsum forming a poorly defined blackish dorsal area; black orbital ring and spot at base of whiskers sharply defined against tawny cheek; toes and distal part of feet white; front side of forearm tawny and dusky nearly or quite to wrist; outer side of hind leg, tarsal joint, and median proximal half of upper side of hind foot blackish brown; ears dusky without definite pale edgings, a tuft of partly concealed blackish hairs at their anterior bases; tail blackish brown above, white or white lightly sprinkled with brownish below; underparts creamy white, occasionally with a small tawny pectoral spot. Worn pelage: Very similar to unworn pelage but slightly duller and with tawny still more largely predominating over the dusky mixture; dorsum but little different from sides.

Skull.—Size medium; teeth relatively large; braincase rather deep and slightly elongate; interparietal large; supraorbital border sharp-angled, but not beaded; zygomata quite distinctly notched anteriorly; audital bullæ rather small; interpterygoid fossa rather wide and expanded anteriorly. Most like that of *evides*, but slightly larger and more angular; smaller, with relatively larger teeth than in *oaxacensis* or *mexicanus*; braincase narrower, supraorbital border more sharply angled, and audital bullæ smaller than in *levipes*.

Measurements.—Average of 5 adults from Mirador, Veracruz: Total length, 229 (215-238); tail vertebrae, 113 (107-121); hind foot, 24.5 (24-26); ear from notch (dry), 15.2 (14.5-16).

Type specimen.—In the original description (l. c., p. 106, footnote), Saussure stated that he had 3 specimens and naturally at that date he did not specify one of them as the type. At least two of

these specimens now exist, one a mounted specimen accompanied by a skull in the Geneva Museum,^a and the other a skin in rather poor condition in the U. S. National Museum. The figure of the molar teeth published by Saussure doubtless represents the Geneva specimen, since this has the only skull known to have been preserved. Therefore if a type must now be selected, it should be the Geneva specimen. The specimen in the U. S. National Museum (No. 3926) is perhaps of greater value for comparison, as it is a skin and, not having been much exposed to light, shows nearly its original colors. It is slit down the middle of the back and only the head and legs are stuffed with cotton. Some hair is gone from the throat, the left ear is imperfect, and the distal half of the tail absent; otherwise it is well preserved and agrees in every respect with recently collected specimens from Mirador, Veraacruz, which, in the lack of exact knowledge, may be assumed to be the type locality, as it is certain that some at least of Saussure's specimens were taken near there.

Remarks.—*P. b. aztecus* is characterized chiefly by its very rich tawny color, and by this may be readily distinguished from most other species of eastern Mexico. *P. ouzacensis* approximates this richness of color, but is considerably larger and occurs at greater elevations. *P. mexicanus* is also larger and has relatively small teeth, less tawny color, and irregularly marked tail. *P. b. levipes* is more nearly the size of *aztecus*, but has smaller teeth, larger audital bullæ, and less tawny color.

It is with some reluctance that *aztecus* is included among the subspecies of *boylei*, but no break in the continuous series of definable forms seems discoverable. From *spicilegus* to *evides* is but a short step, and from *erules* to *aztecus* but another, and each is almost or quite bridged by individual variation. Although *spicilegus* is believed to intergrade with *levipes*, there is no evidence that *aztecus* does so, and it would not be surprising to find both *aztecus* and *levipes* at one locality.

The applicability of Saussure's name to this form is scarcely to be doubted, for even if the specimens still extant are disregarded, the original description is so accurate and complete as to be conclusive. The combination of rich tawny color and the extension of dusky on the hind feet has not been found in any other species of eastern Mexico. Both these characters are emphasized by Saussure, as shown from the following extracts from his description:

Le pied blanchâtre, avec le premier tiers brun-gris en dessus. * * * souvent aussi le pied postérieur est gris-brun jusqu'aux doigts et mêlé de poils blancs * * * par ses flancs qui sont d'un ferrugineux cannelle ainsi que la face externe des pattes antérieures. Cette couleur est très-prononcée.

^a I am indebted to Dr. Merriam for notes and a careful description of this specimen, which was critically examined by him some years ago.

Specimens examined.—Total number 18, from localities as follows:

Puebla: Huachinango, 6.

Veracruz: Jalapa, 2; 'Mexico,' 1; Mirador, 9.

PEROMYSCUS OAXACENSIS MERRIAM.

(Pl. III, fig. 5.)

Peromyscus oaxacensis Merriam. Proc. Biol. Soc. Wash., XII, p. 122, Apr. 30, 1898.

Type locality.—Cerro San Felipe, Oaxaca, Mexico. Altitude 10,300 feet.

Geographic distribution.—High altitudes in southern Mexico, chiefly in the State of Oaxaca; reappearing in the mountains of central Chiapas.

Characters.—Size rather large (hind foot 25–29); tail decidedly longer than head and body, well haired and evenly bicolor; sole of hind foot, except plantar tubercles, hairy; ears relatively small; color chiefly rich tawny; similar in general characters to *P. b. aztecus*, but larger and longer-tailed; skull heavier.

Color.—Upperparts rich tawny mixed with black; middle of back more blackish, sides and shoulders more tawny; sides of face tawny with scarcely a suggestion of grayish; orbital ring and spot at base of whiskers black; sides of nose buffy; ears very thinly haired, scarcely or not at all edged with whitish; feet white, tarsal joint dusky; underparts creamy white; tail evenly bicolor, blackish above, white below. Worn pelage: General effect of upperparts bright, rich tawny shading to cinnamon rufous in middle of back and but little modified by mixture of dusky. Adolescent pelage: Upperparts mixed pale tawny and dusky, producing a general effect approaching bistre and sepia. Color in all pelages almost exactly as in *P. b. aztecus*.

Skull.—Similar to that of *P. b. aztecus*, but averaging larger and heavier; cheek teeth larger; audital bullæ actually slightly larger, relatively about same size; palatine slits larger; supraorbital border sharp-angled but not beaded; general characters about as in *hylecetes*, but audital bullæ slightly smaller.

Measurements.—Type: Total length 242; tail vertebræ 122; hind foot 27. Average of 6 adults from San Cristobal, Chiapas: Total length 246 (241–260); tail vertebræ 127 (120–135); hind foot 27; ear from notch (dry) 16.7 (15.8–17.5).

Type specimen.—No. 68426 U. S. National Museum, Biological Survey Collection. ♂ adult. Sept. 1, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—Individual variation so nearly bridges the difference between *oaxacensis* and *aztecus* that very little objection could be made if *oaxacensis* were included with *aztecus* as a subspecies of the *boylei* series. In its rich tawny color and all general characters it

is closely similar to *aztecus*, differing merely in larger size and longer tail. It inhabits much more elevated regions than *aztecus* and occurs at the same localities with another member of the *boylei* series, *levipes*, from which it may be distinguished both by external and by cranial characters. Possibly here is another example of two subspecies of the same group occurring together, for *levipes* appears to intergrade with *spicilegus*, *spicilegus* with *evides* and *aztecus*, and quite probably *aztecus* with *oaxacensis*. However, until the evidence is more complete, it is perhaps best to consider *oaxacensis* as distinct. In some conditions of pelage, *mexicanus* may show considerable resemblance to *oaxacensis*, but the latter is always distinguishable by its more hairy, sharply and evenly bicolor tail.

Specimens examined.—Total number 69, from localities as follows:

Chiapas: Comitán Valley, 5; Pinabete, 12; San Cristobal, 24.

Oaxaca: Cerro San Felipe, 2; Comaltepec, 1; Oaxaca (15 m. west), 6; Reyes, 19.

PEROMYSCUS HYLOCETES MERRIAM.

(Pl. III, fig. 8.)

Peromyscus hylocetes Merriam. Proc. Biol. Soc. Wash., XII, p. 124, Apr. 30, 1898.

Type locality.—Patzcuaro, Michoacan, Mexico. Altitude 7,000 feet.

Geographic distribution.—Mountainous parts of Michoacan and southern Jalisco; east to mountains near the Valley of Mexico.

Characters.—Size medium; tail rather short, usually shorter than head and body, well clothed with hair and sharply bicolor; color rather dark; most similar to *evides* and *oaxacensis*, but differing from both in relatively shorter tail and larger audital bullæ.

Color.—Unworn pelage: Upperparts pale ochraceous buff, becoming tawny on sides, heavily mixed with blackish, forming a more or less definite blackish dorsal stripe; a narrow lateral line nearly clear tawny, widening somewhat on lower cheeks; nose and postorbital region slightly grayish; orbital ring and spot at base of whiskers sharply blackish; ears thinly clothed with brownish hairs, scarcely or not at all edged with whitish, soft blackish partly concealed hairs at anterior bases; underparts creamy white, usually modified by blackish slate undercolor; feet chiefly white, dusky extending nearly to carpal joint and over tarsal joint sometimes halfway to the end of the hind foot; tail sharply bicolor, blackish above, white below. Worn pelage: General effect of upperparts cinnamon to russet; dorsal stripe not well differentiated, but dark undercolor showing throughout upperparts; lateral line scarcely distinct; otherwise as in unworn pelage.

Skull.—Similar in general form to those of *aztecus* and *oaxacensis*; audital bullæ slightly inflated, larger than in *evides* or *oaxacensis*, but smaller than in *difficilis* or *melanophrys*; palatine slits rather large; interpterygoid fossa somewhat widened anteriorly; no supra-orbital bead, but frontals rather wide and supraorbital border decidedly sharp-angled, sometimes forming a slight shelf; nasals rather narrow and depressed anteriorly; premaxillæ somewhat expanded laterally.

Measurements.—Type: Total length, 238; tail vertebræ, 114; hind foot, 25. Average of 6 adults from Mount Tancitaro, Michoacan: Total length, 227 (220-237); tail vertebræ, 113 (106-117); hind foot, 26.1 (25-27); ear from notch (dry), 18 (17.5-18.5).

Type specimen.—No. 50423 U. S. National Museum, Biological Survey Collection. ♂ adult. July 27, 1892. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This species is evidently a member of the *boylei* series, but appears to be distinct, although it approaches *aztecus* and *evides* very closely. Its slightly shorter tail, more blackish color and larger audital bullæ are the chief characters distinguishing it from these forms. It averages somewhat larger throughout and the skull is usually heavier; but there is some variation in size, and skulls are found practically identical with those of *evides*, save that the audital bullæ are slightly larger. It closely resembles *oaxacensis* in color and general characters, but is easily separated from that species by its shorter tail. From *levipes* it is distinguished by its sharp-angled supraorbital border and less abruptly constricted frontals.

Specimens examined.—Total number 74, from localities as follows:

Jalisco: Sierra Nevada de Colima, 13.

Mexico: Amecameca, 3.

Michoacan: Mount Tancitaro, 17; Patamban, 37; Patzcuaro, 3.

Morelos: Huitzilac, 1.

Key to subspecies of *Peromyscus pectoralis*.

Size larger; hind foot 21-23; tail relatively shorter, averaging less than 100.

Western Texas and Mexico near the Rio Grande..... *P. p. luccianus*

Size smaller; hind foot 20-22; tail averaging more than 100. North Central Mexico.

Size smaller; color paler; no pectoral spot; tarsal joint white,

P. p. cremicoides

Size larger; color darker; usually with a buffy pectoral spot; tarsal joint usually with at least a trace of dusky..... *P. pectoralis*.

PEROMYSCUS PECTORALIS Osgood.

Peromyscus atticateri pectoralis Osgood, Proc. Biol. Soc. Wash., XVII, pp. 59-60, March 21, 1904.

Type locality.—Jalpan, Queretaro, Mexico.

Geographic distribution.—Known from scattered localities in the Sonoran zone of eastern and central Mexico, from central Nuevo

Leon south to Queretaro, and thence west through southern San Luis Potosi and (probably) Guanajuato to eastern Jalisco and southern Zacatecas.

Characters.—Size and proportions about as in *P. eremicus*; color darker and more vinaceous; tail more coarsely annulated and more hairy, sole of hind foot somewhat hairy on proximal third; skull and teeth widely different. Closely similar in general characters to *P. rowleyi* and *P. leripex*, but with relatively longer tail and always

FIG. 5.—Distribution of *Peromyscus pectoralis*, *P. megalops*, *P. furvus*, and *P. guatemalensis*.

distinguishable by smaller size, particularly by smaller skull and molar teeth.

Color.—Unworn pelage: Ground color of upperparts pale ochraceous buff, thickly sprinkled with dusky, producing a general effect of dark wood brown; sides of head behind eyes slightly grayish; a narrow dusky orbital ring; underparts white, pectoral region usually strongly buffy ochraceous; ears brownish dusky, narrowly edged with whitish, no markings about base; feet white, tarsal joint usually with little or no extension of dusky from leg; tail variable, dusky

brownish above and white or often with a considerable sprinkling of dusky below. Worn pelage: Upperparts pale ochraceous buff, heavily mixed with dusky cinnamon, producing an effect of pale russet; sides of head usually showing more grayish than in unworn pelage; otherwise not peculiar.

Skull.—Most similar to that of *rowleyi*, but smaller throughout; rostrum relatively somewhat broader and heavier; braincase less vaulted; molar teeth decidedly smaller. Somewhat similar to that of *leripes*, but smaller; lacrymal region less swollen; premaxillæ usually ending slightly beyond the even nasals; interparietal relatively large.

Measurements.—Type: Total length, 210; tail vertebræ, 114; hind foot, 22. Average of 10 adults from Villar, San Luis Potosi: 201 (195–209); 110.7 (102–115); 21 (20–22); ear from notch (dry), 15.5 (15.4–17.2).

Type specimen.—No. 81236 U. S. National Museum, Biological Survey Collection. ♂ adult. Aug. 30, 1896. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This is the representative of a small group of subspecies any of which in certain pelages shows considerable superficial resemblance to *P. eremicus* or some of its forms. That none of them are closely related to *eremicus* is easily demonstrated by a comparison of the molar teeth. They are really nearest to *P. boylei* and its subspecies, from which they may be distinguished by smaller size, relatively longer tails, and certain cranial characters. The absence of dusky markings on the tarsal joint, which is characteristic of the other forms *eremicoides* and *laceianus*, is not absolutely constant in *pectoralis*. The majority of specimens, however, show no trace of such marking. The name *pectoralis* is by accident the first one applied to a member of this group, having been cited as a subspecies of *attwateri*, the type of which proved to be another species.^a The form *pectoralis*, as its name implies, is characterized by the presence of a buffy pectoral spot. When this is absent or not well developed, as is sometimes the case, the form may be distinguished from *eremicoides* and *laceianus* by its darker color.

Specimens examined.—Total number 62, from localities as follows:

Jalisco: Atemajac, 2; Barranca Ibarra, 1; Bolanos, 1; Colotlan, 1.

Nuevo Leon: Cerro de la Silla, 2; Monterey, 10.

Queretaro: Jalpan, 5.

San Luis Potosi: Jesus Maria, 1; Villar, 10.

Tamaulipas: Victoria, 26.

Zacatecas: Hacienda San Juan Capistrano, 2; Monte Escobedo, 1.

^a Cf. Bailey, Proc. Biol. Soc. Wash., XIX, pp. 57–58, 1906.

PEROMYSCUS PECTORALIS EREMICOIDES OSGOOD.

(Pl. IV, fig. 7.)

Peromyscus altwateri eremicoides Osgood, Proc. Biol. Soc. Wash., XVII, p. 60, March 21, 1904.

Type locality.—Mapimi, Durango, Mexico.

Geographic distribution.—North central Mexico, chiefly in the States of Durango, Coahuila, and Chihuahua; north to southern Arizona.

Characters.—Similar to *P. pectoralis*, but smaller and paler; color nearly as in *P. p. laceianus* and often much as in *P. eremicus*; ears quite small; skull small and light; audital bullæ very small; soles of hind feet usually slightly hairy proximally but sometimes naked, at least medially.

Color.—Upperparts mixed pinkish buff and dusky, producing the general effect of pale broccoli brown; lateral line pinkish buff; facial region between eye and ear grayish; underparts pure creamy white without trace of pectoral spot; feet white, no dusky marking on tarsal joint; tail pale grayish dusky above, white below.

Skull.—Similar to that of *pectoralis* but decidedly smaller; audital bullæ very small; nasals short and only slightly or not at all exceeded by the ascending branches of the premaxillæ; rostrum slightly depressed; interorbital constriction relatively wide.

Measurements.—Type and one topotype: Total length, 180, 195; tail vertebrae, 102, 111; hind foot, 20, 21; ear from notch (dry), 14.3, 16.6.

Type specimen.—No. 57729 U. S. National Museum, Biological Survey Collection. ♂ adult. Dec. 15, 1893. E. A. Goldman. Specimen in good condition.

Remarks.—This form is readily distinguishable from *pectoralis* by its small size, paler color, and pure white underparts. From *laceianus* it differs chiefly in smaller size. Its resemblance to *eremicus*, particularly when in worn or immature pelage, is remarkable. The external characters distinguishing it from *eremicus* are smaller ears, slightly more hairy tail, and white tarsal joints. But these are sometimes difficult to appreciate, as the tail in *eremicus* is often quite hairy, and the dusky on the tarsal joint sometimes so little developed as to be scarcely apparent. However, the molar enamel pattern, except in extremely worn teeth, is always diagnostic, *eremicoides* having the small accessory cusps and *eremicus* being without them. Specimens from the type locality of *eremicoides* and a few neighboring localities are well characterized by their small size, but many from outlying localities, though referable to *eremicoides*, are larger and approach *laceianus* or *pectoralis*. Three specimens from Fort Hua-

chuca, Ariz., seem indistinguishable from typical *eremicoides*. Further material from this region is much needed.

Specimens examined.—Total number 56, from localities as follows:

Arizona: Fort Huachuca, 3.

Chihuahua: Chihuahua, 3; Santa Eulalia, 8.

Coahuila: Carneros, 3; Jaral, 2; Jimulco, 4; Saltillo, 10; Sierra Encarnación, 1.

Durango: Inde, 6; Mapimi, 2.

Nuevo Leon: Santa Catarina, 9.

Tamaulipas: Jaumave Valley, 2 (aberrant); Miquihuana, 3.

PEROMYSCUS PECTORALIS LACEIANUS BAILEY.

Peromyscus attwateri Bailey, N. Am. Fauna No. 25, p. 100. 1905—not of Allen.
Peromyscus pectoralis laceianus Bailey, Proc. Biol. Soc. Wash., XIX, pp. 57–58,
May 1, 1906.

Type locality.—Lacey Ranch, near Kerrville, Tex.

Geographic distribution.—West central Texas, from the vicinity of Austin to the Big Bend of the Rio Grande and immediately adjacent parts of Mexico.

Characters.—Similar to *P. p. eremicoides*, but larger and with tail relatively shorter; somewhat similar to *P. b. attwateri* but smaller; color more grayish; feet and tarsal joint white without dusky marking; skull and teeth smaller.

Color.—Unworn pelage: Similar to *eremicoides*, but slightly more vinaceous; ground color of upperparts pinkish buff with a variable mixture of dusky, not especially concentrated on dorsum but quite evenly distributed; general effect varying from broccoli brown to wood brown; underparts creamy white; no white at bases of ears; feet white, tarsal joint not marked with dusky; tail pale brown above, white below. Worn pelage: Dusky of upperparts paler and less extensive; predominating color pale ochraceous buff to pinkish buff or dusky so changed to cinnamon brown shades that the general effect of the upperparts is a peculiar shade variously approaching the écreu drab, cinnamon, and fawn of Ridgway.

Skull.—Similar to that of *pectoralis*; decidedly larger than that of *eremicoides*; rostrum averaging slightly heavier than in either. Somewhat like that of *attwateri* but decidedly smaller; molar teeth smaller and weaker; braincase relatively more elongate; interparietal relatively larger.

Measurements.—Type: Total length, 185; tail vertebræ, 95; hind foot, 23. Average of 6 topotypes: 187 (185–192); 96 (94–100); 22.1 (22–23); ear from notch (dry), 15.8 (15–16.2).

Type specimen.—No. 97063 U. S. National Museum, Biological Survey Collection. ♂ young adult. May 3, 1899. V. Bailey. Specimen in good condition.

Remarks.—Of the numerous forms occurring in Texas, this one is apt to be confused with *eremicus* and *attwateri* only. Dental characters readily eliminate *eremicus*, and the presence of dusky markings on the tarsal joints of *attwateri* suffices to remove it from consideration. At first sight *laceianus* conveys the impression of a rather pale grayish individual of *attwateri* or *rowleyi*, and its skull is sufficiently similar to make it quite certain that its nearest affinity is with the *boylei* group. It occurs at the same localities with *attwateri* and, like that form, inhabits rocky situations. Slight confusion of names has resulted through a misapplication of the name *attwateri* (Bailey l. c.), but this is now cleared up, and *laceianus* appears to be the only name that has been properly applied to this form.

Specimens examined.—Total number 150, from localities as follows:

- Coahuila:** Opposite Langtry, Tex., 9; 15 m. southeast of Langtry, Tex., 1; Head of Las Vacas Creek, 1; 15 m. east of Las Vacas, 1.
- Texas:** Austin, 13; Boerne, 5; Near Camp Verde, 5; Chisos Mountains, 4; Comstock, 6; Davis Mountains, 1; Fort Clark, 4; Llano, 4; Mouth of Devils River, 2; Fort Lancaster, 5; Howard Springs, 2; Ingram, 20; Japonica, 9; Near Juno, 2; Kerr County, 24 (Lacey Ranch 8, Turtle Creek 16); Langtry, 13; Marathon, 1; Mason, 6; East Painted Cave, 1; Pecos River, 55 m. northwest of Comstock, 1; Rock Springs, 1; Samuels, 2; San Antonio, 1; Sanderson, 1; Sheffield, 5.

Key to subspecies of *Peromyscus truei*.

a. Habitat western United States.

1. Color paler, largely ochraceous buff; ears averaging larger. Chiefly south and east of the summit of the Sierra-Cascade Range.....*P. truei*
2. Color darker, largely deep ochraceous, tawny, cinnamon, or russet, often with much dusky mixture; ears averaging smaller. California and Oregon, chiefly west of the summit of the Sierra-Cascade Range.....*P. t. gilberti*

aa. Habitat Mexico.

b. Habitat Lower California.

1. Size larger. Northern.....*P. t. martirensis*
2. Size smaller. Southern.....*P. t. lagunae*

bb. Habitat Mexico (except Lower California).

- c. Tail shorter, averaging less than 100; ears slightly larger; color pale. Northern.....*P. truei*

cc. Tail longer, averaging about 110; ears slightly smaller. Central and southern.

1. Darker.....*P. t. gratus*
2. Paler.....*P. t. gentilis*

PEROMYSCUS TRUEI (SHUFELDT).

(Pl. IV, fig. 6; Pl. VII, fig. 10.)

Hesperomys truei Shufeldt, Proc. U. S. Nat. Mus., VIII, pp. 407-408, pl. XXI, Sept. 14, 1885.

Hesperomys megalotis Merriam, N. Am. Fauna No. 3, pp. 63-64, pls. III-IV, figs. 1-4, Sept. 11, 1890.—Black Tank, Little Colorado Desert, Arizona.

P[eromyscus] truei Thomas, Ann. & Mag. Nat. Hist., ser. 6, XIV, p. 365, Nov., 1894.

Peromyscus lasius Elliot, Field Col. Mus., Chicago, Zool. Ser., III, pp. 265-266, Mar. 8, 1904.—Hannopee Canyon, Panamint Mountains, California.

Peromyscus montipinoris Elliot, *supra cit.*, III, pp. 264-265, Mar. 8, 1904.—Lockwood Valley, Mount Pinos, California.

FIG. 6.—Distribution of *Peromyscus truei* and subspecies.

Type locality.—Fort Wingate, N. Mex.

Geographic distribution.—Southwestern United States and northern Mexico from southern California (east of the Sierra and San

Bernardino ranges), across southern Nevada, southern Utah, Arizona, to west central New Mexico, and thence south in Mexico at least to north central Chihuahua.

Characters.—Size medium; tail usually about equal to head and body (often slightly shorter, occasionally slightly longer); pelage quite long, lax, and silky; ears very large, about equal in length to hind foot; hind foot usually densely haired from calcaneum to proximal plantar tubercle (about proximal two-fifths of foot). Similar to *P. b. rowleyi* but ears larger, pelage usually longer and softer, tail more closely haired, annulations finer and more nearly concealed; skull with audital bullæ larger and more orbicular. Similar to *P. nasutus* but size smaller, color brighter, less grayish; ears slightly larger; skull usually smaller throughout; audital bullæ actually and relatively larger.

Color.—Unworn pelage: Ground color of upperparts ochraceous buff mixed on back and sides with fine dusky lines, the general effect variously approaching wood brown, isabella color, and cinnamon; lateral line usually well defined, pure ochraceous buff without dusky mixture; sides of face and nose somewhat grayish; a narrow dusky orbital ring and slight dusky spot at base of whiskers; ears dusky brownish thinly clothed within and without with short grayish white hairs; tufts at anterior bases of ears practically same color as surrounding parts and without any definite white or black; underparts creamy white; feet white, tarsal joint slightly dusky, this often partly concealed by overlying white hairs; tail slightly bicolor, brownish dusky above, white below. Worn pelage: General effect of upperparts pale ochraceous buff to pinkish buff mixed with pale cinnamon so blended as to modify the general color but little; lateral line scarcely distinct from upper sides; otherwise practically as in unworn pelage. Adolescent pelage: Upperparts dull buff strongly mixed with fine dusky lines, producing a general effect of broccoli brown lightly tinged with buff; lateral line pale ochraceous buff, narrow but well-defined; head and face except lower cheeks quite decidedly more grayish than rest of upperparts.^a Young in first coat: Upperparts pale drab gray overcast with dusky particularly on dorsum.

Skull.—Size medium (greatest length 26–30); braincase rather deep and somewhat vaulted; zygomata somewhat heavy and squared anteriorly, deeply notched by infraorbital foramen; nasals rather broad and flat, abruptly cuneate posteriorly; audital bullæ large and orbicular; interpterygoid fossa nearly right-angled, the anterior angles slightly rounded and indenting palatal shelf. Compared with

^a This is usually caused by the persistence of the preceding pelage for a longer period on these parts than elsewhere.

that of *rowleyi*, the skull of *truei* shows many differences, but the most obvious and diagnostic is the size of the audital bullæ, which is nearly double that of *rowleyi*. Compared with that of *nasutus*, the skull of *truei* is slightly smaller; braincase narrower and deeper; zygomata heavier, more angular anteriorly, and more deeply notched by infraorbital foramen; rostrum and nasals shorter; audital bullæ always relatively and usually actually larger.

Measurements.—Average of 10 adult topotypes: Total length, 186 (180–195); tail vertebrae, 92 (86–102); hind foot, 23; ear from notch (dry), 22.4 (21.5–24). Of 10 adults from the Manzano Mountains, New Mexico: 197 (180–210); 98 (90–106); 22.5 (22–23). Of 10 adults from the Panamint Mountains, California: 198 (189–210); 103 (97–112); 23.7 (23–24.5).

Type specimen.—No. $\frac{14954}{3108}$ U. S. National Museum. ♂ adult (old). Mar. 14, 1885. R. W. Shufeldt. Skin rather poorly formed: pelage clean, long, and full; right foreleg and left hind leg missing. Skull in good condition; teeth, including incisors, very much worn; zygomata slightly broken; angular process of left ramus of mandible broken; the following teeth missing: right $\bar{m}$ 2, $\bar{m}$ 3; right $\bar{m}$ 2, $\bar{m}$ 3; left $\bar{m}$ 3; skull otherwise perfect.

Remarks.—This species is common throughout its range and is represented in most collections by at least a few specimens. It is often called big-eared mouse, leaf-eared mouse, and similar names, on account of its unusually large external ears. These are relatively larger than in any other species found north of Mexico, but they vary somewhat in size and may be approximated in forms like *nasutus* and *rowleyi*. Fortunately, however, the large internal audital bullæ of *truei* are as characteristic as the large external ears, and the possession of both is usually diagnostic of any given specimen. Fully adult specimens of *truei* in good pelage are readily recognizable, for the combination of large ears, large orbicular audital bullæ, finely haired tail, and long, soft, and chiefly ochraceous pelage is not found in any other species. But, as is often true, immature specimens, or those in unusual or poor conditions of pelage, may prove difficult to place.

The several subspecies of *truei* preserve most of its general characters fairly well, and differ from it chiefly in size, length of tail, or shade of color, combined with slight cranial peculiarities. Intergradation with *gilberti*, *martirensis*, and *gratus* occurs beyond any reasonable doubt.

There are three synonyms, *megalotis*, which appears to be exactly equivalent to *truei*, and *lasius* and *montipinoris*, which may be regarded as approaching *gilberti*, for though they retain the coloration of *truei* (even in its extreme phases) they differ in slight cranial characters that are practically the same as those of *gilberti*.

Specimens examined.—Total number 475, from localities as follows:

- Arizona:** Black Tank, Painted Desert, 2; Grand Canyon (top), 1; Holbrook, 10; Keam Canyon, 9; Moccasin Spring, 3; Springerville, 32; Walnut, 4.
- California:** Coleville, Mono County, 6; Coso, 1; Fort Tejon, 3; Inyo Mountains, 12; Kernville, 2; 25 miles above Kernville, 1; South Fork Kern River, 1; Lone Pine, 1; Long Valley, Mono County, 1; Millford, 1; near Morongo Valley, 3; Mojave, 9; New York Mountain, 3; Panamint Mountains, 46; Piute Mountains, 2; Providence Mountains, 9; San Emigdio Canyon, 1 (approaching *gilberti*); Susanville, 2; Tehachapi Peak, 4 (approaching *gilberti*); Walker Pass, 6; White Mountains, 2.
- Chihuahua:** Casas Grandes, 2; Colonia Garcia, 7.
- Colorado:** Ashbaugh Ranch, 3; Coventry, 5; De Beque, 1; Escalante Hills, 3; Gaume Ranch, 2; Glenwood Springs, 1; Lily, 2; McCoy, 1; Plateau Creek, 2; Rangeley, 2; Rinehart Station (20 miles south of Lamar), 1; Rifle, 1; Salida, 1;^a Uncompahgre Plateau, 1.
- Nevada:** Anderson Ranch, Douglas County, 16; Charleston Mountains, 8; Gardnerville, 5; Grapevine Mountains, 2; Panaca, 1; Reese River, 1; mountains 16 miles east of Stillwater, 2.
- New Mexico:** Abiquiu, 1; Ancho, 1; Aztec, 3; Burro Mountains, 2; Capitan Mountains, 34; Cieneguilla, 2; Clondcroft, 1; Corona, 6; Cuervo, 3; Dog Spring, 1; Datil Mountains, 7; Espanola, 1; Fort Wingate, 26; Gallina Mountains, 5; Gallup, 4; Gila National Forest, 3; Glenwood, 1; Grants, 1; Hale Ranch, near Ruidoso, 5; Isleta, 4; Jemez, 1; Jicarilla Mountains, 36; Laguna, 2; La Plata, 5; Manzano Mountains, 20; Mesa Jumanes, 1; Pecos, 3; Ribera, 3; Rinconada, 8; San Andres Mountains, 4; Sandia Mountains, 4; Santa Rosa, 16; Sierra Grande, 3; Silver City, 4; Weed, 1.
- Utah:** Beaver River, near Fort Cameron, 3; Browns Park, 1; Henry Mountains (east slope Mount Ellen), 1; St. George, 1.

PEROMYSCUS TRUEI GILBERTI ALLEN.

Sitomys gilberti Allen, Bull. Am. Mus. Nat. Hist., N. Y., V, pp. 188-189, Aug. 18, 1893.

Peromyscus gilberti Allen, *supra cit.*, VIII, p. 267, Dec. 4, 1896.

Peromyscus dyscelius Elliot, Field Col. Mus., Chicago, Zool. Ser., I, pp. 207-208, Mar., 1898.—Portola, San Mateo County, Calif.

Type locality.—Bear Valley, San Benito County, Calif.

Geographic distribution.—Mountains and foothills of the interior of California and the coast south of San Francisco Bay; north to central Oregon. Chiefly Upper Sonoran zone.

Characters.—Similar in general to *P. truei*, but color darker and richer; ears and audital bullæ averaging slightly smaller; pelage usually not so long and silky. Somewhat similar to *P. boyleyi*, but ears and audital bullæ smaller.

Color.—Unworn pelage: Similar to that of *truei*, but darker and richer, ground color a deeper shade of ochraceous, often nearly tawny,

^a Collection of E. R. Warren.

dusky mixture more copious; general effect often approaching cinnamon and russet; lateral line usually well-defined, ochraceous to tawny; orbital ring more blackish and more sharply defined than in *truei*; dusky markings intensified throughout; pectoral spot frequently present.

Skull.—Similar to that of *truei*, but averaging slightly smaller with slightly smaller audital bullæ; zygomata somewhat lighter anteriorly and not so deeply notched by infraorbital foramen. Somewhat similar to that of *P. boylei*, but audital bullæ decidedly larger and more nearly orbicular.

Measurements.—Average of 5 adults from Gilroy, Calif.: Total length 200 (186–206); tail vertebrae 98 (87–103); hind foot 22.5 (22–24); ear from notch (dry) 19.2 (18–21).

Type specimen.—No. 329 Collection of Stanford University. ♂ adult. Apr. 1, 1893. C. H. Gilbert and W. W. Price. Specimen in good condition.

Remarks.—This form differs from *truei* in much the same way that *boylei* differs from *rowleyi*. It is perhaps more difficult to distinguish from *boylei* than *truei* is from *rowleyi*. Its external ears are somewhat smaller than those of *truei* and therefore approach more closely the size of those of *boylei*. The color is in many cases practically indistinguishable from that of *boylei*. The ears average considerably larger than in *boylei*, but the only certain means of distinguishing specimens of all ages and pelages is in the skulls, in which the audital bullæ are large and rounded in *gilberti* and decidedly smaller and more nearly triangular in outline in *boylei*. The close resemblance of these forms in size, proportions, and color has led to some confusion, for the excellent cranial characters that distinguish them have not always been appreciated. Quite recently one author^a has stated in very positive terms that *boylei* and *gilberti* are absolutely alike, a conclusion doubtless formed without reference to cranial characters. The *truei* and *boylei* groups seem to be everywhere distinguishable by certain general characters which are still present, but less pronounced and therefore sometimes overlooked, in the representative forms found in central and western California. The extreme of dark color is found in specimens from the heavily forested Santa Cruz Mountains, but specimens nearly or quite as dark are found practically at the type locality of *gilberti* and at other localities somewhat removed from the coast. The name *dyselii* has been given to this extreme, but since *gilberti* is an earlier name and applicable to the darker form as opposed to the paler form *truei*, it does not seem advisable to recognize *dyselii*, for if it were done, *gilberti* would be left as an indefinable intermediate between *truei*

^a Elliot, Field Col. Mus., Zool. Ser., I, pp. 207–208, March, 1898.

and *dyselins* with a decided leaning toward the latter. It would have been fortunate if the extreme of the dark form had received a name earlier.

Specimens examined.—Total number 493, from localities as follows:

California: Alameda Creek, Santa Clara County, 4; Alum Rock Park, near Mount Hamilton, 26; Middle Fork American River, near Auburn, 2; Baird, 2; Bartlett Springs, 1; Bear Gulch, Alameda County, 2; Bear Valley, San Benito County, 15; Berger Creek, 1; Berkeley, 10; Beswick, 8; Big Basin, Santa Cruz County, 1; Big Pine Mountain, 1; Boulder Creek, 8; Briceland, 1; Calabasas, 2; Calistoga, 4; Camp Meeker, 2; Carbondale, 3; Chico, 2; Coarsegold, 8; Cold Creek, 3; Cone Peak, 1; Coulterville, 1; Edgewood, 3; El River, near South Yolla Bolly Mountain, 1; Esbom Valley, Tulare County, 1; Fall River Valley, 3 (approaching *truei*); Fremont Peak, Gabilan Range, 1; Freshwater Creek, 3; Fresno Flat, 2; Gasquet, 2; Gaviota Pass, 1; near Gilroy, 9; Guenoc, 1; Hoopa Valley, 7; Hornbrook, 1; Hurleton, 8; Jolon, 3; East Fork Kaweah River, 2; King City, 1; Laguna Ranch, 3; La Honda, 6; La Panza, 1; Learly Ranch, Mendocino County, 9; near Lower Lake, 32; Marysville Buttes, 41; Monterey, 6; Montgomery, 3; Mount Hamilton, 30; Mount St. Helena, 26; Mount Sanhedrin, 13; Nelson (8 mi. E.), 6; Nicasio, 3; Oakland, 3; Pacheco Pass, 1; Pacheco Peak, 4; Palo Alto, 5; Paraiso Springs, 2; Paso Robles, 5; Pescadero Creek, Santa Cruz Mountains, 13; Picard, 1; Pleyto, 3; Portola, 20; Posts, 2; Pozo, 1; Quincy, 1; Raymond, 3; Redding, 2; Round Valley, 2; Salt Springs, Fresno River, 1; San Antonio, 43; San Lorenzo Creek, 2; near San Simeon, 1; top of Santa Cruz Mountains, near Santa Cruz, 1; Santa Lucia Peak, 3; near Santa Rosa, 1; Scott Valley, 2; Sherwoods, 5; Tassajara Creek, 4; Tracy, 1; Ukiah, 2; Willits, 6; Woodside, 1.

Oregon: Crooked River, 25 miles southeast of Prineville, 2 (approaching *truei*); Grants Pass, Rogue River Valley, 6.

PEROMYSCUS TRUEI MARTIRENSIS (ALLEN).

Sitomys martirensis Allen, Bull. Am. Mus. Nat. Hist., N. Y., V, pp. 187-188, Aug. 18, 1893.

[*Peromyscus*] *martirensis* Trouessart, Catal. Mamm., p. 516, 1897.

Peromyscus hemionotis Elliot, Field Col. Mus., Chicago, Zool. Ser., III, p. 157, April, 1903.—Rosarito Divide, San Pedro Martir Mountains, Lower California.

Type locality.—San Pedro Martir Mountains, at 7,000 feet altitude, Lower California, Mexico.

Geographic distribution.—San Pedro Martir and adjacent ranges of mountains of northern Lower California, and northward to the San Jacinto and San Bernardino mountains of southwestern California.

Characters.—Color and general characters practically as in *truei*; tail considerably longer; audital bullæ averaging slightly smaller.

Color.—Practically as in *truei*; June and July specimens in slightly worn pelage are chiefly ochraceous buff; the dusky markings on the tarsal joints are much reduced and scarcely obvious.

Skull.—Similar to that of *truei*; zygomata slightly more compressed anteriorly; audital bullæ averaging slightly smaller, but still much larger than in *rowleyi* or *boylei*.

Measurements.—Average of 6 adults from La Grulla, San Pedro Martir Mountains: Total length 213 (205–222); tail vertebræ 116.5 (112–122); hind foot 24; ear from notch (dry) 21.7 (21–23).

Type specimen.—No. 4444 American Museum of Natural History, New York. May 8, 1893. A. W. Anthony. Skin in good condition. Skull with last right *m* missing; parietal depressed on one side, evidently from injury in life, giving the orbit a slightly beaded effect.

Remarks.—The long tail of this form is its chief distinguishing character. Specimens in all pelages are not yet available, but judging from June and July material, no color difference separates it from typical *truei*. The type and nearly all other specimens examined are in a very bright ochraceous buff pelage exactly like comparable specimens of *truei*. Certain slight cranial characters, though not present in every specimen, seem to have a value as average differences.

Specimens examined.—Total number 90, from localities as follows:

California: San Bernardino Mountains, 8; San Jacinto Mountains, 2; Summit Coast Range, San Diego County, 1.

Lower California: Aguaje de las Fresas, 2; Agua Escondido, 4; El Rayo, Hanson Laguna Mountains, 2; Hanson Laguna, Hanson Laguna Mountains, 17; La Grulla, San Pedro Martir Mountains, 13; Piñon, west slope San Pedro Martir Mountains, 11; Rosarito Divide, 1; San Matias Spring, 1; San Pedro Martir Mountains at 7,000 feet altitude, 4; Santa Eulalia, 9; Santa Rosa, 7; Vallecitos, 8.

PEROMYSCUS TRUEI LAGUNAE subsp. nov.

Type from La Laguna, Laguna Mountains, Lower California, Mexico. No. 147004 U. S. National Museum, Biological Survey Collection. ♀ adult. Jan. 26, 1906. E. W. Nelson and E. A. Goldman.

Geographic distribution.—Mountains of the region of the extremity of the peninsula of Lower California, Mexico.

Characters.—General characters as in *truei*; ears smaller; tail relatively longer; skull smaller and lighter.

Color.—Essentially as in *truei*. Underparts ochraceous buff mixed with fine lines of dusky; nose and postorbital region grayish; a narrow dusky orbital ring; feet white, tarsal joint dusky; tail brownish dusky above, white below; underparts creamy white.

Skull.—Much as in *truei* and *martirensis* but smaller and lighter; rostrum and nasals more slender; zygomata more compressed an-

teriorly; molar teeth and audital bullæ smaller; interparietal relatively large.

Measurements.—Average of 10 adult topotypes: Total length 193 (182–210); tail vertebrae 105 (97–118); hind foot 22.4 (21.5–23); ear from notch (dry) 19 (18–19.8).

Remarks.—This form, though not strongly characterized, is geographically isolated and the recognition of its peculiarities, such as they are, seems inevitable. During the recent exploration of the peninsula of Lower California by Nelson and Goldman, no specimens of the *truei* group were found in the long stretch of country between the San Pedro Martir Mountains and the Laguna Mountains. Nevertheless, the isolated form here named *lagunae* differs from *martirensis* only in its slightly smaller size and more slender rostrum.

Specimens examined.—Total number 48, from localities as follows:

Lower California: El Sauz, 1; La Chuparosa, 8; La Laguna, 14; Mount Miraflores, 5; Sierra Laguna, 15; Victoria Mountains, 5.

PEROMYSCUS TRUEI GRATUS MERRIAM.

(Pl. IV, fig. 9.)

Peromyscus gratus Merriam, Proc. Biol. Soc. Wash., XII, p. 123, Apr. 30, 1898.

Peromyscus sagax Elliot, Field Col. Mus., Chicago, Zool. Ser., III, p. 142, Mar., 1903.—Patzcuaro, Michoacan, Mexico.

Peromyscus parvidus Elliot, *supra cit.*, pp. 142–143.—Patzcuaro, Michoacan, Mexico.

Peromyscus zelotes Osgood, Proc. Biol. Soc. Wash., XVII, pp. 67–68, Mar. 21, 1904.—Querendaro, Michoacan, Mexico.

Type locality.—Tlalpam, Valley of Mexico, Mexico.

Geographic distribution.—South central Mexico, in the States of Hidalgo, Mexico, Michoacan, and Queretaro; possibly south to central Oaxaca.

Characters.—Similar in general to *P. truei*; ears somewhat smaller; tail decidedly longer and rather more coarsely haired; color darker, with greater mixture of dusky; skull with shorter and relatively heavier rostrum.

Color.—Unworn pelage: Ground color of upperparts ochraceous to ochraceous buff, heavily and nearly uniformly mixed with blackish; general effect isabella color to nearly sepia; facial region, nose, forehead, etc., more grayish; lateral line nearly clear ochraceous, rather narrow but strongly contrasted; orbital ring sharp blackish; ears brownish dusky edged with whitish; feet white, tarsal joint marked with extension of dusky from hind leg; underparts creamy white, occasionally with a buffy pectoral spot; tail blackish above, white sometimes flecked with blackish below. Worn pelage:

General effect varying through brownish fawn, wood brown, and cinnamon to russet; middle of back usually distinctly darker than sides; lateral line blending more or less perfectly with sides; orbital ring and grayish postorbital region more contrasted than in unworn pelage; otherwise similar to unworn pelage.

Skull.—General form as in *truei*; skull somewhat more compact and heavier; rostrum relatively shorter, broader, and heavier; braincase full and high; nasals broad and often nearly flat; ascending branches of premaxillæ even with, or slightly exceeding, posterior nasal endings; audital bullæ large and full, but relatively smaller than in *truei*.

Measurements.—Average of 10 adult topotypes: Total length, 204 (191–225); tail vertebrae, 110.5 (103–125); hind foot, 22.8 (22–24); ear from notch (dry), 19 (17.5–20.2).

Type specimen.—No. 50619 U. S. National Museum, Biological Survey Collection. ♀ adult. Nov. 30, 1892. E. W. Nelson and E. A. Goldman. Specimen practically perfect.

Remarks.—This is merely a longer-tailed and darker edition of *truei* with which intergradation occurs in north central Mexico. It is somewhat variable in cranial characters, but the nasals generally are broad, nearly flat, and rather short. Specimens from Michoacan as a rule have rather narrower nasals and large palatine foramina, but the variation is such that it seems inadvisable to recognize another form from this region. *P. gratus* is distinguishable from *levipes*, *spicilegus*, etc., which are nearly the same size, by its large audital bullæ, short nasals, and high narrow braincase. There are three synonyms, *P. paridus*, *P. sagax*, and *P. zelotes*, all described without suspicion of their relationship to *gratus*, comparisons being made with other forms. The type of *zelotes* has a rather heavy skull with rather small audital bullæ and the skin shows a peculiar combination of worn and unworn pelages. Its resemblance both externally and cranially to the *melanophrys* group is striking and doubtless indicates relationship not very remote. A few immature and otherwise unsatisfactory specimens from Oaxaca and Huajuapam, Oaxaca, are provisionally referred to *gratus*. The relationship of *gratus* to *difficilis* is evidently very close, and where the two are found together they are difficult to distinguish by any character except size, and this is almost covered by variation.

Specimens examined.—Total number 69, from localities as follows:

Hidalgo: Ixmiquilpan, 1; Pachuca, 6; Tula, 2; Zimapan, 2.

Mexico: Ajusco, 1; Tlalpam, 28.

Michoacan: La Palma, 1; Patzcuaro, 5; Querendaro, 3; Zamora, 12.

Oaxaca: Huajuapam, 3; Oaxaca, 1; Tamazulapam, 1.

Queretaro: Tequisquiapan, 3.

PEROMYSCUS TRUEI GENTILIS Osgood.

Peromyscus gratus gentilis Osgood, Proc. Biol. Soc. Wash., XVII, pp. 61-62, Mar. 21, 1904.

Type locality.—Lagos, Jalisco, Mexico.

Geographic distribution.—North central Mexico, chiefly in the States of Durango, Zacatecas, and northern Jalisco; east to southern Coahuila.

Characters.—Similar to *P. gratus*, but paler; sides of head much more fulvous; molar teeth slightly smaller.

Color.—Unworn pelage: Upperparts pale ochraceous buff, lightly mixed with dusky; middle of back with a slight concentration of dusky-tipped hairs; top of head, ear tufts, etc., with a predominance of buffy; sides of head nearly clear ochraceous buff, with a slight tinge of grayish between eye and base of ear; eyelids black; underparts white; hands and feet white; tarsal joint dusky; tail bicolor, blackish above, white below. Worn pelage: Upperparts varying from clear bright ochraceous buff on back and rump to grayish buff about head and shoulders, sometimes with a fine mixture of cinnamon-tipped hairs throughout; underparts white; tail dusky brownish above, white below.

Skull.—As in typical *P. gratus*, having the same large braincase, short depressed rostrum, and relatively large audital bullæ; molar teeth slightly smaller.

Measurements.—Average of 10 adult topotypes: Total length, 201 (194-210); tail vertebrae, 111.7 (103-120); hind foot 23.8 (23-24.5); ear from notch (dry) 18.6 (18-19.3).

Type specimen.—No. 78937 U. S. National Museum, Biological Survey Collection. ♂ adult. June 27, 1896. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This form is practically like *gratus* except in color, which is decidedly paler and more nearly like that of *truei*. However, it is somewhat brighter even than *truei* and also differs from it in its longer tail and cranial characters. Intergradation with both *truei* and *gratus* is amply shown by various specimens.

Specimens examined.—Total number 36, from localities as follows:

Coahuila: Sierra Encarnacion, 1 (approaching *truei*); Sierra Guadalupe, 1.

Chihuahua: Parral, 1; Sierra Madre, 40 m. east of Batopilas, 1.

Durango: Coyotes, 6; Durango, 2.

Guanajuato: Silao, 3 (approaching *gratus*).

Jalisco: Lagos, 12.

San Luis Potosi: Jesus Maria, 3.

Zacatecas: Valparaiso, 4; Zacatecas, 2.

PEROMYSCUS NASUTUS (ALLEN).

(Pl. IV, fig. 8.)

Vesperimus nasutus Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, pp. 299-300, June, 1891.

[*Peromyscus*] *truei nasutus* Trouessart, Catal. Mamm., p. 517, 1897.

Type locality.—Estes Park, Colorado.

Geographic distribution.—Mountains of Colorado, New Mexico, eastern Arizona, and western Texas, chiefly east of the Continental Divide.

Characters.—Color about as in *rowleyi*, but more grayish in summer pelage; size larger; size and proportions about as in *attwateri*, color paler and more grayish; skull with longer rostrum; external ears sometimes nearly as large as in *truei*; annulations of tail finer than in *rowleyi*.

Color.—Unworn pelage: Practically as in *rowleyi*; general effect of upperparts grayish wood brown to isabella color; ochraceous shades seldom or never accentuated; decidedly paler and more grayish than in *attwateri*. Worn pelage: Relatively dull, much duller than in either *rowleyi* or *truei*; general effect of upperparts pale grayish fawn lightly vermiculated with darker, occasionally brightening to a tinge of pinkish buff, but rarely or never attaining the ochraceous shades usual in *rowleyi*, *attwateri*, and *truei*. Adolescent and juvenal pelages: Darker than in *rowleyi*; plumbeous underfur deeper-colored and more mixed with dusky, occasionally quite sooty.

Skull.—About as in *attwateri*, but rostrum averaging slightly longer and audital bullæ more nearly spherical; similar to that of *rowleyi* but larger; audital bullæ actually somewhat larger than in *rowleyi* but relatively little or not at all larger; audital bullæ sometimes actually nearly as large as in small specimens of *truei*, but relatively smaller; rostrum quite decidedly longer than in *truei*; nasals narrower and less flattened; zygomata more compressed anteriorly, less deeply notched by infraorbital foramen; braincase averaging slightly broader and shallower.

Measurements.—Average of 5 specimens from Gold Hill, Colo.: Total length 195 (180-210); tail vertebræ 99 (91-105); hind foot 23.2 (22-24); ear from notch (dry) 19.7 (18.5-20.5). Of 10 adults from Grants, N. Mex.: 204 (199-206); 102 (98-109); 22.8 (22-24); 20.3 (19.5-21).

Type specimen.—No. 3333 American Museum of Natural History. New York. ♂ adult. Jan. 20, 1891. W. G. Smith. Skin rather poorly formed; tip of tail imperfect; underparts greasy. Skull lacking posterior part of braincase, basioccipital, right audital bulla, and smaller adjacent parts.

Remarks.—This species may be easily confused with either *P. truei* or *P. b. rowleyi*, and it is only after examination of a large amount of material (chiefly recently acquired) and the testing of various alternatives that its distinctness becomes apparent. The most obvious characters for separating *truei* and *rowleyi*, namely, size of external ears and of audital bullæ, are somewhat combined in *nasutus*. Since *nasutus* occurs throughout a considerable part of the ranges of *truei* and *rowleyi* confusion is further induced. However, *nasutus* has external ears and audital bullæ slightly larger than in *rowleyi* and slightly smaller than in *truei*. This is true as regards actual size, but since *nasutus* is larger than either *rowleyi* or *truei*, it is evident that its audital bullæ are relatively but little larger than those of *rowleyi*. It differs from both *rowleyi* and *truei* in its larger size, more grayish color (particularly in worn and partly worn conditions of pelage), and more elongate nasals. Its pelage is rather soft and full, more so than in *rowleyi*, and though not often so long, of a slightly different character from that of *truei*. In adolescent pelage there is a softness or fullness not seen in either *truei* or *rowleyi*, and its color then, though elusive of description, is quite characteristic. Although *nasutus* has of late been associated with *truei*, it now seems that its closest affinities are elsewhere, quite probably with *difficilis*, and possibly with *rowleyi*. It is smaller than *difficilis*, has a shorter tail, and more grayish color, but its skull, though smaller, with smaller audital bullæ, has the same general form, and certain specimens of *difficilis*, particularly those from the northern part of its range, appear to decidedly approach *nasutus*.

Specimens examined.—Total number 188, from localities as follows:

Arizona: Springerville, 8.

Colorado: Boulder, 20; Canyon City, 1; Estes Park, 8; Gold Hill, 9; Trinidad, 10.

New Mexico: Arroyo Hondo, 2; Arroyo Seco, 7; Capitan Mountains, 25; Catskill, 4; Cieneguilla, 11; Clayton, 1; Corona, 1; Coyote Creek, 3; Datil Mountains, 2; Emery Peak, 2; Folsom, 4; Fort Wingate, 1; Gallo Canyon, 1; Glorieta, 1; Grants, 17; Hall Peak, 2; Jicarilla Mountains, 19; Mora, 1; Pecos River, 3; Rinconada, 1; San Andres Mountains, 13; Santa Rosa, 3; Sierra Grande, 11; Tucumcari, 1.

PEROMYSCUS POLIUS Osgood.

Peromyscus polius Osgood, Proc. Biol. Soc. Wash., XVII, p. 61, Mar. 21, 1904.

Type locality.—Colonia Garcia, Chihuahua, Mexico.

Geographic distribution.—Known only from the type locality.

Characters.—Similar to *P. b. rowleyi* and *P. b. attwateri* but larger (hind foot 25–26) and more grayish; molar teeth relatively large and heavy; hind feet and tarsal joint white.

Color.—General color of upperparts grayish broccoli brown, produced by a ground color of pinkish buff mixed with dusky; narrow lateral line clear pinkish buff; head slightly more grayish than body, particularly on cheeks; a narrow dusky orbital ring; tuft at base of ear mixed grayish and buffy; ears grayish dusky, narrowly margined with buffy white; underparts pure white; feet and carpal and tarsal joints white; tail bicolor; pale brownish dusky above, white below.

Skull.—Similar in general form to that of *rowleyi*, but decidedly larger; molar teeth decidedly larger; palatine slits longer; audital bullæ actually about same size, relatively smaller. Size about as in large specimens of *attwateri*, but molar teeth actually and relatively larger and heavier.

Measurements.—Average of 8 adult topotypes: Total length 218.5 (210–234); tail vertebræ 117 (111–120); hind foot 25.8 (25–26); ear from notch (dry) 18.1 (17.2–18.5).

Type specimen.—No. 98226 U. S. National Museum, Biological Survey Collection. ♀ adult. June 26, 1899. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This species nearly equals *P. difficilis* in size, but its shorter tail and ears at once distinguish it without recourse to the skull, in which the audital bullæ are scarcely more than half the size of those of *difficilis*. It considerably resembles *rowleyi*, and especially *attwateri*, but is readily distinguished from either by its white 'ankles,' a character that may possibly indicate that its real relationship is with the much smaller but generally similar species, *P. eremicoides*. Nearly typical *rowleyi* is found at the type locality of *polius* and preserves its distinctness there.

Specimens examined.—Total number 11, all from the type locality.

Key to subspecies of *Peromyscus difficilis*.

Color very dark, chiefly rich blackish brown and black.....	<i>P. d. felipensis</i>
Color paler, chiefly ochraceous buff more or less mixed with dusky.	
Size averaging smaller; pelage closer and more glossy; skull with smaller braincase.....	<i>P. difficilis</i>
Size averaging larger; pelage looser and duller; skull with larger braincase.	<i>P. d. amplius</i>

PEROMYSCUS DIFFICILIS (ALLEN).

(Pl. V, fig. 6.)

Vesperimus difficilis Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, pp. 298–299, June, 1891.

[*Peromyscus*] *difficilis* Trouessart, Catal. Mamm., p. 518, 1897.

Type locality.—Sierra de Valparaiso, Zacatecas, Mexico.

Geographic distribution.—Sierra Madre from southwestern Chihuahua south through Durango and Zacatecas, then east and southeast to certain mountainous parts of Guanajuato and northern Hi-

dalgo, and thence north through parts of San Luis Potosi to mountains of southern Coahuila. Chiefly in Transition zone.

Characters.—Size rather large (hind foot 24–28); tail long, always longer than head and body; ears rather large; relatively larger than in other large Mexican species; general appearance that of a decidedly larger and longer tailed counterpart of *P. truei gratus*; skull with rather long nasals, full braincase, and large audital bullæ.

Color.—Unworn pelage: Similar in general to that of *P. truei gratus*, somewhat darker than in *truei*; ground color of upperparts ochraceous buff mixed with dusky, chiefly disposed as fine lines and rather dominating the general effect; sides, except lateral line, same as back; lateral line clear ochraceous buff, and usually fairly well defined; nose, postorbital region, and general facial region above lateral line quite distinctly grayish; ears thinly haired, margined with whitish, tufts at bases about the same color as surrounding parts; a narrow blackish orbital ring; underparts creamy white, usually without any pectoral spot; feet white, tarsal joint with a small dusky marking; tail sharply bicolor, blackish brown above, white below. Worn pelage: General effect of upperparts varying from dull fulvous drab to rather bright cinnamon; head and shoulders usually considerably more grayish than back and rump; lateral line scarcely or not at all distinct from rest of sides.

Skull.—Similar in general form to that of *nasutus* but larger, heavier, and with larger audital bullæ; braincase full and deep; interorbital space narrow; supraorbital border not beaded and seldom very sharp-angled, never forming any distinct shelf as in *melanophrys*; nasals quite elongate; teeth moderate; audital bullæ large and full, relatively smaller than in *gratus* but decidedly larger than in most other Mexican species.

FIG. 7.—Distribution of *Peromyscus difficilis* and subspecies.

Measurements.—Average of 10 adult topotypes: Total length 233 (212–255); tail vertebrae 127 (115–143); hind foot 26.3 (25.5–28); ear from notch (dry) 21 (19.5–23.5).

Type specimen.—No. †††† American Museum of Natural History, New York. ♂ adolescent. July 27, 1889. Audley C. Buller. Skin rather badly made, feet and tail twisted, and underparts stained, but still fairly satisfactory for comparison. Skull with cracks in basioccipital and interorbital part of frontal; anterior part of right zygoma absent.

Remarks.—The relationship of *difficilis* and its subspecies to the *truei* group is quite apparent, but there is no absolute connection between the two groups unless it be through *nasutus*, which may be a northern representative of *difficilis*. Thus in south central Mexico the two groups are represented by *difficilis* and *gratus*, and are there usually easily distinguishable by size alone; in New Mexico, Colorado, etc., are *truei* and *nasutus*, representatives of the same two groups, but with characters more nearly approximating each other, and therefore more difficult to distinguish. *P. difficilis* is readily distinguishable from other Mexican species of corresponding size by its larger ears and its unbeaded skull with large rounded audital bullæ. The bullæ are approached in size by those of *P. melanophrys*, but in that species the external ears are decidedly smaller and the supraorbital border of the skull is developed into a slight shelf often even suggesting a bead. Variation in cranial characters is considerable, but most of it appears in specimens from intermediate localities. Specimens from Hidalgo for the most part appear to be intermediate between *difficilis* and *amplus*. A large series from near Jesus Maria, San Luis Potosi, shows cranial variations almost covering the differences from *nasutus* to *amplus*. The most northerly specimens, as those from near Guadalupe y Calvo, have bullæ uniformly smaller than the average of typical *difficilis*, and appear to approach *nasutus*. They are best referred to *difficilis*, however, and the difference between them and *nasutus* is still sufficient to make it advisable to hold the two for the present as distinct species. Specimens from the mountains of Coahuila also are not quite typical, being unusually grayish, but this is perhaps due, at least in part, to age and condition of pelage. Another possible relative of *difficilis* is *P. polius*, which has a shorter tail, white tarsal joints, and also cranial characters.

Specimens examined.—Total number 255, from localities as follows:

Chihuahua: Batopilas (mountains 65 m. east), 6; mountains near Guadalupe y Calvo, 17.

Coahuila: Carneros, 2; Sierra Encarnacion, 19; Sierra Guadalupe, 26.

Durango: El Salto, 10.

Guanajuato: Santa Rosa, 20.

Hidalgo: Encarnacion, 9; Ixmiquilpan, 7; Zimapan, 14.

San Luis Potosi: Charcos, 5; mountains near Jesus Maria, 37

Tamaulipas: Miquihuana, 25.

Zacatecas: Platendo, 18; Valparaiso Mountains, 26; Zacatecas, 14.

PEROMYSCUS DIFFICILIS AMPLUS Osgood.

Peromyscus amplus Osgood, Proc. Biol. Soc. Wash., XVII, pp. 62-63, Mar. 21, 1904.

Type locality.—Coixtlahuaca, Oaxaca, Mexico.

Geographic distribution.—Mountains of north central Oaxaca, Puebla, southeastern Veracruz, and southern Hidalgo.

Characters.—Similar to *P. difficilis* and *P. d. felipensis*; color much as in *difficilis* but duller; size and cranial characters as in *felipensis*; color very much paler; pelage long and lax, usually lacking the gloss or luster shown in *difficilis*; skull large, with a broad full braincase.

Color.—Type: General effect of upperparts uniform clay color produced by a ground color of ochraceous buff and a fine peppery mixture of dusky; lateral line rather broad, ochraceous buff; forehead and orbital region from posterior base of whiskers to ear grayish; anterior base of whiskers buffy; underparts creamy white, with a well-developed ochraceous buff pectoral spot; feet white, tarsal joints marked with dusky; tail dusky brownish above, white below.

Skull.—Similar in general to that of *difficilis*, but larger and heavier throughout; rostrum and nasals broader and heavier; practically as in *felipensis*, but braincase averaging slightly higher and fuller; audital bullæ large, but relatively slightly smaller than in *difficilis*; interorbital space narrow; no supraorbital bead.

Measurements.—Average of 10 adult topotypes: Total length 248 (235-260); tail vertebrae 136 (128-145); hind foot 27 (26-28); ear from notch (dry) 20.9 (19.5-21.8).

Type specimen.—No. 70158 U. S. National Museum, Biological Survey Collection. ♀ adult. Nov. 12, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—In cranial characters, *amplus* differs from *difficilis* in the same way that *felipensis* does. Its color is similar to that of *difficilis*, but there is less dusky mixture and this is not usually disposed as fine lines, but as a fine peppery sprinkling. The pelage has a peculiar quality which baffles description, having less gloss or luster than in most other species. In this respect it resembles many specimens of the '*melanophrys*' group. It is easily distinguished from *melanophrys* by the absence of a definite supraorbital ridge and by its larger audital bullæ. It intergrades with both *difficilis* and *felipensis*. Specimens from northern Hidalgo show considerable approach to *difficilis*, while among series of *felipensis* are occasional paler specimens evidently approaching *amplus*.

Specimens examined.—Total number 133, from localities as follows:

Hidalgo: Irolo, 16; Marques, 5; Pachuca, 6; Real del Monte, 8; Tula, 14; Tulancingo, 8.

Oaxaca: Coixtlahuaca, 16; Tamazulapam, 12.

Puebla: Chalchicomula, 9; Esperanza, 18.

Tlaxcala: Apixaco, 2.

Veracruz: Maltrata, 6; Perote, 14.

PEROMYSCUS DIFFICILIS FELIPENSIS MERRIAM.

Peromyscus felipensis Merriam, Proc. Biol. Soc. Wash., XII, pp. 122-123, Apr. 30, 1898.

Type locality.—Cerro San Felipe, Oaxaca, Mexico. Altitude 10,300 feet.

Geographic distribution.—High elevations (8,000 feet to 11,000 feet) on the mountains surrounding the Valley of Mexico; reappearing at similar elevations in the mountains northeast of the city of Oaxaca.

Characters.—General characters as in *difficilis* and *amplus*; color very much darker than in either, rich blackish brown and pure black predominating; pelage somewhat heavier, more woolly; ears averaging smaller; size slightly larger than in *difficilis*; skull larger and heavier; braincase averaging flatter than in *amplus*.

Color.—Unworn pelage: Upperparts mixed grayish ochraceous buff and black; general effect on dorsum nearly black, lightly sprinkled with buffy gray, on sides nearly hair brown becoming more buffy toward lateral line, which is ochraceous buff mixed with dusky and seldom very sharply contrasted with rest of sides; sides of face, nose, and forehead tinged with grayish; blackish markings everywhere accentuated; orbital ring and spot at base of whiskers sharply black; spot on each side of nose in front of whiskers, buffy; white of lips ascending to lower edge of dusky spot at base of whiskers; feet white, tarsal joint with a broad blackish brown marking; tail sharply bicolor, blackish brown above, white below, but usually with some mixture of dusky on the underside near base; underparts creamy white modified by the blackish slate undercolor which is never entirely concealed; pectoral region broadly ochraceous buff. Worn pelage: Upperparts more uniform, with dorsum less differentiated; ends of hairs worn down and exposing considerable of the blackish slate undercolor; general effect varying from dark hair brown to sepia; lateral line scarcely apparent; underparts much modified by blackish slate undercolor. Young in first coat: Median upperparts deep blackish slate, very lightly flecked with gray; sides slate gray lightly vermiculated with darker.

Skull.—Similar to that of *difficilis*, but somewhat larger; rostrum and nasals broader and heavier; audital bullæ relatively smaller;

braincase averaging broader and shallower; practically as in *amplus* but braincase averaging slightly shallower.

Measurements.—Average of 10 adult topotypes: Total length 241.5 (225–248); tail vertebrae 127 (118–132); hind foot 26.8 (25.5–27.5); ear from notch (dry) 20.4 (19–21.7).

Type specimen.—No. 68409 U. S. National Museum, Biological Survey Collection. ♂ adult. Aug. 22, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—Its very dark color readily distinguishes this form from *difficilis* and *amplus*, and its cranial characters are likely to prevent confusion with any others. The audital bullae are not so full and rounded as in *difficilis* but still are larger than in most other Mexican species. *P. lepturus* also is dark colored, but will scarcely be confused with *felipensis* on account of its smaller size, smaller audital bullae, and relatively larger teeth. In nearly all other Mexican species at all similar to *felipensis* the interorbital region is broader, with some development of a supra-orbital ridge.

The distribution of *felipensis* is curiously interrupted, Cerro San Felipe being apparently quite isolated from the other localities from which the form is known, while *amplus* is found on mountains in the intervening region. Possibly *felipensis* occupies higher or more humid regions.

Specimens examined.—Total number 41, from localities as follows:

Mexico: Ajusco, 3; Amecameca, 8; Toluca Valley, 5; Salazar, 4.

Oaxaca: Cerro San Felipe, 21.*

PEROMYSCUS BULLATUS Osgood.

(Pl. VII, fig. 7.)

Peromyscus bullatus Osgood, Proc. Biol. Soc. Wash., XVII. p. 63, Mar. 21, 1904.

Type locality.—Perote, Veracruz, Mexico.

Geographic distribution.—Known only from the type locality.

Characters.—Similar in general to *P. truei* and *P. difficilis*; ears very large; audital bullae greatly inflated; tail shorter than head and body.^a

Color.—Similar to that of *P. truei*, but richer, more nearly approaching tawny; slightly paler than in *difficilis*; sides and ground color of upperparts tawny ochraceous; dorsum with considerable dusky producing a general effect of nearly broccoli brown; top of head and nose broccoli brown; sides of head between base of ear and eye distinctly grayish; a narrow dusky orbital ring; underparts creamy white; feet white, tarsal joint marked with dusky; tail brownish dusky above, white below.

* The tail of the type and only specimen is slightly imperfect, having lost the extreme tip, but its distal attenuation indicates that it was naturally but little longer, and certainly much shorter than that of *P. difficilis*.

Skull.—Similar in general form to *P. truei*; size larger than *P. truei*, but smaller than *P. difficilis*; audital bullæ very much inflated, actually as well as relatively larger than in any other known species of the genus; braincase rounded and rather inflated; interorbital constriction relatively wider than in *difficilis*; nasals and palatine slits rather long; molar teeth large, actually larger than those of *truei* and nearly equalling those of *difficilis*.

Measurements.—Type: Total length, 200; tail vertebræ, 93+; hind foot, 23; ear from notch (dry), 25.

Type specimen.—No. 54405 U. S. National Museum, Biological Survey Collection. ♀ adult. June 3, 1893. E. W. Nelson and E. A. Goldman. Specimen in good condition except that extreme tip of tail is broken off.

Remarks.—The relationships of this species are clearly with *P. truei* and *P. difficilis*. Its short tail and light color easily distinguish it from *difficilis*, and its enormous audital bullæ at once separate it from *truei*. The external ears also are very large, slightly exceeding those of *difficilis* as well as of all other species. It is conceivable that the single specimen known may be an abnormal individual of the *difficilis* group, but its

FIG. 8.—Distribution of *Peromyscus melanophrys*, *P. zenurus*, and subspecies.

characters are pronounced and not paralleled anywhere in the considerable variation found in *difficilis*.

Specimens examined.—One, the type.

Key to Subspecies of *Peromyscus melanophrys*.

- Color darker; a large buffy pectoral spot usually present.-----*P. m. zamorae*
 Color paler; underparts usually pure white or with only traces of a pectoral spot.
 Size larger; tail averaging more than 140; skull usually more elongate. South of the City of Mexico.-----*P. melanophrys*
 Size smaller; tail averaging less than 140; skull relatively shorter, with shorter nasals and larger audital bullæ. North of the City of Mexico.-----*P. m. consobrinus*

PEROMYSCUS MELANOPHRYS (COUES).

(Pl. V, fig. 3.)

Hesperomys melanophrys Coues, Proc. Acad. Nat. Sci. Phila., pp. 181-182. Dec. 15, 1874.

Peromyscus leucurus Thomas, Ann. & Mag. Nat. Hist., Ser. 6, XIV, pp. 364-5, Nov., 1894.—Tehuantepec, Oaxaca, Mexico.

Peromyscus leucurus gadorii Thomas, Ann. & Mag. Nat. Hist., Ser. 7, XI, pp. 484-485, May, 1903.—San Carlos (=Yautepec), Oaxaca, Mexico.

P[eromyscus] melanophrys Allen, Bull. Am. Mus. Nat. Hist., N. Y., IX, p. 51, Mar. 15, 1897.

Type locality.—Santa Efigenia, Oaxaca, Mexico.

Geographic distribution.—Arid Tropical and Lower Sonoran region of south central Mexico from sea level to arid mountains of 5,000 feet altitude. States of Chiapas, Guerrero, Morelos, Oaxaca, and Puebla.

Characters.—Size rather large; tail very long (usually more than 140 mm.), annulations rather coarse but covered with short, stiff hairs; tail frequently tipped with white; ears large and nearly naked; heel hairy, occupying about one-fifth of the entire length of the foot; general color cinnamon or pale buffy finely flecked with black, no definite lateral line; a black orbital ring and conspicuous patch of gray around it; skull with a sharp-angled supraorbital ridge, but without an interior sulcus as in *banderanus*.

Color.—No. 68658, Oaxaca City, Oaxaca. Adult ♀, June 13, 1894: Upperparts tawny ochraceous very finely lined with dusky; sides same color as back to line of demarcation between upper and under color; feet white, slightly dusky about 'ankles'; base of whiskers and ring around eye sharply black, remainder of face chiefly gray, which extends back to the base of the ear, and is somewhat mixed with tawny on forehead and lower cheeks; tail bicolor, dusky above, white below; underparts creamy white, not quite subduing the plumbeous underfur. No. 68404, Oaxaca City, ♀ adult, Aug. 15, 1894: Similar to the above, but decidedly darker, the ground color apparently somewhat paler and less rufescent and the admixture of dusky much greater, causing the general color to appear russet or Mars brown; otherwise similar.

Skull.—Size medium, smaller than in *mexicanus*; rostral part rather depressed as well as occipital, giving a nearly even curve to the outline of the skull; a definite supraorbital ridge present, which is often developed into a trenchant shelf but not bounded on the inner side by a deep sulcus; temporal region somewhat swollen; nasals of moderate length and nearly even width, shorter and less cuneate than in *mexicanus*; braincase narrower and audital bullæ smaller than in *difficilis*; teeth about same size or slightly smaller than in *mexicanus*; audital bullæ slightly larger.

Measurements.—Average of 3 adults from mountains near Tonalá, Chiapas: Total length, 269 (262-275); tail vertebræ, 149 (146-155); hind foot, 28; ear from notch (dry), 19.3 (18.5-21). A very large individual from Yaganiza, Oaxaca: 280; 163; 29. Average of 4 adults from Totolapa, Oaxaca: 250; 154; 28.

Type specimen.—No. $\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}$ U. S. National Museum. ♀ adult. Skin and skull, collected July 11, 1871, by F. Sumichrast. The skin appears to have been preserved in alcohol and later renovated. It is, however, in fairly good condition. The tail vertebræ have not been removed, but have been strengthened by a wire along their length outside. The right ear is somewhat torn, but the left is intact except that it seems to have lost the small amount of hair which originally clothed it. The condition of the pelage is of slight wear, and the general color of the upperparts is cinnamon tinged with fawn. The skull lacks the basioccipital and supraoccipital and the anterior part of the nasals is slightly broken. The teeth are perfect and almost unworn. The mandibles are perfect, except the angular processes which are slightly broken.

Remarks.—*P. melanophrys* is the representative of a rather striking group of large, very long-tailed mice inhabiting the more arid regions of southern Mexico. According to Mr. Nelson, it is found living chiefly among rocks. It may be distinguished from nearly all the other species of Mexico by its very long tail and slightly beaded skull. Like other members of the genus, it is subject to considerable variation in color, most of which seems to be due to age. In nearly all series numbering upward of 10 specimens the older individuals are brighter colored, and occasional very old ones are exceptionally bright. Young specimens may be either brownish or pale buffy, apparently according to stage of development. *P. gadovii* of Thomas seems to represent specimens in the darker stage. A series from Oaxaca City, where '*gadovii*' is said to be found (Thomas, l. c.), contains both light and dark examples. In any event, '*gadovii*' becomes a synonym, as the type of *melanophrys*, which was not accessible to Thomas, is in the darker stage or phase. The relationship of *P. leucurus* to *melanophrys* was also evidently not suspected by its describer. One specimen from Tehuantepec, the type locality of *leucurus*, is somewhat immature, but agrees in every way with others of the same age from various parts of range of the species. The type of *leucurus* is rather paler than is usual throughout the group.

Specimens examined.—Total number 85, from localities in Mexico, as follows:

Chiapas: Near Tonala, 9; San Bartolome, 1; San Vicente, 1.

Guerrero: Ayusinapa, 1; Sochi, 1; Tlalixtaquilla, 7; Tlapa, 1.

Morelos: Cuernavaca, 12; Yautepec, 2 (aberrant); Yecapixtla, 2.

Oaxaca: Cuicatlan, 1; Las Vacas, 2; Mitla, 1; Puerto Angel, 1; San Bartolo, 2; San Carlos, 1; San Miguel, 1 (aberrant); Oaxaca, 11; Santa Efigenia, 1 (type); near Tehuantepec, 2; Tlapancingo, 1; near Totolapa, 8; Yaganiza, 2.

Puebla: Acatlan, 1 (approaching *consobrinus*); Chalchicomula, 1; Piaxtla, 11; Tehuacan, 1 (approaching *consobrinus*).

PEROMYSCUS MELANOPHRYS ZAMORAE Osgood.

Peromyscus melanophrys zamorae Osgood. Proc. Biol. Soc. Wash., XVII, pp. 65-66, Mar. 21. 1904.

Type locality.—Zamora, Michoacan, Mexico.

Geographic distribution.—South central Mexico between the ranges of *melanophrys* and *consobrinus*; known from a few localities in the states of Hidalgo and Michoacan.

Characters.—Similar to *P. melanophrys*, but averaging slightly larger and darker; a large tawny pectoral spot present; skull comparatively broad and heavy; teeth large.

Color.—Similar in general to that of *P. melanophrys*, but apparently somewhat darker, the difference in this respect being very slight if any. Adults with a broad band of tawny across pectoral region between forelegs. Upper side of tail more nearly black than in *melanophrys*.

Skull.—Similar to that of *melanophrys*, but slightly larger and heavier; braincase fuller and broader; audital bullæ larger; supra-orbital beads less trenchant and forming ridges rather than shelves anteriorly; molar teeth larger; other characters similar.

Measurements.—Type: Total length, 260; tail vertebrae, 141; hind foot, 29. Average of 7 young adult topotypes: Total length, 259; tail vertebrae, 144; hind foot, 28.4; ear from notch (dry), 20 (19-21).

Type specimen.—No. 120288 U. S. National Museum. Biological Survey Collection. ♂ adult. Jan. 20, 1903. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—All adult specimens of this form thus far examined have the tawny pectoral marking highly developed. The constancy of this character may be doubted, as it is of such irregular occurrence in this genus. In the present case, while not diagnostic, it seems to be a character of importance. Of 76 specimens of *melanophrys* and *consobrinus*, only 4 have pectoral spots, and these are small and indistinct. Of 19 typical specimens of *zamora*, all have well-marked pectoral spots except 2 plumbeous young, which have only traces.

The majority of the series from Zamora are adolescents and, perhaps for this reason, are exceptionally dark. Even those that have not passed beyond the plumbeous juvenile pelage are decidedly darker than comparable specimens of typical *melanophrys*. Two adults, however, show only very slightly darker shades than *melanophrys*. Specimens from Zimapan, Hidalgo, are questionably referred to this form, but in cranial characters they approach *consobrinus*. Four specimens from Querendaro seem to be typical *zamora*.

Specimens examined.—Total number 43, from localities in Mexico as follows:

Hidalgo: Zimapan, 24 (aberrant).

Michoacan: Querendaro, 4; Zamora, 15.

PEROMYSCUS MELANOPHRYS CONSORBRINUS Osgood.

Peromyscus melanophrys consobrinus Osgood, Proc. Biol. Soc., Wash., XVII, p. 66, March 21, 1904.

Type locality.—Berriozabal, Zacatecas, Mexico.

Geographic distribution.—Southern part of the Mexican tableland; Sonoran zone in states of San Luis Potosi, Jalisco, Zacatecas, etc.

Characters.—Similar to *P. melanophrys*, but tail slightly shorter; skull with larger audital bullæ and other slight peculiarities.

Color.—As in *melanophrys*. Topotype No. 58028, in full winter pelage (December): Upperparts and sides tawny ochraceous, thickly lined with black to the edge of a narrow tawny lateral line; orbital ring black, sharply contrasting with a grayish area about it which extends from the base of the whiskers around the eye to the anterior base of the ear; underparts creamy white with a very small tawny pectoral spot; tail bicolor, white below, dusky above; feet creamy white, 'ankles' dusky.

Skull.—Similar to that of *melanophrys*, but somewhat shorter; nasals shorter and slightly broader; audital bullæ larger; braincase more bulging and less elongate.

Measurements.—Type: Total length, 250; tail vertebræ, 131; hind foot, 26.5. Average of 5 adult topotypes: Total length, 256; tail vertebræ, 135; hind foot, 27.5; ear from notch (dry), 19 (18–19.8).

Type specimen.—No. 79626 U. S. National Museum, Biological Survey Collection. ♀ adult. July 10, 1896. E. W. Nelson and E. A. Goldman.

Remarks.—This subspecies is not strongly marked, but its characters, such as they are, have great constancy throughout its range. It is apparently the form of the Mexican tableland, but its distribution may be continuous with that of *zamora* and thence with true *melanophrys*. Specimens from Zimapan, Hidalgo, appear to approach *consobrinus* in cranial characters but retain the coloration of *zamora*.

Specimens examined.—Total number 38, from localities in Mexico as follows:

Aguas Calientes: Chicalote, 1.

Guanajuato: Silao, 3.

Jalisco: Atemajac, 16 (aberrant); Colotlan, 1.

San Luis Potosi: Ahualulco, 1; Hacienda La Parada, 3.

Zacatecas: Berriozabal, 12; Monte Escobedo, 1.

PEROMYSCUS XENURUS Osgood.

Peromyscus xenurus Osgood, Proc. Biol. Soc. Wash., XVII, p. 67, March 21, 1904.

Type locality.—Durango, Durango, Mexico.

Geographic distribution.—Known only from the type locality.

Characters.—Similar in size and proportions to *P. melanophrys*; ground color more nearly fawn than tawny; pectoral spot well developed; tail black, except a narrow ventral line of white; hind feet clouded with dusky.

Color.—Type, in fresh pelage except on rump: Ground color of upperparts grayish fawn color, gradually becoming more grayish anteriorly, so that, on account of the mixture of black throughout, the effect from the middle of the back forward passes from mixed fawn color through drab to hair brown; the rump, which is still in worn pelage, is fawn color; lower cheeks bright fawn color blending with gray, which covers most of the face from the base of the ears forward to the nose; underparts white except patch of bright fawn color extending from bases of forelegs across breast; hind feet clouded with dusky brown to base of toes, which are creamy white; tail black all around except a narrow stripe of white on the underside occupying scarcely more than one-fifth of the entire surface of the tail except distally, where, the diameter of the tail being very slight, it nearly covers the underside.

Skull.—Similar in general to that of *P. m. consobrinus*; nasals noticeably shorter; anterior palatine foramina shorter; postpalatal notch shorter and wider.

Measurements.—The type and 1 adult topotype, respectively: Total length 246, 248; tail vertebrae 142, 140; hind foot 28, 28.

Type specimen.—No. 94518 U. S. National Museum, Biological Survey Collection. ♀ adult. July 1, 1898. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This species is easily distinguished from any other of the *melanophrys* group by the combination of large pectoral spot, dusky hind feet, and peculiar tail, with only a narrow line of white on the underside instead of the usual equal division of light and dark areas. It is the northernmost form of the *melanophrys* group, and at present is known only by two specimens from one locality, so doubtless much remains to be learned of its distribution. Eventually it may be found to intergrade with *consobrinus* or *zamora*.

Specimens examined.—Total number 2, both from the type locality.

PEROMYSCUS MEKISTURUS MERRIAM.

Peromyscus mekisturus Merriam, Proc. Biol. Soc. Wash., XVII, pp. 124–125, Apr. 30, 1898.

Type locality.—Chalchicomula, Puebla, Mexico. Altitude 8,200 feet.

Geographic distribution.—Known only from the type locality.

Characters.—Size medium (hind foot 24); tail very long, equaling three-fourths of total length, well haired and indistinctly bicolor; ears of moderate size; pelage rather full and thick, similar in color

and general character to that of the *melanophrys* type, but underparts creamy buff without any white; hind feet except toes chiefly dusky brownish, soles naked, at least medially; skull small with short nasals and unbeaded, much constricted frontals.

Color.—Ground color of upperparts ochraceous buff, becoming paler and more grayish anteriorly and brighter more nearly tawny posteriorly, and throughout mixed uniformly with dusky; back without any definite concentration of dusky, but essentially like sides; sides of face, nose, and forehead grayish; end of nose with a tiny nearly white tuft of hair surmounting rhinarium; orbital ring and spot at base of whiskers dusky; underparts cream buff, becoming paler, almost white on chin and throat; fore feet creamy white, hind feet dusky brownish except on toes and sides of feet; tail dusky brownish above, mixed brownish and whitish below, thus being very indistinctly bicolor.

Skull.—Size small, scarcely as large as that of *gratus*; braincase rather long relatively to rostral part of skull, which appears disproportionately short; frontals much constricted anteriorly; supraorbital border without bead or shelf; zygomata squared anteriorly, somewhat wider posteriorly; audital bullæ moderate, smaller than in *gratus*, but relatively larger than in most other species of similar size; nasals short, flat, slightly cuneate, and but little depressed; interpterygoid fossa wide; posterior palatine foramina nearer to interpterygoid fossa than to anterior palatine foramina; molar teeth moderate, upper incisors very long.

Measurements.—Type: Total length 249; tail vertebræ 155; hind foot 24; ear from notch (dry) 18.4.

Type specimen.—No. 64108 U. S. National Museum, Biological Survey Collection. ♀ adult. March 16, 1894. E. W. Nelson and E. A. Goldman. Specimen in excellent condition.

Remarks.—Although this species is distinct, with no very close allies, it is evidently more nearly related to *melanophrys* and subspecies than to any others. The general color, the character of the pelage, and the very long coarsely-haired tail are essentially as in *melanophrys*. The skull also bears a general resemblance to that of *melanophrys*, but is so much smaller that comparison is difficult.

Specimen examined.—One, the type only.

PEROMYSCUS LEPTURUS MERRIAM.

(Pl. IV, fig. 12.)

Peromyscus lepturus Merriam, Proc. Biol. Soc. Wash., XII, pp. 118-119, Apr. 30, 1898.

Type locality.—Mount Zempoaltepec, Oaxaca, Mexico.

Geographic distribution.—Known only from the type locality.

Characters.—Size medium (hind foot 27); tail about as long as or slightly shorter than head and body, rather coarsely haired, evenly

bicolor or nearly uniform dusky above and below; color dark; pelage full, long, and lax; hind feet extensively marked with dusky; soles hairy posteriorly. Skull with rather long nasals, constricted and beardless frontals, large interparietal, and relatively large teeth.

Color.—General effect of back brownish black, lightly mixed with cinnamon; sides, shoulders, and head cinnamon to russet, mixed with brownish black, producing a general effect approximating the bister of Ridgway; ears thinly clothed with soft brown hairs, scarcely or not at all edged with paler; tuft of soft hairs at anterior base of ear black; broad area from side of nose through base of whiskers to and around eye black or brownish black; underparts creamy white, usually modified to bluish gray by the effect of the slaty basal color of the hairs; pectoral region sometimes slightly marked with russet; forearm sooty to carpal joint; forefeet white; dusky of hind leg extending over tarsal joint and over the upper side of the hind foot two-thirds of the distance or quite to the base of the toes; toes and sides of hind feet whitish; tail variable, in some specimens nearly evenly bicolor, blackish above and white below, but usually more or less blackish on the underside near the base, in other specimens uniform blackish above and below.

Skull.—Similar in general form to that of *levipes*; size slightly larger; nasals rather long and palatine slits correspondingly so; zygomatica slightly compressed anteriorly, widest posteriorly; frontals small and constricted, not beaded; supraorbital border scarcely even sharp-angled; interparietal rather large; superior outline of skull nearly flat or very slightly arched; molar teeth relatively large, larger than in *levipes* or *mexicanus*, but relatively about the same size as in the smaller species *lophurus* and *simulatus*; audital bullæ moderate, about as in *levipes*.

Measurements.—Average of 7 topotypes: Total length 228 (218–238); tail vertebrae 115 (112–119); hind foot 27 (26–28); ear from notch (dry) 17.3 (16.4–18.2).

Type specimen.—No. 68612. U. S. National Museum, Biological Survey Collection. ♂ adult. July 8, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This species is the largest of a small group including also *lophurus* and *simulatus*. From either of these it is distinguishable by its larger size, more coarsely haired tail, and less arched skull. The same characters, as well as its dark color and other peculiarities, serve in large measure to distinguish it from *levipes*, *aztecus*, etc. *P. m. totontepecus*, and *P. melanocarpus*, also found on Mount Zempoaltepec, are sometimes similar in color to *lepturus*, but their larger heavier skulls with relatively smaller teeth make close comparison unnecessary.

Specimens examined.—Total number 8, from localities as follows:

Oaxaca: Mount Zempoaltepec at 8,000 feet altitude, 7; Totontepec, 1.

PEROMYSCUS LOPHURUS Osgood.

(Pl. III, fig. 6.)

Peromyscus lophurus Osgood, Proc. Biol. Soc. Wash., XVII, p. 72, Mar. 21, 1904.

Type locality.—Todos Santos, Guatemala. Altitude 8,500 feet.

Geographic distribution.—Highlands of the State of Chiapas, Mexico, and of western Guatemala.

Characters.—Most similar to *P. lepturus*, but smaller and paler; tail long and covered with comparatively long soft hairs, and terminating in a distinct pencil; pelage soft and 'woolly' and rather dull and lusterless; skull with large interparietal and short nasals.

Color.—Type: General effect of upperparts between wood brown and fawn color, with a small dusky area in middle of back; lateral line pale ochraceous buff; underparts white; no pectoral spot; tail sepia brown, unicolor; forearm dusky to wrist, fore feet white; hind feet dusky brownish to base of toes; toes white; orbital ring dusky black, rather narrow, but expanded into a distinct spot in front of eye.

Skull.—Similar to that of *lepturus*, but smaller and with rostral part decidedly shorter; molar teeth actually about same size, relatively larger; interparietal very large. Compared to that of *P. levipes*, the skull of *lophurus* is shorter, with shorter nasals and heavier infraorbital region; the teeth are decidedly heavier and longer and the interparietal larger.

Measurements.—Average of 4 adult topotypes: Total length, 208; tail vertebræ 105; hind foot 24.5; ear from notch (dry) 16.

Type specimen.—No. 77219 U. S. National Museum, Biological Survey Collection. ♂ adult. Dec. 30, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This very distinct species is easily recognized by its penciled tail and usually by the absence of white on the under side of the tail. All the specimens from Todos Santos have unicolor tails, but 2 from Calel are quite distinctly bicolor, and among 4 from San Cristobal, 2 have unicolor and 2 have imperfectly bicolor tails, indicating that this character is variable. The character of the pelage differs somewhat from most of the smaller species of *Peromyscus* in being dull and soft without the usual gloss, and although rather short it is fine and slightly 'woolly.' Its close allies are *lepturus*, which is larger and has a more flattened skull, and *simulatus*, which is decidedly smaller.

Specimens examined.—Total number 17, from localities as follows:

Chiapas: Pinabete, 5; San Cristobal, 4.

Guatemala: Calel, 2; Todos Santos, 8.

PEROMYSCUS SIMULATUS OSGOOD.

(Pl. III, fig. 7.)

Peromyscus simulatus Osgood, Proc. Biol. Soc. Wash., XVII, pp. 72-73, Mar. 21, 1904.

Type locality.—Near Jico, Veracruz, Mexico. Altitude 6,000 feet.

Geographic distribution.—Known only from the type locality.

Characters.—A miniature of *P. lophurus* (hind foot 21); dark markings slightly more intense; skull and teeth very small; tail clothed with long, soft hairs and penciled as in *lophurus*; audital bullæ relatively large.

Color.—Almost exactly as in *P. lophurus*; dark markings of feet and face slightly more intense; tail chiefly brown, but with a narrow line of white on under side.

Skull.—Size very small; similar in general to that of *P. lophurus*, but with more inflated braincase and depressed rostrum; audital bullæ relatively larger; interorbital constriction relatively wider; teeth very small.

Measurements.—Type: Total length 169; tail vertebræ 87; hind foot 21; ear from notch (dry) 14.3.

Type specimen.—No. 55028 U. S. National Museum, Biological Survey Collection. ♀ adult. July 12, 1893. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This small species is not closely related to any known species except *P. lophurus*, of which it is almost an exact miniature. Its skull is even smaller than that of *P. melanotis*, which occurs in the same region. It has, however, no relationship whatever to *melanotis*. Its small size, crested tail, and dark brown feet amply suffice to distinguish it from all other known species. A single specimen (No. 51177) from Tlalpam, Valley of Mexico, may represent an undescribed subspecies of *simulatus*. It is quite immature, but seems to differ from *simulatus* in paler color, with the tail bicolor and the hind feet more extensively white. The skull, though immature, agrees fairly well with adults of *simulatus*.

Specimens examined.—Total number 2, both from the type locality.

PEROMYSCUS GUATEMALENSIS MERRIAM.

(Pl. V, fig. 2.)

Peromyscus guatemalensis Merriam, Proc. Biol. Soc. Wash., XII, p. 118, Apr. 30, 1898.

Type locality.—Todos Santos, Guatemala. Altitude 10,000 feet.

Geographic distribution.—High altitudes in western Guatemala and southern Chiapas. (See fig. 5, p. 161.)

Characters.—Size about as in *megalops*, larger than *mexicanus* or *fuscus*, but smaller than *zarhynchus*; tail longer than head and body, scantily haired, usually evenly bicolor, but sometimes irregularly blotchy below or rarely uniform dusky; pelage very long and lax; color very dark; skull with frontals constricted and without definite supraorbital bead.

Color.—Unworn pelage: Upperparts chiefly pale cinnamon rufous, liberally mixed with dusky, the latter considerably concentrated on dorsum, forming an ill-defined stripe from shoulders to base of tail; general effect of sides russet, becoming Prout brown and nearly black toward middle of back; lateral line scarcely differentiated; a broad area from base of whiskers to and around eye and nearly to base of ear very dark, nearly pure black; tuft of soft hairs at anterior base of ear also nearly black; tip of nose grayish white; ears brownish, very lightly margined with whitish; underparts buffy white, considerably modified by slaty under color; pectoral and axillary regions usually broadly cinnamon rufous; entire underparts, except chin and throat, sometimes suffused with cinnamon rufous; fore feet white; forearm brownish black nearly to carpal joint; hind feet chiefly white, tarsal joint dusky brownish, this often extending over median upper side of hind foot halfway to base of toes; tail usually bicolor, underside frequently irregularly blotched, dusky and yellowish; entire tail occasionally dusky. Worn pelage: General effect of upperparts russet to Mars brown and Prout brown; subterminal zone of color very narrow, allowing much of the slaty under color to appear; underparts buffy white, much modified by slaty.

Skull.—Similar to that of *mexicanus* but larger and broader with larger teeth and audital bullæ; nasals quite elongate; frontals constricted and slightly sharp-angled but not distinctly beaded; braincase rather large and full, decidedly broader than in *mexicanus*. Size, audital bullæ, and teeth about as in *auritus*, but frontals more constricted and without supraorbital bead.

Measurements.—Average of 10 adult topotypes: Total length 267 (252–290); tail vertebræ 138 (132–153); hind foot 30.7 (30–32); ear from notch (dry) 20.6 (20–21.5).

Type specimen.—No. 76861 U. S. National Museum, Biological Survey Collection. ♂ adult. Dec. 31, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—*P. guatemalensis* appears to be most closely related to *P. fuscus* and *P. nudipes*, both of which are somewhat smaller. It may be distinguished from *megalops* and *auritus* by its dark color, 'woolly' pelage, and unbeaded skull. From all other species, its size distinguishes it. It averages slightly larger than *auritus* and occasionally attains the size of smaller individuals of *zarhynchus*. There is some cranial variation in the comparatively small series examined.

Specimens from Pinabete are rather robust and their skulls have unusually heavy rostrums. Others from Volcan Santa Maria have relatively large teeth. The relationship of *guatemalensis* to the smaller and more uniformly black-tailed species *nudipes* is not remote, and it is quite possible that intergradation between them may be found when specimens from the mountains of Nicaragua are obtained.

Specimens examined.—Total number 59, from localities as follows:

Chiapas: Pinabete, 8; Volcan de Tacama, 1.

Guatemala: Culel, 21; Todos Santos, 8; Volcan Santa Maria, 11; Zunil, 10.

PEROMYSCUS NUDIPES (ALLEN).

Hesperomys (*Vesperimus*?) *nudipes* Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, pp. 213-214, Apr. 17, 1891.

Peromyscus nudipes Thomas, Ann. & Mag. Nat. Hist., ser. 6, XIV, p. 365, Nov., 1894.

Peromyscus cacabatus Bangs, Bull. Mus. Comp. Zool., XXXIX, pp. 29-30, figs. 8-10, Apr., 1892.

Peromyscus nudipes Allen, *supra cit.*, XX, pp. 67-68, Feb. 29, 1904.

Type locality.—La Carpintera, Costa Rica.

Geographic distribution.—Mountains of central Costa Rica and thence south to Chiriqui.

Characters.—Similar in general to *guatemalensis* but slightly smaller; slightly larger than *mexicanus*; color very dark; pelage full and soft; ears relatively small, nearly naked; tail scaly with very short hairs, nearly unicolor; soles of hind feet narrowly naked medially; skull similar to that of *guatemalensis* but averaging smaller and narrower.

Color.—Unworn pelage: Much as in *guatemalensis*, but more fulvous; sides chiefly russet to Mars brown, quite in contrast to back, which is much more mixed with dusky, forming a broad blackish brown area from shoulders to base of tail; lateral line dark ochraceous buff, slightly contrasted with upper sides; underparts yellowish white with a broad pectoral spot of ochraceous buff, this sometimes quite produced posteriorly or even suffusing entire underparts except chin and throat; fore feet white, forearm dusky nearly to wrist; hind feet white usually with the broad dusky brownish marking on tarsal joint extended on upper side of foot about halfway to base of toes; tail usually unicolor brownish black, but occasionally with the scaly part of the under side slightly blotched with yellowish white.

Skull.—Similar to that of *guatemalensis* but slightly smaller; braincase narrower; nasals slightly broader; audital bullæ smaller; supraorbital border occasionally with a faint suggestion of a bead near fronto-parietal suture; palatine slits widely open; zygomata slightly or scarcely at all notched anteriorly; quite similar to that of *mexicanus* but teeth decidedly larger.

Measurements.—Average of 6 adults from Volcan Irazu, Costa Rica: Total length, 261 (250–280); tail vertebræ, 130 (121–135); hind foot, 28.6 (26–30); ear from notch (dry), 19.1 (18.4–19.4).

Type specimen.—No. 3443 American Museum of Natural History, New York. ♀ adult. October, 1890. George K. Cherrie. Specimen in alcohol except skull, which has been removed and numbered. It bears a recent type label and an old label the data on which are illegible. The skull is broken across the frontals into two parts, but most of the parts important for comparison are present.

Remarks.—In some ways this species may be said to be intermediate between *guatemalensis* and *mexicanus*. The most obvious character distinguishing it from both of these is its uniformly blackish tail. Occasional specimens show traces of white on the under side of the tail, and the known variability of this character in other species makes it not altogether reliable. The skull of *nudipes* is slightly smaller than that of *guatemalensis* but otherwise agrees very closely. It is about the size and often nearly the form of that of *mexicanus*, but usually there is less suggestion of supraorbital bead and the teeth are larger.

Specimens examined.—Total number 131, from localities as follows:

Chiriqui: Boquete, 89.

Costa Rica: Azala, Cartago, 1; Carpintera, 1; El Coronel de Carrillo, 4; near Jimenez, 1; Juan Vinos, 4; La Estrella, Cartago, 1; near San José, 1; Volcan Irazu, 29.

PEROMYSCUS FURVUS ALLEN AND CHAPMAN.

(Pl. V, fig. 7.)

Peromyscus furrus Allen and Chapman, Bull. Am. Mus. Nat. Hist., N. Y., IX, pp. 201–203, June 16, 1897.

Type locality.—Jalapa, Veracruz, Mexico. Altitude 4,400 feet.

Geographic distribution.—Known from a few localities in humid tropical parts of northern Veracruz and Puebla. (See fig. 5, p. 161.)

Characters.—Size slightly larger than in *mexicanus* (hind foot 29–32) but smaller than in *guatemalensis*; color very dark; ears relatively small, nearly naked; tail slightly longer than head and body, very thinly haired, blackish all around or with slight irregular light markings on scaly part of under side; soles of hind feet naked medially to calcaneum; skull in adult with nasals widely expanded anteriorly.

Color.—Slightly worn pelage: General effect of upperparts dark mummy brown, more blackish on dorsum and more russet on sides, but dorsal area not well defined; a slight suggestion of a lateral line russet; sides of face brownish sepia and blackish, the blackish surrounding the eye and dominating the area from the base of the

whiskers to the base of the ear; underparts including pectoral region grayish white considerably modified by slaty undercolor; forearm blackish brown nearly to carpal joint; fore feet white; hind feet white with a broad blackish brown marking on tarsal joint, this occasionally extended for some distance on upper side of hind foot; tail unicolor, blackish all around, or irregularly bicolor, the scaly part of the underside being somewhat blotched with yellowish white. Unworn pelage? (No. 108546): General effect of sides brownish sepia; middle of back nearly pure black, lightly sprinkled with brownish.

Skull.—Size slightly larger than in *mexicanus*, smaller than in *guatemalensis*; frontals quite constricted and without any bead though the posterior part of the supraorbital border may be slightly sharp-angled; zygomata slightly or not at all notched anteriorly; teeth and audital bullæ moderate, slightly larger than in *mexicanus* and relatively about same size as in *guatemalensis*; nasals long, compressed posteriorly and exceeding ascending branches of premaxillæ, greatly expanded in adults anteriorly; premaxillæ correspondingly expanded anteriorly.

Measurements.—Average of 14 topotypes (males): Total length, 263 (248–282); tail vertebrae, 131 (123–145); hind foot, 27.9 (26–29); ear, 21.9 (20–23). Of an adult from Huachinango, Puebla: 267; 142; 32.

Type specimen.—No. $\frac{124500}{10789}$ American Museum of Natural History, New York. ♂ adult. Apr. 2, 1897. F. M. Chapman. Specimen in good condition; tip of tail very slightly injured.

Remarks.—The widely expanded 'bell-shaped' nasals of this species are quite diagnostic, but do not develop until the animal is thoroughly mature. Even in young specimens, however, the nasals are decidedly cuneate posteriorly, and this in connection with the absence of any suggestion of a supraorbital bead and the very dark color of the pelage suffices to distinguish specimens of any age. The closest affinities of *furrus* seem to be with *guatemalensis*, although, save for its very dark color, it has much the general appearance of *mexicanus*.

Specimens examined.—Total number 32, from localities, as follows:

Puebla: Huachinango, 2.

Veracruz: Jalapa, 28; Jico, 2.

PEROMYSCUS ALTILANEUS Osgood.

Peromyscus altilaneus Osgood. Proc. Biol. Soc. Wash., XVII, pp. 74, 75, Mar. 21, 1904.

Type locality.—Todos Santos, Guatemala. Altitude 10,000 feet.

Geographic distribution.—Known only from the type locality.

Characters.—Similar to *P. melanocarpus*, but smaller and with shorter and less hairy tail; fore feet entirely white; hind feet with

much more white than in *melanocarpus*; skull slightly smaller and more slender; similar to that of *guatemalensis* but much smaller.

Color.—Very dark as in *melanocarpus*, but tail blotched with yellowish white below, much as in *mexicanus*; fore feet and part of forearm white; hind foot with a V-shaped dusky mark extending about halfway to the base of the toes, remainder of foot white; pectoral spot strongly developed.

Skull.—Similar to that of *melanocarpus*, but slightly smaller throughout; nasals relatively more expanded anteriorly; braincase slightly higher and more inflated and rostral region more depressed; anterior palatine foramina shorter; infraorbital plate very narrow; supraorbital bead slight; very similar to that of *guatemalensis* but decidedly smaller; similar to that of *mexicanus*, but smaller with a more depressed rostrum and a narrower infraorbital lamina.

Measurements.—Type: Total length, 228; tail vertebræ, 115; hind foot, 28; ear from notch (dry), 20.6.

Type specimen.—No. 76856 U. S. National Museum, Biological Survey Collection. ♂ adult. Dec. 30, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This species is about the size of *melanocarpus* and is similar also in color except in extent of dusky on the feet. However, a close study of the skulls seems to indicate that *melanocarpus* is most closely related to *megalops*, while *atrilaneus* is more similar to *guatemalensis* and *mexicanus*. In fact, scarcely any character can be found distinguishing it from *guatemalensis* except that of size. The type skull, that of an adult male, is so much smaller throughout than in typical *guatemalensis* that it seems hardly possible that it is merely an abnormally small individual of that species. The color and character of the pelage, however, are exactly as in *guatemalensis*.

Specimen examined.—One, the type.

Key to subspecies of *Peromyscus mexicanus*.

Size smaller; hind foot 23–24. Parts of Chiapas and Guatemala.....*P. m. gymnotis*
Size larger; hind foot 28–29.

Size very large; total length 244–268; hind foot usually more than 28; color usually very dark.....*P. m. totontepecus*

Size smaller; total length 233–258; hind foot usually not more than 28.

Color darker; rostrum and nasals heavier. Tabasco.....*P. m. teapensis*

Color not so dark; rostrum and nasals not so heavy.

Audital bullæ averaging larger. Chiapas, Guatemala, and Nicaragua.

P. m. saxatilis

Audital bullæ averaging smaller. Chiapas to northern Puebla.

P. mexicanus

PEROMYSCUS MEXICANUS (SAUSSURE).

(Pl. V, fig. 8; Pl. VII, fig. 6.)

Hesperomys mexicanus Saussure, Rev. et Mag. de Zool., Paris, XII, pp. 103–105, pl. IX, figs. 1, 1a, Mar., 1860.

P[eromyscus] mexicanus Thomas, Ann. & Mag. Nat. Hist., ser. 6, XIV, p. 364, Nov., 1894.

Peromyscus tehuantepecus Merriam, Proc. Biol. Soc. Wash., XII, p. 122, Apr. 30, 1898.—Tehuantepec, Oaxaca.

Type locality.—Mexico; assumed to be the vicinity of Mirador, Veracruz.^a

Geographic distribution.—Tropical parts of eastern and southern Mexico from northern Puebla southward to southern Veracruz and thence south and east to southern Oaxaca and northern Chiapas.

Characters.—Size medium, about as in *ouzacensis*, decidedly smaller than in *megalops* and *guatemalensis*; tail slightly longer than head and body, rather coarsely annulated (about 17 annulations per cm.) and clothed with very short scarcely obvious hairs; tail seldom evenly bicolor but usually blotched irregularly on the underside with yellowish white; ears moderate, very thinly haired; proximal fourth of sole of hind foot usually hairy; pelage soft but rather short; skull with relatively small molars and audital bullæ.

Color.—Unworn pelage: Upperparts cinnamon rufous mixed with dusky; middle of back darker than sides, but dusky chiefly disposed in fine lines and always somewhat mixed with rufescent; general effect of sides from cheeks to flanks bright russet; top of head and shoulders like back or slightly paler; spot at base of whiskers and broad orbital ring blackish brown; underparts creamy white, with or without a cinnamon rufous pectoral marking; ears dusky brownish faintly edged with whitish; fore feet and carpal joints white; proximal half of forearm dusky overlaid by rufescent; hind feet white, tarsal joints broadly dusky brownish; hairs of tail dusky above, dull white below; scaly part of tail dusky above, chiefly yellowish below, irregularly blotched with dusky.

Worn pelage: Upperparts varying from ochraceous buff to tawny mixed with darker; general effect varying from dark clay color to russet; middle of back usually much like sides, sometimes darker, approaching Mars brown and Prout brown; dusky facial markings much reduced in area; underparts variously modified by slaty undercolor.

Adolescent pelage: Upperparts and sides pale cinnamon fawn, uniformly mixed with dusky, producing a general effect varying from

^aThe original description states that this species "Habite les mêmes régions que les précédents." "Les précédents" are *H. toltecus* (= *Sigmodon toltecus*) and *H. fulvescens* (= *Oryzomys fulvescens*), the first of which "Habite la Cordillère de la province de Vera-Cruz," and the second "Habite le Mexique." The description following that of *mexicanus* is that of *H. aztecus* (= *Peromyscus aztecus*), which is said to inhabit the "Même patrie que les précédents." It is evident, therefore, that Saussure did not intend to make any fine distinctions as to locality, but wished to indicate merely that all his material came from eastern Mexico. We are justified, then, in assuming that *mexicanus* probably came from the vicinity of Mirador, Veracruz, as Saussure is known to have stopped near there at the Sartorius ranch.

wood brown to broccoli brown; a narrow lateral line of dark ochraceous buff usually evident; dusky orbital ring narrow, and surrounding part of face slightly grayish.

Young in first coat: Upperparts nearly uniform mouse gray, sometimes paler; nearly smoke gray on sides and shoulders; and darker, nearly brownish slate gray, on dorsum.

Skull.—Size medium, smaller than in *megalops* and *guatemalensis*, about equal to or slightly larger than in *oaxacensis* and *hyllocetes*; rostrum and nasals moderately long; braincase usually full and deep but not very wide; frontals rather narrow, supraorbital borders sharp-angled, often with a slight bead, this usually confined to the vicinity of the fronto-parietal suture; interparietal large; zygoma strong, usually becoming decidedly notched anteriorly in adults; molar teeth and audital bullæ relatively very small; interpterygoid fossa extending anteriorly a trifle beyond plane of last molar.

Measurements.—Average of four adults from Mirador, Veracruz: Total length, 246 (235–254); tail vertebrae, 128 (118–133); hind foot, 26.6 (26–27); ear from notch (dry), 19 (17.7–20.5). Of four adults from Tehuantepec, Oaxaca: 248.5; 127; 27.

Type specimen.—In the original description of this species, Saussure specifically mentions two specimens and gives their measurements. One of these is mounted in the Geneva Museum and was examined some years ago by Doctor Merriam, who made the following notes on it and has kindly allowed their use in the present publication:

"No. $\frac{519}{98}$ " (marked also in pencil "No. 3") Mexico. Evidently the type of Saussure's description and the specimen whose measurements he gave in the first column (p. 104). Size large; ears large; tail long and scant haired, not distinctly bicolor. Hind foot 26. Ear from crown 15. Tail 106 in the mounted specimen, the extreme tip broken off. Whiskers long, reaching shoulder. Texture of pelage having a velvety appearance somewhat resembling that of *Didelphis murina*. Color: Upperparts dark brown, palest on the flanks and cheeks, which parts are washed with pale ochraceous buff. Viewed from behind the dark brown of the back and shoulders seems lighter and has something of a hoary appearance. Just in front of the forelegs a faint fulvous wash extends over the sides of the breast. It is probable that the colors have undergone some change from museum exposure. Ankles in front and on outside dark brown, this color extending out on the upper surface of the feet more than half way to the toes; rest of hind feet and toes white. Fore feet and wrists white, the brown color of the leg ending abruptly about 2 mm. above the wrist in front on the inner side, and 6 mm. above on the outer side. There is a little rusty about the nose.

The skull of this specimen was not submitted to Doctor Merriam with Saussure's material, but it may be preserved still in the Geneva Museum, and possibly it is the one of which the teeth were figured with the original description.

Remarks.—*P. mexicanus* and its subspecies are readily distinguishable from nearly all other species by the character of the tail, which is very irregularly bicolor and with the scaly annulations scarcely at all concealed by hair. Certain larger species, as *guatemalensis*, sometimes have irregularly blotched tails, but their size precludes the possibility of their being confused with *mexicanus*. The tail is not always evenly bicolor in *banderanus* and *yucatanicus*, but these forms are well characterized otherwise, *banderanus* by its beaded skull and *yucatanicus* by its small size. The subspecies of *mexicanus* are very slightly characterized and perhaps but recently developed from a common stock. They can not consistently be 'lumped,' but it must be said that there is much variation throughout the group and that none of the characters of the several subspecies are absolutely constant. Certain average characters, however, are to be found, and certain extremes of differentiation are fairly marked. The variation in cranial characters is very great, and every considerable series examined has shown some deviations from the general type. It is difficult to associate any two series on the basis of common peculiarities. In view of this variation it does not seem possible to recognize a form under the name '*tehuantepecus*.' The small series from Tehuantepec are chiefly in worn pelage and in color do not differ from similarly worn specimens from localities in Veracruz near the type locality of *mexicanus*. Although the interparietal averages large in the few skulls from Tehuantepec, it does not seem to be a subspecific character, for equally large interparietals may be found in almost any series; in fact, the most nearly perfect skull from Mirador, the type locality of *mexicanus*, has the interparietal slightly larger than that of the type of '*tehuantepecus*.' In regard to color there is also much variation, perhaps of an 'ontogenetic' nature. Specimens from more humid localities are usually darker than those from more arid parts, but this does not seem to be correlated with definite areas. It is even conceivable that unusual darkness of color may be produced by an unusually wet season in a normally arid region.

Specimens examined.—Total number 182, from localities as follows:

Chiapas: Mountains near Tonalá, 8; Ocozucanatlá, 4; Ocuilapa, 2; Valley of Jiquipilas, 4.

Oaxaca: Agua Frio, 7; Lagunas, 3; near Tehuantepec, 5; Santa Efigenia, 13.

Puebla: Metlaltoyuca, 7.

Veracruz: Achotal, 19; Carrizal, 9; Cutemaco, 5; Jico, 12; Lagunas, 6; Mirador, 4; Otatitlán, 4; Papantla, 13; Pasa Nueva, 8; San Andres Tuxtla, 4; San Carlos, 12; Santiago Tuxtla, 9; Teocelo, 2 (approaching *totontepecus*); Texolo, 16; Volcan Tuxtla, 6 (approaching *totontepecus*?).

PEROMYSCUS MEXICANUS TOTONTEPECUS MERRIAM.

Peromyscus mexicanus totontepecus Merriam, Proc. Biol. Soc. Wash., XII, pp. 120-121, Apr. 30, 1898.

Peromyscus mexicanus orizabae Merriam, *supra cit.*, pp. 121-122.—Orizaba, Veracruz, Mexico.

Type locality.—Totontepec, Oaxaca, Mexico. Altitude, 6,000 feet.

Geographic distribution.—Western Veracruz and east central Oaxaca west of the range of *P. mexicanus*.

Characters.—Similar to *P. mexicanus*, but larger and averaging decidedly darker; skull larger and molar teeth heavier.

Color.—Similar to that of *mexicanus*, but darker throughout; general effect of back Prout brown nearly to black; general effect of sides cinnamon rufous to chestnut; dusky markings accentuated, those on the tarsal joints extending from one-third to one-half the length of the upper side of the hind foot; pectoral spot more frequently and more extensively developed than in *mexicanus*; entire underparts often suffused with rufescent.

Skull.—Similar to that of *mexicanus*, but averaging larger; molar teeth larger and broader.

Measurements.—Average of 5 adult topotypes: Total length, 257 (244-268); tail vertebræ, 131 (124-136); hind foot, 28.2 (28-29); ear from notch (dry), 16.9 (16-17.8). Average of 10 adults from Orizaba, Veracruz: 254 (238-269); 134 (122-142); 28.6 (28-29.5).

Type specimen.—No. 68624 U. S. National Museum, Biological Survey Collection. ♀ adult. July 16, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition; skull with slightly broken basioccipital.

Remarks.—This form is distinguished from *mexicanus* and the others of the group chiefly by its large size. It is also very dark colored, but is nearly equaled in this respect by *teapensis*, though quite decidedly darker than *mexicanus* or *saxatilis*. Skulls from Totontepec do not show such heavy and deeply notched zygomata as those from Orizaba, but after considering the entire *mexicanus* group, it appears that this and other peculiarities found in small series from various localities are due to age or individual variation. The dark color, large size, heavy skull, and relatively broad molars seem to be the only characters common to series from more than one locality, and therefore the series with these associated characters have been recognized under the name *totontepecus* without regard to the peculiarities of individual series which are not constant and are found sporadically throughout the group. The apparent tendency of the series from Orizaba to heavy notched zygomata may be indication of a leaning towards *mexicanus*, for the best available adult skull of typical *mexicanus* from Mirador shows exactly this type of zygoma. It is strange that these Orizaba specimens should differ at all from

those of *mexicanus*, for the locality is on the same mountain slope but a short distance from Mirador.

Specimens examined.—Total number 71, from localities as follows:

Oaxaca: Choapan, 1; ^a Comaltepec, 2; Guichicovi, 8; ^a mountains near Santo Domingo, 6; ^a Santo Domingo, 13; ^a Totontepec, 10.

Veracruz: Motzorongo, 11; Orizaba, 20.^a

PEROMYSCUS MEXICANUS SAXATILIS MERRIAM.

Peromyscus mexicanus saxatilis Merriam, Proc. Biol. Soc. Wash., XII, p. 121, Apr. 30, 1898.

Peromyscus nicaraguæ Allen, Bull. Am. Mus. Nat. Hist., XXIV, pp. 649–650, Oct. 13, 1908.—Matagalpa, Nicaragua.

Type locality.—Jacaltenango, Huehuetenango, Guatemala. Altitude, 5,400 feet.

Geographic distribution.—Northwestern Guatemala and southeastern Chiapas, south to Nicaragua.

Characters.—Very similar to *mexicanus*; color practically identical; skull with slightly larger audital bullæ.

Color.—As in *mexicanus*.

Skull.—Similar to that of *mexicanus*; braincase averaging broader and fuller; frontals wider with slightly less tendency to the formation of a supraorbital bead; audital bullæ larger.

Measurements.—Average of 10 adult topotypes: Total length, 224 (233–258); tail vertebrae, 127 (120–138); hind foot, 27.6 (27–29); ear from notch (dry), 18.2 (16.6–19.5).

Type specimen.—No. 77296 U. S. National Museum, Biological Survey Collection. ♂ adult. Dec. 19, 1905. E. W. Nelson and E. A. Goldman. Specimen in good condition. Size abnormally small.

Remarks.—The only character of consequence by which to separate this form from *mexicanus* is the size of the audital bullæ, and even this is not absolutely constant. As an average character, however, it seems to prevail throughout a considerable number of specimens from several localities. The recognition of this form makes it even more imperative to place '*tehuantepecus*' in synonymy, for it seems that the Tehuantepec specimens are intermediate between *mexicanus* and *saxatilis* in much the same way that Orizaba specimens fall between *mexicanus* and *totontepecus*. In color *saxatilis* seems to be exactly like *mexicanus*. The series from Jacaltenango are in unworn pelage exactly like specimens in the same pelage from Mirador. The worn pelage is shown by specimens from Canjob and San Bartolomé, which agree with equally worn specimens of *mexicanus* from localities in Veracruz. The type of *saxatilis* is unusually small, the skull

^a Approaching *mexicanus*.

and teeth being particularly small and light as compared with those of the large series of topotypes.

Specimens examined.—Total number 96, from localities as follows:

Chiapas: Canjob, 16; Chicharras, 20 (approaching *gymnotis?*); San Bartolomé, 7; San Vicente, 1; Tuxtla Gutierrez, 4.

Guatemala: Jacaltenango, 34; Nenton, 4.

Nicaragua: Chontales, 3; Matagalpa, 5; San Rafael del Norte, 2.

PEROMYSCUS MEXICANUS TEAPENSIS Osgood.

Peromyscus mexicanus teapensis Osgood, Proc. Biol. Soc. Wash., XVII, pp. 69-70, Mar. 21, 1904.

Type locality.—Teapa, Tabasco, Mexico. Altitude 800 feet.

Geographic distribution.—Humid tropical parts of northern Tabasco, Mexico.

Characters.—Similar to *P. m. totontepecus*, but sides brighter and more contrasted with dark area in middle of back; skull with thicker, heavier rostral region.

Color.—Type: Sides rich chestnut, shading into a well-defined blackish area in median dorsal region; a narrow black orbital ring and spot at base of whiskers; underparts slate color overlaid with creamy white (no pectoral spot in type, but of frequent occurrence among series of topotypes); tail black with the exception of a few irregular spots of yellowish white on under side; fore feet white; hind feet white except a dark brown area extending with decreasing width from 'ankles' down nearly to base of toes.

Skull.—Similar to that of *totontepecus*, but with broader nasals and generally heavier and more thickened rostral region; anterior palatine foramina usually wider; infraorbital part of zygomata rather heavy but not squarely 'elbowed'; teeth about as in *totontepecus*, wider and heavier than in *mexicanus*.

Measurements.—Average of 10 adults from the type locality: Total length, 245 (234-254); tail vertebræ, 129 (121-136); hind foot, 28 (27-28.5).

Type specimen.—No. 100022 U. S. National Museum, Biological Survey Collection. ♀ adult. March 25, 1900. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—The thickened rostrum and anteriorly expanded nasals of this form approach the condition found in *P. furvus*, but the development is not so extreme as in that species. As in *furus*, the characters are not well developed except in fully adult specimens. The vicinity of Teapa, visited by Nelson and Goldman in the spring of 1900, is not far above sea level, and is now well known for the dark rich color of its animals. The present subspecies is not an exception. Its color is not so extensively blackish as in *totontepecus*, but the rufescent shades equal in richness anything found elsewhere in the *mexicanus* group.

Specimens examined.—Total number 21, from localities as follows:

Tabasco: Near El Salto, 2; Monteclaro, 2; Tenpa, 17.

PEROMYSCUS MEXICANUS GYMNOTIS THOMAS.

Peromyscus gymnotis Thomas, Ann. & Mag. Nat. Hist., Lond., ser. 6, XIV, pp. 365-366, Nov., 1894.

Type locality.—Guatemala.

Geographic distribution.—Certain parts of Guatemala and (probably) northward at slight elevations to southwestern Chiapas.

Characters.—Similar to *P. mexicanus*, but smaller (hind foot 23-25); tail about equal to or slightly shorter than head and body, scaly annulations slightly finer than in *mexicanus* and clothed with even shorter hairs; tail nearly unicolor or with slight blotches of yellowish on under side; ears moderate, very scantily haired.

Color.—No. 77659: Upperparts chiefly rich tawny ochraceous, almost as in *P. aztecus*, except that there is very little black in the mid-dorsal region; underparts dull buffy white with slaty undercolor showing through, pectoral region suffused with fulvous; head, feet, and ears about as in *mexicanus*; scaly part of tail dusky blackish all around except some slight blotches of yellowish white on proximal half of under side. Two additional specimens in worn pelage: Back dark mummy brown with thin patchy areas of ochraceous on the sides.

Skull.—Similar to that of *mexicanus* but smaller, about the size of that of *P. aztecus*; premaxillæ rather swollen laterally; nasals decidedly convex; zygomata depressed anteriorly considerably below plane of rostrum; supraorbital border with a very slight suggestion of a bead; teeth and audital bullæ small.

Measurements.—Type and two adults from Huehuetan, Chiapas, respectively: Total length, 191; 217; 220; tail vertebræ, 92; 104; 110; hind foot, 23; 25; 24; ear from notch, 17; 16.5 (dry); 15 (dry).

Type specimen.—No. 86.5.13.4 British Museum. "Coll. Bernoulli." Specimen in alcohol in fair condition.

Remarks.—The above description is based chiefly on three specimens from Huehuetan, Chiapas, which are believed to be very similar to the type of *P. gymnotis*. Two of these specimens (Nos. 77658 and 77659) were sent to the British Museum in the summer of 1905 and there compared by G. S. Miller, jr.,^a with the type of *gymnotis*.

Mr. Miller's notes on the type are as follows:

Color of type injured by alcohol—a peculiar indefinite gray brown above, suggesting immaturity—underparts between buff and Isabella color—no pectoral spot visible. Tail of type more finely ringed than in any of these, 22 rings to the centimeter at middle and without trace of lighter color below—haired as

^a Since the above was written I also have examined this type, but can form no more positive conclusions regarding it than those here stated.

in Nos. 77658—ears as in 77658—9. The animal is close to these (judging by externals) and not at all like 77309 [*saxatilis*], which is much too large and with bicolor tail.

In spite of this fairly close agreement there are some discrepancies, and it is quite possible that additional collecting in Guatemala may prove either that *gymnotis* is the same as *allophylus* or a species not yet represented in American collections. For the present it seems best to associate the name *gymnotis* with the specimens from Huehuetan rather than to add another name to a difficult group already overburdened. The essential part of the original description of *gymnotis* is as follows:

Size medium; ears long, tail short. General color, so far as can be made out in a spirit-specimen, very dark, almost bistre-brown. Under surface dirty buff, the slate-colored bases of the hairs showing through. Ears long, laid forward in a spirit-specimen they reach 3 or 4 millim. in front of the anterior canthus of the eye; perfectly naked, no hairs being discernible upon them (except at their bases posteriorly) even with a lens;¹ their substance plumbeous in color. Palate ridges 3–5. Hands and feet thinly covered with fine silvery-white hairs; fifth hind toe reaching to the base of the second phalanx of the fourth; soles practically naked along median line, a few scattered white hairs being only found on this part. Tail slightly shorter than the head and body, slender, very thinly clothed with minute brown hairs, which are everywhere of the same color, while the skin of the tail itself is also dark brown above and below for its whole length.

Skull, as compared to that of *P. aztecus*, decidedly more lightly built and flatter above when viewed in profile; muzzle longer and narrower; supra-orbital edges square but not beaded; palatal foramina widely open; bullæ rather smaller. Dimensions of the type (an adult male in spirit): Head and body 99 millim.; tail 92; hind foot 22 (with claws 23); ear 17 x 13.5; heel to front of last footpad 10.

Specimens examined.—Total number 4, from localities as follows:

Chiapas: Huehuetan, 3.

Guatemala: Guatemala, 1 (type).

PEROMYSCUS ALLOPHYLUS Osgood.

Peromyscus allophylus Osgood, Proc. Biol. Soc. Wash., XVII, p. 71, Mar. 21, 1904.

Type locality.—Huehuetan, Chiapas, Mexico. Altitude 200 feet.

Geographic distribution.—Known only from the type locality.

Characters.—Size medium (hind foot 25): tail shorter than head and body; ears moderate, scantily haired; coloration dark; tail dusky blackish, unicolor, covered with small imbricate scales, much as in *Oryzomys*; proximal third of soles of hind feet finely haired; skull rather long and narrow; teeth very small.

¹“A second examination with a more powerful lens shows that there are a few widely scattered minute whitish hairs on the ears, but they are so few and so small as practically not to affect the statement in the text.”

Color.—General effect of sides mummy brown, deepening toward middle of back, causing a rather distinct median dorsal line of blackish brown; underparts yellowish white over slate-color, the latter showing through; tail dusky blackish, unicolor; a black orbital ring and antorbital spot; feet whitish, scantily haired; 'ankles' dusky.

Skull.—Rather long and narrow; braincase elevated; infraorbital notch scarcely evident; nasals rather short, slightly exceeded by premaxillæ; no supraorbital ridge; palatine foramina rather large, longer than bony palate; audital bulke small, smaller than in *aztecus* or *mexicanus* and having a marked flange on anterior flattened production; molar teeth very small; interparietal small; frontals rather wide; supraorbital border sharp-angled but not beaded.

Measurements.—Type: Total length, 202; tail vertebræ, 95; hind foot, 25; ear from notch (dry), 17.

Type specimen.—No. 77657 U. S. National Museum, Biological Survey Collection. ♀ adult. Feb. 21, 1896. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—It is difficult to be certain of the affinities of this peculiar species. But for the size of its ears and shortness of its tail it might well pass for an *Oryzomys* of the *O. chapmani* group. Its dark scaly tail suggests *Oryzomys*, and the character and color of its pelage bear out the resemblance. Its skull, however, is that of the ordinary type of *Peromyscus*. Its closest relationship is probably with the *mexicanus* group, though it may be a northern member of a Central American group not yet known as such. It agrees in some respects with the description of *P. gymnotis* Thomas from Guatemala, but without direct comparison it is difficult to determine whether or not it is that species.

Specimen examined.—One, the type.

Key to Subspecies of *Peromyscus banderanus*.

- Skull with supraorbital beads slight or obsolete.....*P. b. angelensis*
 Skull with supraorbital beads well developed.
 Color paler, chiefly ochraceous buff with very little dusky mixture.....*P. banderanus*
 Color darker, usually with considerable mixture of dusky.....*P. b. vicinior*

PEROMYSCUS BANDERANUS ALLEN.

(Pl. V, fig. 1.)

Peromyscus banderanus Allen, Bull. Am. Mus. Nat. Hist., N. Y., IX, p. 51, Mar. 15, 1897.

Type locality.—Valle de Banderas. Tepic, Jalisco, Mexico.

Geographic distribution.—Pacific coast of Mexico from Bahia Banderas. Tepic, to vicinity of Acapulco, Guerrero.

Characters.—Size medium (hind foot about 25); tail about equal to head and body; ears moderate; pelage soft but rather short; soles

of hind feet naked to calcaneum; color chiefly bright ochraceous buff; skull rather elongate and having well-developed supraorbital beads.

Color.—No. 33333 Hacienda Magdalena, Colima, Mar. 19, pelage very slightly worn: General color of upperparts and sides ochraceous buff, with a very fine mixture of cinnamon nearly uniformly distributed; the color is almost solid ochraceous buff, being merely toned down by the admixture of cinnamon tipped hairs and the effect of the underlying plumbeous; underparts creamy with a broad ochraceous buff pectoral patch; forehead and sides of head mixed cinnamon and drab gray; a buffy spot under eye connecting on its lower side with the main color of the sides; orbital ring and spot at base of whiskers Vandyke brown; feet white with a prominent spot of Prout brown on 'ankles'; hairs of tail dusky above, white below, scaly part of tail sometimes bicolor, but frequently blotched dusky and yellowish. Adolescent, No. 70757, Acapulco, Guerrero: Similar to adult, but general color decidedly paler and more broken up by admixture of dusky tipped hairs with a slight tendency to concentration in median dorsal region. Young: Underfur slate color (Ridgway, Pl. II, No. 4), as in adults; ground color smoke gray with a plentiful mixture of brownish tipped hairs; dusky markings about eyes, whiskers, and 'ankles' well indicated.

Skull.—General outline narrow and elongate; posterior part of braincase elongated to such extent that more than half of the large interparietal lies posterior to a plane passing behind the audital bullæ; supraorbital beads highly developed, forming a trenchant shelf above the orbit and bounded on the inner side by a distinct groove-like channel extending from the lacrymal region up to and often beyond the parieto-frontal suture; lacrymal region swollen; nasals ending slightly anterior to a well-marked interlacrymal pit and almost exactly on the plane of the anterior border of the orbit; audital bullæ rather small (scarcely more than half as large as in *melanophrys*); anterior palatine foramina smaller than in *mexicanus* or *melanophrys*, and usually ending anterior to the plane of the front of the first upper molar; general shape of these foramina usually triangular, being narrowest at the anterior apex and gradually widening to the middle and thence nearly constant to the posterior end; teeth of moderate size, slightly smaller than in *mexicanus* and *melanophrys*.

Measurements.—Average of 5 adults from Hacienda Magdalena, Colima: Total length, 234 (228–245); tail vertebræ, 119 (115–127); hind foot, 25; ear from notch (dry), 18 (17.2–18.5).

Type specimen.—No. 33333 American Museum of Natural History, New York. ♀ adult. Feb. 23, 1893. A. C. Buller. Skin in good condition, though badly formed, head 'humped,' forelegs turned

back, etc. Skull with nasals slightly chipped in front, molar teeth loose and two of them missing; otherwise in good condition.

Remarks.—*P. banderanus* is about the size and proportions of *P. aztecus* and closely related forms, but is much paler in color. Its naked soles distinguish it from this and all other Mexican species of approximate size. Its general combination of characters is unique, so it should not be confused with other species. The naked soles, pale color, and narrow beaded skull easily distinguish it. It is confined to the west coast of Mexico and has but two subspecific representatives, one at the extreme southern end of its range and the other a short distance into the interior to the eastward.

Specimens examined.—Total number 41, from the following localities in Mexico:

Colima: Colima City, 7; Hacienda Magdalena, 9; Hacienda San Antonio, 1; Manzanillo, 7.

Guerrero: Acapulco, 11; El Limon, 2; near Ometepec, 2.

Tepic: Navarrete, 1; Valle de Banderas, 1.

PEROMYSCUS BANDERANUS VICINIOR Osgood.

Peromyscus banderanus vicinior Osgood, Proc. Biol. Soc., Wash., XVII, pp. 68-69, Mar. 21, 1904.

Type locality.—La Salada, Michoacan, Mexico.

Geographic distribution.—Western Mexico in the States of Michoacan and Guerrero, occupying the slightly more elevated region immediately east of the range of typical *banderanus*.

Characters.—Similar to *P. banderanus* but darker, usually with considerable mixture of dusky in color; skull averaging narrower; soles of hind feet naked medially.

Color.—Slightly darker and more vinaceous in worn pelage than in *banderanus*; decidedly darker in winter pelage; ground color ochraceous buff, but with a strong mixture of dusky on back and sides and a slightly differentiated concentration in median dorsal region; nose and sides of face grayish; markings about eyes, whiskers, and tarsal joints sooty instead of brownish; pectoral spot often absent; upper side of tail blackish instead of brownish; otherwise similar to *banderanus*.

Skull.—Similar to that of *banderanus*, but braincase averaging slightly narrower; anterior palatine foramina more nearly elliptical, being widest in the middle and narrowing toward each end; supra-orbital beads well developed.

Measurements.—Type: Total length, 216; tail vertebræ, 107; hind foot, 27. Average of three adolescents from La Huacana, Michoacan: 233 (225-240); 117 (115-121); 24.5 (24-25); ear from notch (dry), 16.2 (16-16.5).

Type specimen.—No. 126503 U. S. National Museum, Biological Survey Collection. ♂ adult. March 23, 1903. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This is an interior form of *banderanus* having a narrow range in the slightly elevated region paralleling the coast. In full unworn pelage, as shown by two specimens from Los Reyes, Michoacan, it is decidedly darker than *banderanus*, since the pelage contains a liberal mixture of dusky. The small series from La Salada have uniformly narrow skulls, noticeably narrower than in *banderanus*, but other specimens from Los Reyes and La Huacana indicate that this character is not stable. Whether it is even an average character throughout the range of the form will appear when further material is acquired.

Specimens examined.—Total number 15, from localities as follows:

Guerrero: Acahulizotla, 3.

Michoacan: La Huacana, 4; La Salada, 6; Los Reyes, 2.

PEROMYSCUS BANDERANUS ANGELENSIS Osgood.

Peromyscus banderanus angelensis Osgood, Proc. Biol. Soc. Wash., XVII, p. 69, Mar. 21, 1904.

Type locality.—Puerto Angel, Oaxaca, Mexico.

Geographic distribution.—Coast of southern Oaxaca; known from two localities only.

Characters.—Similar to typical *banderanus*; size larger; sole of hind foot narrowly naked medially, but not so obviously so as in *banderanus*; skull larger and heavier; supraorbital bead nearly obsolete instead of well-developed.

Color.—Practically as in *banderanus*; possibly averaging a trifle darker; pectoral spot well-developed and considerably produced posteriorly.

Skull.—Similar in general form to that of *banderanus*, but supraorbital borders much less distinctly or scarcely at all beaded, but reduced to simple shelves much as in *melanophrys* and *mexicanus*; size larger; braincase less elongate; interparietal shorter; nasals longer; molar teeth slightly larger.

Measurements.—Average of 7 adult topotypes: Total length, 235 (222–258); tail vertebrae, 120 (112–128); hind foot, 27 (26.5–28); ear from notch (dry), 17.3 (17–17.7).

Type specimen.—No. 71442 U. S. National Museum, Biological Survey Collection. ♀ adult. March 13, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—The divergence of this form from typical *banderanus* seems to be in the direction of the *mexicanus* group. Its general appearance, character of pelage, nearly naked soles, etc., are as in *banderanus*, but its skull approaches that of *mexicanus* quite closely,

differing mainly in its more elongate braincase. Therefore, it would not be surprising if further material should demonstrate connection between *mexicanus* and *hauderanus*.

Specimens examined.—Total number 23, from localities as follows:

Oaxaca: Photepa, 1; Pluma, 2; Puerto Angel, 20.

Key to Subspecies of *Peromyscus yucatanicus*.

Color paler, not largely mixed with dusky; median dorsal area usually not differentiated ----- *P. yucatanicus*

Color darker, with considerable mixture of dusky; dorsal area usually somewhat differentiated ----- *P. y. badius*

PEROMYSCUS YUCATANICUS ALLEN AND CHAPMAN.

(Pl. V, fig. 4.)

Peromyscus yucatanicus Allen and Chapman, Bull. Am. Mus. Nat. Hist., N. Y., IX, p. 8, Feb. 23, 1897.

Type locality.—Chichenitza, Yucatan, Mexico.

Geographic distribution.—Northern parts of the peninsula of Yucatan; chiefly arid tropical zone.

Characters.—Size medium (hind foot 22–24); tail about equal to or slightly shorter than head and body; ears medium, nearly naked; soles of hind feet hairy proximally; tail thinly haired, scarcely penciled, evenly bicolor or with under side blotchy; skull with slight supraorbital bead, small teeth, and small audital bullæ. Similar in general characters to *P. mexicanus*, but decidedly smaller.

Color.—Slightly worn pelage: Upperparts bright ochraceous buff or ochraceous, lightly and nearly uniformly mixed with dusky; sides about like back; a rather broad lateral line clear ochraceous, only slightly contrasted; a narrow dusky orbital ring; underparts yellowish white, becoming more nearly pure white on throat and chin; pectoral spot rarely present; feet white, tarsal joint slightly marked with pale brownish; hairs of tail dusky above and white below, evenly divided, but scaly annular part of tail dusky above and yellowish white below, variously speckled and blotched with dusky.

Skull.—Size medium; braincase rather elongate; frontals wide and supraorbital border shelflike or slightly beaded; nasals relatively wide, ending about even with posterior endings of premaxillæ; audital bullæ medium or rather small; palatine slits moderately large; teeth relatively very small; zygomata very slightly notched by infraorbital foramina. Similar in general to that of *mexicanus*, but very decidedly smaller throughout.

Measurements.—Average of 10 adults from La Vega, Yucatan: Total length, 216 (208–232); tail vertebrae, 112 (105–122); hind foot, 23.8 (23–26); ear from notch (dry), 17 (15.2–18.3).

Type specimen.—No. {{{}} American Museum of Natural History, New York. ♂ adult. Mar. 17, 1896. Frank M. Chapman. Specimen in good condition.

Remarks.—While apparently quite distinct, this species is little more than a miniature of *P. mexicanus*. In all general characters except size it shows no marked departure from *mexicanus*. Its slightly blotched tail, slightly beaded skull, small teeth, and small audital bullæ readily distinguish it from any species approximating it in size. Its pelage, including the hairiness of the tail, is not so coarse as in *mexicanus*, and in specimens so far examined (all in slightly worn pelage) the color is somewhat brighter, being chiefly bright ochraceous throughout.

Specimens examined.—Total number 35, from localities as follows:

Yucatan: Chichenitza, 8; La Vega, 26; Puerto Morelos, 1.

PEROMYSCUS YUCATANICUS BADIUS Osgood.

Peromyscus yucatanicus badius Osgood, Proc. Biol. Soc. Wash., XVII, pp. 70-71, March 21, 1904.

Type locality.—Apazote, Campeche, Mexico.

Geographic distribution.—Known only from the type locality.

Characters.—Similar to *P. yucatanicus*, but darker colored.

Color.—Decidedly darker than *P. yucatanicus*, having the median dorsal area with a strong admixture of black and more or less black on the sides, except a narrow lateral line which is cinnamon rufous like the general ground color; underparts faintly suffused with yellow; a narrow black orbital ring; hairs of tail blackish brown above, white below; underside of tail beneath hairs chiefly yellowish white, but somewhat irregularly blotched with dusky; feet white.

Skull.—As in *P. yucatanicus*.

Measurements.—Average of 10 topotypes: Total length, 193.4; tail vertebræ, 96.7; hind foot, 23.5; ear from notch (dry), 16.4 (16-16.8).

Type specimen.—No. 108016 U. S. National Museum, Biological Survey Collection. ♀ adult. Dec. 28, 1900. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This slight form doubtless owes its dark color to the character of its habitat, which is in a more humid region than that of true *yucatanicus*. Its range is probably limited to the region of the base of the peninsula of Yucatan, as its nearest relatives known from west of that region are the larger and quite different forms of the *mexicanus* group.

Specimens examined.—Total number 19, all from the type locality.

Key to subspecies of *Peromyscus megalops*.

Tail uniform blackish all around.....	<i>P. m. melanurus</i>
Tail evenly bicolor or at least somewhat blotched with yellowish white below.	
Slightly darker; audital bullæ smaller.....	<i>P. megalops</i>
Slightly paler; audital bullæ larger.....	<i>P. m. auritus</i>

PEROMYSCUS MEGALOPS MERRIAM.

(Pl. V, fig. 5.)

Peromyscus megalops Merriam, Proc. Biol. Soc. Wash., XII, p. 119, Apr. 30, 1898.

Type locality.—Mountains near Ozolotepec, Oaxaca, Mexico. Altitude, 10,000 feet.

Geographic distribution.—Known only from the type locality.

Characters.—Size large (hind foot 30–31); tail decidedly longer than head and body, coarsely haired, and irregularly bicolor; pelage long and lax; color with more tawny than in *guatemalensis*, much as in *thomasi*; skull with large broad braincase and distinct supra-orbital bead.

Color.—Slightly worn pelage: Upperparts mixed tawny and blackish brown; sides chiefly rich tawny but little modified by dusky; broad dorsal area chiefly blackish brown, lightly sprinkled with tawny, producing a general effect approaching the mummy brown of Ridgway; line from base of whiskers to and around eye and thence halfway to base of ear broadly blackish brown; forehead brownish; sides of nose in front of whiskers grayish cinnamon; extreme tip of nose with a tiny whitish spot; underparts pale whitish buff, somewhat modified by undercolor; pectoral and axillary region broadly tawny (usually); feet white; forearm with a narrow dusky line reaching nearly to carpal joint; tarsal joint broadly dusky, and this sometimes slightly extended on upper side of hind foot; hairs of tail usually evenly bicolor, dusky above, whitish below; scaly annular part of tail dusky above and irregularly blotched dusky and yellowish white below.

Skull.—Size large, exceeding that of *mexicanus* and about equaling that of *guatemalensis*; braincase broad; frontals broad, distinctly beaded on supraorbital border and depressed in median line forming a shallow pit immediately behind the nasals; lacrymal region rather swollen; zygomata very slightly notched by infraorbital foramina; nasals rather long, slightly exceeding the ascending branches of the premaxillæ; audital bullæ relatively small; interpterygoid fossa wide and long, extending anteriorly to the plane of the middle of the last molar; palatine slits large and broadly open; teeth moderate, decidedly larger than in *mexicanus*, about as in *guatemalensis*.

Measurements.—Type: Total length, 282; tail vertebræ, 150; hind foot, 31; ear from notch (dry), 19. Average of five topotypes: 278; 147; 31.

Type specimen.—No. 71592 U. S. National Museum, Biological Survey Collection. ♂ old. March 26, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition, but skull lacking the first upper molar on each side.

Remarks.—This species and its very closely allied subspecies are among the largest members of the restricted genus. They about equal *guatemalensis* in size, and in the subgenus *Peromyscus* are exceeded only by *P. zarhynchus*. They may be distinguished from *guatemalensis* by their more tawny color and by their more distinctly beaded frontals.

Specimens examined.—Total number 5, all from the type locality.

PEROMYSCUS MEGALOPS AURITUS MERRIAM.

Peromyscus auritus Merriam, Proc. Biol. Soc. Wash., XII, pp. 119–120, Apr. 30, 1898.

Peromyscus comptus Merriam, *supra cit.*, p. 120.—Mountains near Chilpancingo, Guerrero.

Type locality.—Mountains 15 miles west of Oaxaca, Oaxaca, Mexico. Altitude 9,300 feet.

Geographic distribution.—High altitudes in mountains of western Oaxaca and southeastern Guerrero, Mexico. (See fig. 5, p. 161.)

Characters.—Very similar to *P. megalops*, but ears possibly slightly larger and color averaging slightly paler; audital bullæ decidedly larger.

Color.—Practically as in *megalops*, but apparently averaging slightly paler. Unworn pelage: General effect of upperparts cinnamon; back only very slightly darker than sides; face with dusky markings subdued by fulvous, only a narrow orbital ring conspicuous; underparts nearly pure creamy white, but slightly modified by undercolor; tail dusky above, white below, scaly part very slightly blotched with dusky on underside. Worn pelage: About as in *megalops*; dark undercolor more exposed on upperparts as well as on underparts; sides of face darker, with dusky markings more pronounced.

Skull.—Similar to that of *megalops*, but audital bullæ decidedly larger; nasals slightly longer.

Measurements.—Type: Total length, 288; tail vertebrae, 148; hind foot, 30.5; ear from notch (dry), 23.3. Average of four topotypes: 281; 148; 31.5. Of ten adults from mountains near Chilpancingo, Guerrero ('*comptus*'): 273; 143; 30.4.

Type specimen.—No. 68438 U. S. National Museum, Biological Survey Collection. ♀ old. Sept. 17, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—In all general characters this form is like *megalops*. Its best distinguishing character is the size of the audital bullæ, which is markedly greater than in *megalops*. The material thus far available in this small group is hardly sufficient for satisfactory conclusions as to slight variations in color. The few specimens of *auritus* from the type locality are in somewhat worn pelage. A considerable series of adults from the mountains near Chilpancingo, Guerrero, are

in very full unworn pelage, which appears to be quite decidedly lighter than the worn pelage. Their subspecific separation would seem to be warranted were it not for a series recently obtained from Omilteme, Guerrero, but a few miles away, in which are found slightly worn specimens indistinguishable from the type of *auritus*. The ears appear to be slightly larger than in *megalops*, but with only dry specimens for comparison it is difficult to be certain of the real difference in this respect.

Specimens examined.—Total number 38, from localities as follows:

Guerrero: Mountains near Chilpancingo, 18; Omilteme, 14.

Oaxaca: Mountains 15 miles west of Oaxaca, 6.

PEROMYSCUS MEGALOPS MELANURUS subsp. nov.

Type from Pluma, Oaxaca, Mexico. Altitude, 4,600 feet. No. 71385, U. S. National Museum, Biological Survey Collection. ♂ adult. Mar. 20, 1895.
E. W. Nelson and E. A. Goldman.

Geographic distribution.—Known only from the type locality.

Characters.—Similar to *megalops*, but size smaller, pelage much shorter, and skull smaller and more stoutly built; tail nearly unicolor, blackish above and below. Size and general appearance about as in *mexicanus*, but skull with broader and more distinctly beaded frontals.

Color.—Worn pelage: Extremely variable, running from Mars brown to bright tawny ochraceous; a dark dorsal area considerably darker than sides usually well marked; dusky orbital ring and spot at base of whiskers sharply defined; feet white, thinly haired, broadly brownish on tarsal joints; underparts yellowish white, usually without fulvous pectoral area; tail blackish all around, scaly part sometimes with indistinct zones of dull yellowish brown at irregular intervals in its length.

Skull.—Similar to that of *megalops*, but slightly smaller and more stoutly built; rostrum thicker; teeth and audital bullæ smaller; interparietal large and quite produced posteriorly; frontals wide and distinctly beaded; anterior part of zygomatic scarcely or not at all notched by infraorbital foramen. Somewhat similar to that of *mexicanus* but larger; frontals wider and more distinctly and extensively beaded; teeth larger; audital bullæ about same size.

Measurements.—Average of 10 adult topotypes: Total length, 259 (238–278); tail vertebrae, 135 (127–145); hind foot, 27.3 (26–28.5); ear from notch (dry), 17 (15.8–17.8).

Remarks.—This form shows quite a marked departure from *megalops* in size and external appearance, but since it agrees with it closely in cranial characters it seems best to treat it as a subspecies. It inhabits lower and doubtless warmer localities than *megalops*, in this respect, as well as others, standing between the *megalops* series and the *mexicanus* series. Its uniformly dark tail is almost diagnos-

tic but not quite so, as rare variants in the *mexicanus* series approach it. It is not so heavily haired as in *melanocarpus*.

Specimens examined.—Total number 18, all from the type locality.

PEROMYSCUS MELANOCARPUS Osgood.

Peromyscus melanocarpus Osgood, Proc. Biol. Soc. Wash., XVII, pp. 73-74, Mar. 21, 1904.

Type locality.—Mount Zempoaltepec, Oaxaca, Mexico.

Geographic distribution.—Known only from the upper slopes of Mount Zempoaltepec.

Characters.—Similar to *P. megalops*, but smaller and darker; hind feet slightly darker; fore feet decidedly more so, the blackish extending to base of digits; tail usually dusky all around and with only traces of paleness beneath; pelage long and soft.

Color.—No. 68627, adult ♂, July 17: General effect of upperparts dark blackish mummy brown, slightly darker along middle of back; actual color of subterminal zone of hairs cinnamon rufous, which is almost lost in the general effect by the many black-tipped hairs and the dark plumbeous undercolor which shows through the thin subterminal zone; underparts deep blackish slate washed with creamy white, producing an effect which varies from olive gray to slate gray; pectoral region usually rich cinnamon rufous; an intense black line extending from nostrils through base of whiskers and eye; tail covered with short, bristly, blackish hairs scarcely paler below than above; scaly annulations of tail usually dusky all around, sometimes with slight irregular patches of paler; fore and hind feet dusky brownish to base of toes.

Skull.—Similar to that of *megalops*, but smaller; nasals slightly shorter and more compressed posteriorly. Superficially similar to that of *totontepecus*, but differing as follows: Nasals shorter and nearly always ending in advance of the orbits about on a plane with the infraorbital foramen; frontals wider and with decidedly greater development of supraorbital shelves; braincase wider; anterior palatine foramina much longer; molar teeth larger. Differs from that of *lepturus*, as follows: Braincase larger and broader; frontal wider and quite distinctly beaded; nasals longer.

Measurements.—Type (not quite adult): Total length, 241; tail vertebrae, 125; hind foot, 27; ear from notch (dry), 19.2. Adult ♂ from Totontepec, Oaxaca: 262; 132; 30.

Type specimen.—No. 68610 U. S. National Museum, Biological Survey Collection. ♀ adolescent. July 8, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This mountain species is about the size of *P. m. totontepecus*, with which it ranges to some extent, but is much more closely related to *megalops* and *auritus*, as indicated by its cranial charac-

ters and its more bristly tail. Its most diagnostic character, however, is the extent of dusky brownish on the fore feet, which is almost unique. In some specimens the ends of the toes and the outer side of the metacarpus are the only parts not occupied by the dark color. The pelage is long and lax, like that of many other mountain forms. The type was taken at 8,000 feet altitude, and specimens from Totontepec on the north slope of the same mountain at 6,500 feet altitude show that it ranges to slightly lower levels. *P. lepturus*, which also occurs on Mount Zempoaltepec, is smaller than *melanocarpus* and differs in numerous cranial characters.

Specimens examined.—Total number 6, from localities as follows:

OAXACA: Mount Zempoaltepec at 8,000 feet altitude, 1; Totontepec, 5.

PEROMYSCUS ZARHYNCHUS MERRIAM.

(Pl. VI, fig. 1.)

Peromyscus zarhynchus Merriam, Proc. Biol. Soc. Wash., XII, p. 117, Apr. 30, 1898.

Peromyscus zarhynchus cristobalensis Merriam, *supra cit.*, pp. 117-118.—San Cristobal, Chiapas.

Type locality.—Tumbala, Chiapas, Mexico. Altitude 5,500 feet.

Geographic distribution.—Highlands of Chiapas and Guatemala.

Characters.—Size very large, exceeded only in the subgenus *Megadontomys*; tail very long, always longer than head and body, rather finely scaly and scantily clothed with short hairs; soles of hind feet naked medially to calcaneum; color dark; skull with very elongate rostrum.

Color.—Unworn pelage? (No. 76120): Middle of back from shoulders to base of tail deep blackish brown very lightly sprinkled with russet, producing a general effect of mummy brown; sides, shoulders, and most of head cinnamon rufous mixed with dusky, producing a general effect varying from russet to Mars brown; lateral line rather broad, clear cinnamon rufous; orbital and antorbital regions dark blackish brown not very sharply contrasted; underparts yellowish white, with or without pectoral spot, sometimes entirely suffused with cinnamon; feet soiled whitish, tarsal joint broadly brownish and proximal part of foot slightly brownish; scaly part of tail evenly bicolor, dusky above and whitish below or dusky above and irregularly blotched below. Worn pelage: Slightly paler, more grayish, than in unworn pelage and with dark dorsal area less contrasted.

Skull.—Size very large, equaling that of *P. thomasi* in length but general form lighter; nasals, rostrum, palatine slits, etc., very long; shelf of bony palate rather short; interpterygoid fossa and audital bullæ about as in *guatemalensis* and *thomasi*; frontals quite constricted; supraorbital border sharp-angled but rarely showing any

definite bead; zygomata slightly compressed anteriorly and but slightly notched; lower side of infraorbital plate somewhat produced forward; teeth larger than in *guatemalensis* but smaller than in *thomasi*.

Measurements.—Average of 10 adult topotypes: Total length 316 (305–327); tail vertebræ 170.7 (162–178); hind foot 35.7 (33.5–38); ear from notch (dry) 22.2 (21.2–24). Average of 10 adults from San Cristobal, Chiapas: Total length 312 (303–323); tail vertebræ 166 (157–174); hind foot 33.8 (33–36).

Type specimen.—No. 76119 U. S. National Museum, Biological Survey Collection. ♀ adult. October 20, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This is the largest species of *Peromyscus* except those of the subgenus *Megadontomys*. Its size, therefore, is sufficient to distinguish it. The skull is characterized by a very long rostrum, longer even than in *Megadontomys*. The supraorbital border is not beaded, being about as in *guatemalensis*. The teeth are not peculiar, but a few specimens show a faint suggestion of the inner enamel island of the anterior triangle of the first upper molar, which is well developed in *Megadontomys*. This species is represented by two fairly good series, one from Tumbala and one from San Cristobal. There is considerable variation in each series, both in color and in cranial characters. No constant, nor even average, difference in cranial characters appears, and in color the very slight average difference is scarcely more than is found between any two series of one species. The environmental conditions of Tumbala and San Cristobal are nearly alike, and the distance between the two places is not great.

Specimens examined.—Total number 36, from localities as follows:

Chiapas: San Cristobal, 22; Tumbala, 14.

Subgenus MEGADONTOMYS Merriam.

Megadontomys Merriam, Proc. Biol. Soc. Wash., XII, pp. 115–116, Apr. 30, 1898.

Type.—*Peromyscus thomasi* Merriam.

Subgeneric characters.—Size very large, slightly exceeding the largest species, and greatly exceeding the majority of the species of the other subgenera of *Peromyscus*; molar teeth largest and heaviest of the genus; tubercles of molars low and usually worn flat at an early stage; supplementary tubercles (in primary angles of both upper and lower molars) more highly developed than in the subgenus *Peromyscus*; first upper molar, when slightly worn, presenting five salient and four reëntrant outer angles; anterior loop of first upper molar, when somewhat more worn, containing a subcircular enamel island, which is the persistent part of the first outer reëntrant angle; first and second lower molars with a prominent and well-developed

supplementary enamel loop in the outer primary reëtrant angles; third lower molar presenting three salient and three reëtrant angles on each side during a much longer period of wear than in the subgenus *Peromyscus*. Plantar tubercles of hind foot 6, as in *Peromyscus*. Mammar 6, pectoral 1, inguinal $\frac{1}{2}$.

Species.—*P. thomasi*, *P. nelsoni*, and *P. flavidus*.

Remarks.—Nearly all the characters of this subgenus are relative rather than absolute. The development of the supplementary cusps, particularly those of the lower molars, gives the enamel pattern of the worn tooth quite a different appearance from that in the subgenus *Peromyscus*. These supplementary cusps, however, are quite well developed in the upper molars of true *Peromyscus*, and are present also, but little developed, in the lower molars. As seen in the profiles of unworn teeth, these cusps are merely larger and higher in *Megadontomys* than in *Peromyscus*. Therefore the slightly worn surface of the molars of *Megadontomys* presents a pattern different from that of *Peromyscus* at the same stage of wear, but when the molars of *Peromyscus* are worn to a greater degree the cross section shown by the upper surfaces is essentially the same as that of *Megadontomys*. In *Haplomylomys*, the 'supplementary cusps' are entirely absent, in *Peromyscus* they are variously developed, and in *Megadontomys* they find their greatest development. Some authors have hastened to give *Megadontomys* full generic rank, but in view of the relative nature of its characters this seems ill advised.

Key to species of subgenus *Megadontomys*.

Anterior tubercle of first upper molar distinctly divided longitudinally.....	<i>P. flavidus</i>
Anterior tubercle of first upper molar scarcely or not at all divided.	
Supraorbital border somewhat beaded.....	<i>P. thomasi</i>
Supraorbital border not beaded.....	<i>P. nelsoni</i>

PEROMYSCUS THOMASI MERRIAM.

(Pl. V, fig. 13; pl. VI, figs. 3-3a; pl. VII, fig. 5; pl. VIII, figs. 1, 1a, 1b, 1c.)

Peromyscus (Megadontomys) thomasi Merriam, Proc. Biol. Soc. Wash., XII, pp. 116, 120, fig. 20, Apr. 30, 1898.

Megadontomys thomasi Baugs, Bull. Mus. Comp. Zool., XXXIX, p. 27, 1902.

Type locality.—Mountains near Chilpancingo, Guerrero, Mexico. Altitude, 9,500 feet.

Geographic distribution.—High altitudes in mountains of central Guerrero, Mexico.

Characters.—Size very large, equaling and often slightly exceeding *P. zarkhynchus*; tail decidedly longer than head and body, nearly unicolor and closely covered with short bristly hairs, which do not quite conceal the annulations; ears large and minutely hairy, appearing almost naked; soles of hind feet naked to calcaneum; pelage long and rather coarse; color similar in general to that of *P. megalo-*
lops; skull with supraorbital beads.

Color.—Unworn pelage: General color much as in *P. megalops*, but averaging slightly darker. Upperparts rich tawny mixed with black, the tawny everywhere predominating; back only very slightly darker than sides; sides with relatively little black admixture, leaving the general effect from the cheeks to the thighs nearly pure tawny; nose and region about base of whiskers black; orbital ring black; underparts creamy white, usually somewhat modified by slaty under color, and occasionally with a slight suffusion of tawny in the pectoral region; fore feet white; forearm dusky brownish three-fourths of the way around; hind feet white, tarsal joint and distal part of hind leg dusky brownish all around; hairs of tail dusky all around; scaly part of tail chiefly dusky above and below, but occasionally light yellowish on proximal half of under side. Worn pelage: Similar to unworn pelage, but general appearance rougher; under color more or less exposed and an extensively dusky dorsal area well differentiated.

Skull.—Size very large, equaling that of *zarhynchus* in length and exceeding it in massiveness; supraorbital border distinctly beaded; nasals long, slightly shorter and wider than in *zarhynchus*; zygomata decidedly convergent anteriorly and scarcely notched by infraorbital foramen; interparietal very large, often produced to a sharp angle posteriorly; palatine slits very large; interpterygoid fossa wide; audital bullæ moderate, about as in *zarhynchus*; molar teeth large and heavy, larger than in any species of the subgenus *Peromyscus*; molar enamel pattern peculiar in most stages of wear (see subgeneric diagnosis).

Measurements.—Average of 7 adult topotypes: Total length, 330 (310–350); tail vertebrae, 175 (162–188); hind foot, 32.8 (32–34); ear from notch (dry), 23 (21.4–24.8).

Type specimen.—No. 70142 U. S. National Museum, Biological Survey Collection. ♂ adult. Dec. 24, 1894. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—Although equaled, or nearly equaled, in size by *P. zarhynchus*, this species is so well characterized by cranial and dental characters as not to require close comparison. Its only close relationship, of course, is with the other member of the subgenus *Megadontomys* (*nelsoni*), from which it is distinguished by its lighter, more extensively tawny color and by its distinctly beaded skull. Externally it very closely resembles *P. megalops*, merely being somewhat larger and showing the same character of pelage and the same extensively tawny color in unworn pelage.

Specimens examined.—Total number 14, from localities as follows:

Guerrero: Mountains near Chilpancingo, 7; Omilteme, 7.

PEROMYSCUS NELSONI MERRIAM.

Peromyscus (Megadontomys) nelsoni Merriam, Proc. Biol. Soc. Wash., XII, pp. 116-117, Apr. 30, 1898.

Megadontomys nelsoni Bangs, Bull. Mus. Comp. Zool., XXXIX, p. 27, 1902.

Type locality.—Jico, Veracruz, Mexico. Altitude 6,000 feet.

Geographic distribution.—Known only from the type locality.

Characters.—Similar to *P. thomasi* but color less extensively tawny and skull without distinct supraorbital beads.

Color.—Slightly worn pelage: Upperparts mixed tawny and dusky; general effect of sides cinnamon to russet and tawny olive; middle of back with dusky largely predominating, general effect raw umber to bistre; dusky markings about eyes and base of whiskers rather heavy; fore feet white; forearm dusky to wrist; hind feet grayish dusky; toes white, tarsal joint broadly brownish; tail unicolor, dusky all around.

Skull.—Similar to that of *thomasi*, but frontals slightly more constricted and supraorbital beads comparatively undeveloped.

Measurements.—Type and one topotype, respectively: Total length, 302, 318; tail vertebræ, 172, 170; hind foot, 35, 32; ear from notch (dry), 20.

Type specimen.—No. 55024 U. S. National Museum, Biological Survey Collection. ♀ adult. July 10, 1893. E. W. Nelson and E. A. Goldman. Specimen in good condition; last left upper molar absent.

Remarks.—Probably the real color difference between *nelsoni* and *thomasi* is rather slight or practically nothing. The only known specimens of *nelsoni* are in slightly worn pelage and, although different from the majority of specimens of *thomasi*, are scarcely distinguishable from equally worn specimens. The absence of supraorbital beads, however, appears to be distinctive.

Specimens examined.—Total number 2, both from the type locality.

PEROMYSCUS FLAVIDUS (BANGS).

(Pl. VI, figs. 2-2a; pl. VII, fig. 8.)

Megadontomys flavidus Bangs, Bull. Mus. Comp. Zool., Cambridge, Mass., XXXIX, pp. 27-29, figs. 5-7, Apr., 1902.

Type locality.—Boquete, south slope Volcan de Chiriqui, Panama.

Geographic distribution.—Known only from the type locality.

Characters.—Similar to *P. thomasi* but decidedly larger; ears relatively smaller; color slightly paler with less dusky about head; skull with heavy rostrum characterized by long nasals and laterally swollen premaxillæ; anterior lamina of first upper molar longitudinally divided.

Color.—Similar to that of *thomasi*, but averaging slightly paler; blackish markings about head less extensive, chiefly confined to base

of whiskers; underparts more yellowish; entire upperparts, head, back, sides, etc., rich ochraceous rather coarsely lined with dusky; lower cheeks and lateral line ochraceous scarcely or not at all mixed with dusky; nose and forehead a slightly paler shade of ochraceous than body; a narrow dusky orbital ring and a well-defined brownish dusky spot at base of whiskers; underparts yellowish white, without pectoral spot; forearm dusky to wrist; fore feet white; hind feet whitish, more or less mixed with dusky brownish to base of toes; toes white; tail thinly clothed with very short hairs, usually indistinctly bicolor. Worn pelage: Upperparts a richer shade of ochraceous (more nearly tawny), with dusky mixture slightly modified and blended.

Skull.—Decidedly different from that of *P. thomasi*; larger, higher, and relatively narrower; rostrum much heavier, with nasals more extended backward and premaxillæ much more swollen laterally; anterior palatine foramina shorter and wider; teeth and audital bullæ actually and relatively smaller; supraorbital beads strongly developed; nasals ending far back, at least on plane of lacrymals; interparietal scarcely produced posteriorly; coronoid process of mandible broad, strong, and elevated; teeth relatively short and broad; *m*₁ with anterior lamina distinctly divided, making 6 cusps instead of 5; lower molars with supplementary loops slightly developed, much less than in *Megadontomys*, about as in *Peromyscus*.

Measurements.—Average of 10 adult topotypes: Total length, 341.6 (320–375); tail vertebræ, 181.2 (155–205); hind foot, 31.8 (31–33); ears, 22.5 (20–24).

Type specimen.—No. 10331 Museum Comparative Zoology, Cambridge, Mass., formerly same number, collection of E. A. and O. Bangs. ♂ adult. April 12, 1901. W. W. Brown, jr.

Remarks.—The inclusion of this species within the genus *Peromyscus* is provisional. In dentition it decidedly approaches several neotropical genera. The first upper molar in fact is almost completely six-cusped, whereas in typical *Peromyscus* this tooth is five-cusped. However, an approach to the six-cusped condition is shown in *P. thomasi*, in which the anterior lamina of the tooth is incompletely divided. Moreover, *P. thomasi* is closely similar to *P. flavidus* in external characters. Since the generic relationships of various neotropical murines are imperfectly understood, it seems best for the present to retain *P. flavidus* in the subgenus *Megadontomys*.

Specimens examined.—Total number 27, all from the type locality.

Subgenus OCHROTOMYS nobis.

Type.—*Arvicola nuttalli* Harlan (= *Peromyscus nuttalli*).

Subgeneric characters.—Color of young in first pelage essentially same as that of adult; hairs clothing ears of same color as those of

upperparts; abdomen suffused with color of upperparts. Plantar tubercles 6, with a rudimentary seventh, adjacent to the large tubercle at the base of the fifth digit. Mammaræ 6; inguinal $\frac{3}{2}$, pectoral $\frac{1}{2}$. Posterior palatine foramina situated farther back than in *Peromyscus*, being decidedly nearer to the interpterygoid fossa than to the posterior endings of the anterior palatine slits. Molariform teeth relatively wide, and with enamel folds much compressed; tubercles relatively low; a tendency to development of a raised cingulum marked by subsidiary tubercles in the inner salient angles of m_1 and m_2 ; enamel relatively thicker than in subgenus *Peromyscus*, the pattern as seen in partly worn teeth being much compressed both laterally and longitudinally, so that the folds of the two sides touch in almost all stages of wear, leaving five subtriangular islands of dentine in m_1 and four in m_2 ; lower molars similarly peculiar.

Species.—One, the type only.

Remarks.—It is rather surprising that the numerous characters of *P. nuttalli* have not been accorded more than specific rank. It differs widely from all other species of the genus in external, cranial, and dental characters. Its general appearance is striking, not only on account of the bright uniform color, the ochraceous ears and belly, but also for the peculiar pelage, which is extremely dense and soft, suggesting that of the tropical murine opossums.

Although the tubercles of its teeth number the same as in the subgenus *Peromyscus*, and, as seen in cross section, show the same number of enamel folds, the relation of these folds to each other and to the dentine is different. In general, the enamel is thicker and occupies a relatively greater part of the upper surface of the worn tooth. Except in extremely old individuals, the dentine areas are not confluent, whereas in *Peromyscus*, even in teeth but slightly worn, these areas are all, or nearly all, confluent through narrow constrictions. This gives the worn surface of the tooth a characteristic aspect which, upon hasty examination, might lead to the conclusion that the enamel pattern is much more complicated than in true *Peromyscus*. The tendency to greater development of a raised cingulum is difficult to appreciate without examination of many teeth of different ages. When the teeth are worn to the level of this raised part of the cingulum (and this occurs before the obliteration of any important angles), the lateral angles are bridged, as it were, and the outer boundaries of the teeth are entire; that is, all the angles are inclosed.

Key to subspecies of *Peromyscus nuttalli*.

Size larger; maxillary tooththrow about 4.....*P. nuttalli*
 Size smaller; maxillary tooththrow usually less than 4.....*P. n. aureolus*

PEROMYSCUS NUTTALLI (HARLAN). NORTHERN GOLDEN MOUSE.

(Pl. V, fig. 11; pl. VI, figs. 7-7a; pl. VII, fig. 2; pl. VIII, figs. 5-5a.)

Arvicola nuttalli Harlan, Monthly Am. Jour. of Geol. and Nat. Sci., Phila., I, pp. 446-447, Apr., 1832; Med. and Phys. Researches or Orig. Memoirs, Phila., pp. 55-56, col. pl., 1835.

Hesperomys nuttalli Baird, Mamm. N. Am., Pac. R. R. Repts., VIII, pp. 467-468, 1857.

Peromyscus nuttalli Bangs, Proc. Bost. Soc. Nat. Hist., XXVIII, p. 197, Mar., 1898.

Type locality.—Norfolk, Va.

Geographic distribution.—Southeastern Virginia and northern North Carolina; west to central Kentucky.

Characters.—In general those of the subgenus *Ochrotomys*, of

FIG. 9.—Distribution of *Peromyscus nuttalli* and *P. n. aureolus*.

which it is the only species. Pelage very soft and thick; color chiefly rich tawny ochraceous; ears same color as body; abdomen suffused with ochraceous; proximal half of hind foot hairy; skull and teeth somewhat peculiar.

Color. — Upper-parts in all pelages rich tawny ochraceous, nearly clear on sides, lightly mixed with dusky on back in fresh pelage; face

and head exactly like sides; underparts creamy white suffused with ochraceous on abdomen, this often extending to entire underparts except chin and throat; hairs with slate-colored bases throughout, except on chin and throat and a small inguinal area where they are creamy white to the roots; ears tawny ochraceous like sides; whiskers mixed brownish and whitish, no dusky spot at base and no orbital ring; forearm extensively ochraceous; feet creamy white; tail pale brownish (near broccoli brown) above, creamy white below. Young: Similar to adults but slightly paler; ears thickly haired and conspicuously bright ochraceous.

Skull.—Somewhat similar in general form to that of *leucopus* but relatively broader; braincase rather full, somewhat elevated; nasals rather short, usually somewhat compressed posteriorly; rostrum

rather broad, particularly across lacrymals; interpterygoid fossa broad and nearly square-angled anteriorly; posterior palatine foramina about opposite middle of m_2 , decidedly nearer to interpterygoid fossa than to plane of front of m_1 ; molar teeth peculiar (see subgeneric diagnosis).

Measurements.—Average of 10 adults from the Dismal Swamp, Virginia: Total length, 181 (170–190); tail vertebra, 85 (80–93); hind foot, 19.7 (19–20); ear from notch (dry), 15.5 (14.4–16.4).

Type specimen.—Not known to be in existence.

Remarks.—The many characters of this species make it unmistakable. To those unfamiliar with it the color of the ears alone will serve as a means of certain identification, for it is the only species in the genus having ochraceous ears, the same color as the body. It is perhaps best known under the name *aureolus*, which has long been in use. The name *nuttalli*, employed by Baird in 1857 and then discarded by later authors, was revived by Bangs in 1898. The original description by Harlan does not mention any characters that are diagnostic; indeed it states that the animal was “fawn-coloured above, whitish beneath,” which really applies better to *leucopus* than to this species. However, a colored figure published two years later by the same author more nearly represents this species than *leucopus* or *gossypinus*, the only others which might have been found at Norfolk, the type locality. It represents a mouse with ears colored like the body and with the underparts washed with buffy. It shows also the body color extending entirely over the feet, a peculiarity not found in any of the species and which might be taken to discredit the figure altogether. Since, however, nothing definite can be proved it seems best to follow current usage and allow the name *nuttalli* to stand for the species under consideration. Specimens from the Dismal Swamp, Virginia, only a few miles from Norfolk, are larger and have larger molar teeth than specimens from more southern localities and seem subspecifically separable. The name *nuttalli* therefore will stand for this northern form, and for the southern and more widely ranging form the well-known name *aureolus* is available.

Specimens examined.—Total number 90, from localities as follows:

Kentucky: Eubanks, 7.

North Carolina: Asheville, 1; Bancombe, 3; Highlands, 1; Magnetic City, foot of Roan Mountain, 7; Weaverville, 20.

Tennessee: High Cliff, 1; Knoxville, 1.

Virginia: Dismal Swamp, 40.

PEROMYSCUS NUTTALLI AUREOLUS (AUD. AND BACH.). SOUTHERN GOLDEN MOUSE.

Mus (Calomys) aureolus Audubon and Bachman, Proc. Acad. Nat. Sci., I, pp. 98–99, 1841.

Peromyscus aurcolus Trouessart, Catal. Mamm., p. 517, 1897,

Type locality.—"In the oak forests of South Carolina."

Geographic distribution.—Southeastern United States from North Carolina to northern Florida; west to eastern Texas and Oklahoma. Lower Austral zone.

Characters.—Similar to *nuttalli*, but averaging smaller; skull and molar teeth smaller.

Color.—As in *nuttalli*; at the extreme of its range possibly averaging very slightly paler.

Skull.—Similar to that of *nuttalli*, but smaller and narrower actually and relatively; molar teeth quite decidedly smaller.

Measurements.—Average of 7 adults from Milton, Fla.: Total length, 172.5 (164–184); tail vertebræ, 83 (80–88); hind foot, 18.8 (17–20); ear from notch (dry), 14.1 (13.4–14.6). Of a large male from Augusta, Ga.: Total length 175; tail vertebræ 90; hind foot 19; ear from crown 11.5; ear from notch 17.

Type specimen.—Not known to be extant.

Remarks.—The amount of difference between this form and typical *nuttalli* is not great, but is reasonably constant in the material thus far examined. Two small series from Eubanks, Ky., and Magnetic City, N. C., respectively, have been referred to *nuttalli* on account of their rather large teeth. Their skulls, however, are not very large, and it is not improbable that larger series from these localities would prove to be more or less intermediate. A large series from Raleigh, N. C., seems referable to *aureolus*, though somewhat intermediate.

Specimens examined.—Total number 160, from localities as follows:

Alabama: Brewton, 1; Huntsville, 1; Mobile Bay, 1.

Arkansas: Beebe, 1.

Florida: Enterprise, 2; Gainesville, 2; Jacksonville, 1; Milton, 8; New Berlin, 1; San Mateo (16 m. southeast), 1; Tallahassee, 3; Whitefield, 6.^a

Georgia: Augusta, 8; Hoschton, 1; Pinetucky, 6; Riceboro? ("Southern States," Leconte), 1.

Louisiana: Mansfield, 1.

Missouri: St. Louis, 1.

North Carolina: Apex, 2; Bertie County, 2; Chapanoke, 4; Raleigh, 92; Roanoke Rapids, 1.

Oklahoma: Redland, 2.

South Carolina: Calhoun Falls, 8; Charleston, 1; Columbia, 1.

Texas: Joaquin, 1.

Subgenus *PODOMYS* nobis.

Type.—*Hesperomys floridanus* Chapman (= *Peromyscus floridanus*).

Subgeneric characters.—Plantar tubercles of hind foot 5 instead of 6, as in the other subgenera of *Peromyscus*; digital tubercles 3, phalangeal 2, the latter much reduced in size and subcircular in shape.

^a Carnegie Museum.

Molar teeth slightly more hypsodont than in *Peromyscus*, less so than in *Onychomys*; accessory tubercles in salient interangles of molars very small, as seen in transverse section, never forming a loop which extends to the outer edge of the tooth, as in *Peromyscus*. *Mammæ*: 6 (i., $\frac{2}{3}$, a., $\frac{1}{3}$, p., $\frac{1}{4}$).

Species.—One, the type only.

Remarks.—The constancy of the number and relative size of the plantar tubercles throughout the genus *Peromyscus* is so great that the decided departure shown by *P. floridanus* must be considered of more than specific importance. In other respects the species does not differ so greatly from *Peromyscus*, although its skull is well characterized specifically, and its teeth are somewhat peculiar. The reduction in the number of plantar tubercles and the large, slightly more hypsodont teeth suggest the possibility that this form may be intermediate between *Peromyscus* and *Onychomys*.

Fresh or alcoholic specimens are necessary for an appreciation of the character of the plantar tubercles, as in dry specimens the tubercles are so much distorted that their character, or even their number, may be mistaken.

PEROMYSCUS FLORIDANUS (CHAPMAN).

(Pl. V, fig. 14; pl. VI, figs. 6-6a; pl. VII, fig. 1; pl. VIII, fig. 8.)

Hesperomys floridanus Chapman, Bull. Am. Mus. Nat. Hist., N. Y., II, p. 117, June, 1889.

Hesperomys macropus Merriam, N. Am. Fauna No. 4, pp. 53-54, Oct. 8, 1890. Lake Worth, Florida.

Peromyscus floridanus Bangs, Proc. Biol. Soc. Wash., X, p. 122, 1896.

Type locality.—Gainesville, Fla.

Geographic distribution.—The central part of peninsular Florida from coast to coast.

Characters.—Size large (hind foot 25-27); tail shorter than head and body; ears large and thinly haired; proximal fifth of sole of hind foot hairy, remainder nearly naked; plantar tubercles 5 (see subgeneric diagnosis); color paler than in *leucopus* or *gossypinus*.

Color.—Unworn pelage: Top of head, neck, back, and upper sides pale ochraceous buff finely mixed with dusky, producing a pale grayish-cinnamon effect; lower sides from nose to base of tail rich ochraceous buff, very lightly or not at all mixed with dusky; subauricular tufts mixed pale ochraceous buff and dusky; thin hairiness of outside of ears dusky, of inside whitish; underparts creamy white, often with an ochraceous buff pectoral spot; feet and forelegs chiefly white, upper side of hind feet somewhat dusky at base; tail brownish dusky above, creamy white below. Worn pelage: Similar to unworn pelage, but sides more broadly ochraceous and back less dusky; tail often dingy and very indistinctly bicolor. Adolescent pelage;

Scarcely different from adult pelage, possibly a little more dusky with sides less broadly ochraceous. Young in first coat: General effect of upperparts varying from smoke gray to drab gray, shading into mouse gray on middle of back.

Skull.—Size large and depth relatively great; supraorbital border rather sharp and shelf like; posterior end of nasals slightly exceeding ascending branches of premaxillaries; palatine slits rather short and expanded; interpterygoid fossa rather wide and nearly right-angled anteriorly. Molars large and broad, the tubercles considerably elevated; accessory tubercles between outer salient angles small or scarcely evident.

Measurements.—Average of 10 adults from Fort Gardner, Fla.: Total length, 199.8 (190–221); tail vertebræ, 86.2 (80–95); hind foot, 26.6 (26–27.5); ear from notch, 22.5 (22–25).

Type specimen.—No. 1812 American Museum of Natural History, New York. Skin without skull. Immature. Sex (?). Oct., 1888. J. H. P. Bell. Skin in rather poor condition, both hind legs dangling, distal half of tail gone.

Remarks.—*P. floridanus* is the largest species of *Peromyscus* native in the eastern United States. This fact alone serves to distinguish it without reference to its subgeneric characters. The limited distribution of this very distinct form suggests that it may be one of the well-known stranded forms representing a group of former wide distribution. Of its habits in Florida, Bangs says:^a

It lives only in the higher sandy ridges, where there is plenty of black-jack oak and turkey oak, and where the bare white sand is in places covered by scattered patches of scrub palmetto. It is the characteristic small mammal of such places, commonly known as 'black-jack ridges,' and I have never found it elsewhere.

Specimens examined.—Total number 147, from localities as follows:

Florida: Anastasia Island, 8; Blitch Ferry, 1; Canaveral, 2; Citronelle, 4; Crystal River, 1; Eau Gallie, 5; Enterprise, 69; Fort Gardner, Kissimee River, 29; Gainesville, 2; Lake Worth, 8; Micco, 9; Miami, 3; Ocklawaha River, 2; Sebastian, 1; Tarpon Springs, 3.

Subgenus **HAPLOMYLOMYS** Osgood.

Haplomylomys Osgood, Proc. Biol. Soc. Wash., XVII, pp. 53–54, fig. 1, Mar. 21, 1904.

Type.—*Hesperomys eremicus* Baird (= *Peromyscus eremicus*).

Characters.—Tail rather long, always longer than head and body; plantar tubercles 6; mammæ 4 (i., $\frac{2}{3}$, a., $\frac{2}{3}$, p., $\frac{2}{3}$); skull with cranium rather large and rostral region relatively weak; first and second upper molars usually with three salient and two reëntrant outer angles at all stages of wear; accessory tubercles between outer pri-

^a Proc. Bost. Soc. Nat. Hist., XXVIII, p. 194, Mar., 1898.

mary tubercles very rudimentary or absent; lower molars correspondingly simple. (See Pl. VIII, figs. 3-4).

Species.—*P. eremicus*, *P. californicus*, *P. goldmani*, and *P. crinitus*.

Remarks.—The simple character of the molar teeth is usually diagnostic of this group. No accessory cusps are evident either in transverse or longitudinal views of the molars, except in *P. crinitus*, and in this species they are extremely reduced. The presence of these accessory cusps in the other subgenera is, however, not always obvious at all stages of wear. Therefore it often requires close examination to determine properly the position of individual specimens. The external appearance of the members of this subgenus is slightly peculiar but not readily described, although experienced workers find little difficulty in its recognition. *P. californicus* and *P. eremicus* are usually recognized by their naked or nearly naked soles, but this peculiarity does not extend to *P. crinitus* and *P. goldmani*. *P. crinitus* is the most aberrant member in this group on account of the approach to the subgenus *Peromyscus* indicated by its molar teeth, but since it has only two pairs of mammae it seems best to include it here.

Key to species of the subgenus Haplomylomys.

ADULTS.

Size large; hind foot 25-29.....	<i>P. californicus</i>
Size smaller; hind foot 19-24.	
Hind foot 19-22.	
Zygomata compressed anteriorly; nasals attenuate, slightly or not at all exceeded by premaxilla.....	<i>P. crinitus</i>
Zygomata less compressed anteriorly; nasals broader and flatter; decidedly exceeded by premaxilla.....	<i>P. eremicus</i>
Hind foot 22-24; sides of head ochraceous.....	<i>P. goldmani</i>

Key to subspecies of *Peromyscus crinitus*.

Size smaller; hind foot 19-20; greatest length of skull usually less than 24; color pale. Southern Nevada to northern Lower California.....	<i>P. c. stephensi</i>
Size larger; hind foot 20-21; greatest length of skull usually more than 24; color not so pale. Great Basin region from Oregon and Idaho to Arizona and New Mexico.	
Color more buffy ochraceous with a minimum of dusky mixture.....	<i>P. c. auripectus</i>
Color more grayish with a larger mixture of dusky.....	<i>P. crinitus</i>

PEROMYSCUS CRINITUS (MERRIAM). CANYON MOUSE.

(Pl. III, fig. 9.)

Hesperomys crinitus Merriam, N. Am. Fauna, No. 5, pp. 53-54, July 30, 1891.
Peromyscus truci crinitus Trouessart, Catal. Mamm. Viv. et Foss., p. 517, 1897.
Peromyscus crinitus scitulus Bangs, Proc. New Eng. Zool. Club, I, p. 67, July 31, 1899.—Gardnerville, Nev.
Peromyscus crinitus Bangs, *supra cit.*

Type locality.—Shoshone Falls, Snake River, Idaho.

Geographic distribution.—Rocky cliffs and canyons of southern Idaho, eastern Oregon, eastern California, northern Nevada, and northwestern Utah. Upper Sonoran zone.

Characters.—Size medium; tail longer than head and body, thickly covered with long, soft hairs, terminating in a distinct pencil; ears rather large; pelage usually long and lax; hind foot hairy on proximal fourth or naked in median part to calcaneum; skull with rather wide, shallow braincase, and long, slender nasals.

Color.—Adult in new fall pelage: Upperparts pale ochraceous buff uniformly mixed with dusky; forehead, nose, and upper face slightly grayish; underparts white, frequently with a faint pectoral spot of buff; tail bicolor, sooty blackish above, white below; hands and feet white. Immature: Less buffy than adult, general color more grayish.

Skull.—Braincase broad and somewhat flattened; zygomata compressed anteriorly; rostrum slightly depressed and more or less

rounded dorsally; nasals long and somewhat compressed posteriorly; ascending branches of premaxillæ usually attenuate and rarely exceeding nasals; auditory bullæ moderate; molar teeth with accessory tubercles between outer angles very small and inconspicuous, worn teeth often showing same simple enamel pattern as in *P. eremicus*.

Measurements.—Average of 9 topotypes: Total length, 176 (172–184); tail vertebræ, 95 (92–97); hind foot, 21; ear from notch (dry), 16.3 (15.4–17.5).

Type specimen.—No. 31111 U. S. National Museum, Biological Survey Collection. ♂ adult. Oct. 10, 1890. C. Hart Merriam and Vernon Bailey. Specimen in good condition.

Remarks.—*P. crinitus* is a very distinct species confined chiefly to the Great Basin region. It is apparently rare, for it has been obtained at only a small number of localities and in limited numbers. Externally it is characterized by soft silky pelage, much as in *P. eremicus*, and by a hairy crested tail. It appears to be more closely related to *P. eremicus* than to any other species and apparently connects *Peromyscus* proper and *Haplomylomys*. It is referred to *Haplomylomys* because it has four mammae, as in the other species of *Haplomylomys*, instead of six as in the subgenus *Peromyscus*. Many specimens show the simple enamel pattern as in *P. eremicus* and *P.*

FIG. 10.—Distribution of *Peromyscus crinitus* and subspecies.

californicus, but examination of large series of all ages proves the existence of the small tubercles as in typical *Peromyscus*, but so reduced in size as to be almost obsolete. *P. crinitus* may be distinguished from *cremicus*, regardless of other characters, by the rostral part of the skull. In *crinitus* the rostrum is more elongate, depressed, and rounded; the zygomatics are much more compressed anteriorly; and the premaxillae do not exceed the posterior ends of the nasals. The pelages of *crinitus* differ chiefly in the amount of dusky admixture present. The new fall pelage is strongly dusky and the general effect of the upperparts is decidedly grayish. In summer (June and July) specimens become worn, the dusky fades to brownish, and the buff or ochraceous buff ground color becomes dominant. Immature specimens are invariably grayish in general color.

P. crinitus scitulus seems to be the same as *crinitus*, having been based on August specimens in which the pelage appears more fulvous than in the Shoshone Falls specimens taken in October.

Specimens examined.—Total number 63, from localities as follows:

California: Amedee, 6; Colerille, 2; Susanville, 1.

Idaho: Shoshone Falls, 12; Silver Creek, 1.

Nevada: Anderson Ranch, Douglas County, 12; Elko, 1; Gardnerville, 9; Granite Creek, 3; Pyramid Lake, 4; Smoke Creek Desert, 1.

Oregon: Crooked River (20 m. southeast Prineville), 2; Harney, 4; Narrows, 1.

Utah: Beaver River, near Fort Cameron, 3; Parawan, 1 (not typical).

PEROMYSCUS CRINITUS AURIPECTUS ALLEN. BUFF-BREADED CANYON
MOUSE.

Sitomys auripectus Allen, Bull. Am. Mus. Nat. Hist., N. Y., V, pp. 75-76, Apr. 28, 1893.

Peromyscus auripectus Allen, Bull. Am. Mus. Nat. Hist., N. Y., VII, pp. 226-227, June 29, 1895.

Type locality.—Bluff City, San Juan River, Utah.

Geographic distribution.—Known from a limited number of localities in northeastern Arizona, southeastern Utah, and adjacent parts of Colorado and New Mexico.

Characters.—Similar in general to *P. crinitus*, but lighter colored and more buffy; tail heavily haired; skull as in *crinitus*.

Color.—Full winter pelage: Upperparts rich ochraceous buff, faintly lined with dusky on back, nearly clear on sides; head and face ochraceous buff; ears dusky brownish edged with buffy white; lanuginous ear tufts buffy sometimes mixed with white; underparts creamy white, frequently with a buffy ochraceous pectoral spot; entire underparts occasionally suffused with buffy; tail dusky brownish above, white below; hands and feet white.

Skull.—As in *P. crinitus*; possibly averaging slightly larger.

Measurements.—Average of 10 adult topotypes: Total length, 177.7 (174–182); tail vertebrae, 93 (89–98); hind foot, 20.8 (20–21); ear from notch (dry), 17.3 (16.6–18).

Type specimen.—No 1111 American Museum of Natural History, New York. ♀ adult. May 14, 1892. C. P. Rowley. Specimen in fair condition; skull with several slight imperfections.

Remarks.—In full winter pelage, this is a very attractive species. Its rich buff color is nearly unmixed with dusky and it is therefore quite conspicuous. It is really very closely related to *crinitus*, the chief difference being in color. Specimens from the Grand Canyon, Arizona, distinctly tend toward *P. c. stephensi*. The pectoral spot is variable and not always present. It is rather frequent among specimens from the type locality, but occurs in very few of a series from Holbrook, Arizona, and is then imperfectly developed. The Holbrook specimens, however, have a decided buffy suffusion throughout the underparts.

Specimens examined.—Total number 105, from localities as follows:

Arizona: Grand Canyon, near Mountain Spring, 9; Holbrook, 36; Keam Canyon, 9; Painted Desert, Little Colorado River, 4.

Colorado: Ashbaugh Ranch, 2; Coventry, 2; Grand Junction, 1;^a Mesa Verde, 1; Plateau Creek, 1.

New Mexico: Chaco Canyon 4.

Utah: Bluff City, 26; Cainesville, 1; Henry Mountains (east base Mount Ellen), 1; Noland Ranch, 4; Uncompahgre Indian Reservation, 4.

PEROMYSCUS CRINITUS STEPHENSI MEARNS. STEPHENS CANYON MOUSE.

(Pl. III, fig. 10.)

Peromyscus stephensi Mearns, Proc. U. S. Nat. Mus., XIX, p. 721, July 30, 1899.

Peromyscus petraeus Elliott, Field Col. Mus., Zool. Ser., III, p. 244, Jan., 1904.—Lone Pine, California.

Type locality.—"The lowest water, on the wagon road, in a canyon, at the eastern base of the Coast Range Mts., San Diego Co., California, near the Mexican Boundary Line."

Characters.—Similar to *P. auripectus*, but smaller and paler.

Geographic distribution.—Rocky situations in the Lower Sonoran zone from northeastern Lower California northward to the desert valleys and ranges of the Death Valley region and eastward across southern Nevada to southwestern Utah and northwestern Arizona.

Color.—General color much as in *P. eremicus*; ground color of upperparts pale ochraceous buff; facial region slightly grayish; a uniform mixture of dusky brownish covers upperparts except a narrow buff lateral line; underparts white or creamy white, occasionally with a buff pectoral spot. In worn pelages the amount and intensity of the dusky admixture varies greatly; in moderate wear

^a Collection of E. R. Warren.

the dusky changes to cinnamon and in extreme wear it almost entirely disappears, leaving only clear pale buff; the eyelids and whiskers are dusky at all times.

Skull.—Similar to that of *auripectus* but smaller; lighter and more frail throughout; zygomata much compressed anteriorly; rostrum attenuate; molar teeth small.

Measurements.—Type: Total length, 193; tail vertebrae, 108; hind foot, 19. Average of 10 adults from Funeral Mountains, California: Total length, 170 (161–176); tail vertebrae, 94 (88–101); hind foot, 20; ear from notch (dry), 16 15.3–16.5).

Type specimen.—No. 61026 U. S. National Museum. ♀ adult. May 9, 1894. Collected by Dr. E. A. Mearns. The specimen is in very worn pelage and therefore very pale; moreover, it is slightly overstuffed, which also increases paleness. The specimen is perfect except for two slight breaks in the skull, one in the right zygoma and the other in the left side of the basioccipital.

Remarks.—This species is not definitely distinguishable from *P. eremicus* by color alone, although one who has handled large numbers of each may become sufficiently expert to discriminate them accurately in the majority of cases. The hairiness of the tail is usually sufficient to distinguish *stephensi* from *eremicus*, and a comparison of skulls usually removes all doubt. The long attenuate rounded rostrum of *stephensi* is always easily recognized in contrast to the high, flat rostrum with truncate nasals and long premaxillae of *eremicus*. The species is not numerously represented from the region of the type locality, but was taken in very large numbers in the desert ranges of eastern California by the Death Valley Expedition. These northern specimens, when in the same pelage, do not differ from the type in color. The type has a somewhat longer tail and shorter hind foot than the average of the northern specimens, but may be exactly matched among them, so there seems no reason for recognizing *P. petraeus*, the type of which has been examined. *P. stephensi* intergrades with *P. crinitus* as well as with *P. auripectus*. In the immense series of this form examined great variation in shade of color occurs, due to the various stages of wear in the pelage. The extent to which dusky becomes cinnamon or brown or other shades results in endless slight variations in general effect. Some series are entirely bright cinnamon; others are pale buffy gray mixed with dusky, etc.

Specimens examined.—Total number 449, from localities as follows:

Arizona: Dolan Spring, 2; Tinajas Altas, 1.

California: Amargosa River, 2; Argus Mountains, 13; Barstow, 6; Benton, 1; Burns Canyon, San Bernardino Mountains, 1; Cave Camp, Pahump Valley, 6; Copper City, 5; Coso, 2; Coso Mountains, 2; Daggett, 1; Death Valley, 3; East base Coast Range, Mexican

boundary, 1; Emigrant Spring, 13; Funeral Mountains, 17; Granite Springs, 5; Grapevine Spring, 2; Independence Creek, 2; Inyo Mountains, 7; Kern River, 15 m. northeast of Bakersfield, 1; Little Owens Lake, 7; Lone Pine, 33; Lone Willow Spring, 21; Long Valley, 1; Ludlow, 4; Morana, 1; Morongo Pass, 2; Maturango Spring, 14; New York Mountain, 4; Oro Grande, 14; Owens Lake, 4; Palm Springs, 8; Panamint Mountains, 113; Pilot Knob, near Yuma, 1; Providence Mountains, 2; Resting Springs, 10; San Felipe Valley, 2; Saratoga Springs, 17; Shepherd Canyon, 8; Twelve Mile Spring, 4; Victor, 5; 35 miles south of Victor, 2; Warrens Well, 1; White Mountains, 1; Wild Rose Spring, 6.

Lower California: Canyon Esperanza, 2; Cocopah Mountains, 2; Signal Mountain, 1.^a

Nevada: Ash Meadows, 3; Charleston Mountains, 16; Gold Mountain, 2; Grapevine Mountains, 13; Pahroc Spring, 2; Pahrump Valley, 9; Thorp Mill, 8.

Utah: St. George, 11; Santa Clara, 2.

Key to subspecies of *Peromyscus californicus*.

Size larger; molars heavier. Central California.....*P. californicus*
 Size smaller; molars weaker. Southern and Lower California.....*P. c. insignis*

PEROMYSCUS CALIFORNICUS GAMBEL. PARASITIC MOUSE.

(Pl. VI, fig. 5; pl. VIII, fig. 4.)

Mus californicus Gambel, Proc. Acad. Nat. Sci. Phila., IV, p. 78, August, 1848.
 [*Hesperomys*] *parasiticus* (Cooper), Baird, Mamm. N. Am., U. S. Pac. R. R. Reports, VIII, p. 479, 1857.—*Nomen nudum*.

P[eromyscus] californicus Thomas, Ann. & Mag. Nat. Hist, ser. 8, XIV, p. 364, Nov., 1894.

Type locality.—Monterey, California.

Geographic distribution.—Upper Sonoran and Transition zones of the coast region of California from San Francisco Bay south to the vicinity of Santa Barbara, where intergradation with subspecies *insignis* occurs.

General characters.—Size very large, exceeding all other species in the United States; color dark, buffy pectoral spot frequently present; pelage long and lax; sole of pes naked to end of calcaneum (occasionally very narrowly naked or covered medially by ends of lateral-rooted hairs on tarsus between end of metatarsals and end of calcaneum); tail longer than head and body, well haired, but annulations not thoroughly concealed; ears very large and leafy, very thinly haired within and without; skull of moderate size and regular proportions; first and second upper molars without cusplets between outer angles between tubercles.

Color.—Topotype No. 31978 (Fresh winter pelage; date Oct. 1; second molt nearly complete): Ground color of upperparts russet (more grayish on back and more ruddy on sides) blending with

^a Collection of F. Stephens.

broccoli brown on head, except cheeks, which are bordered below by a light line of russet; orbital ring dusky; upperparts everywhere much mixed with black, which is somewhat concentrated in middle of back; sides much paler in general effect than back; underparts creamy white, except base of tail, which is russet; forelegs pale russet, becoming dusky near end of carpus; manus white; pes white with a short dusky stripe extending down from hind leg; tail bicolor, black and white not sharply contrasted. Worn summer pelage (represented by No. 35405, Mountain View, Calif., Aug. 3): Upperparts cinnamon heavily mixed with Mars brown, back only slightly darker than sides; underparts 'bluish' white.

Skull.—Size large; proportions regular; nasals moderate, relatively shorter than in *P. sithkensis*; braincase rather full; audital bullæ large; molar teeth heavy; enamel pattern as shown in partly worn teeth with two simple involutions on outer sides of first and second molars.

Measurements.—Average of 10 adult topotypes: Total length, 243 (238–260); tail vertebrae, 133 (127–146); hind foot, 27 (26–29); ear from notch (dry), 22.3 (21.3–23.5).

Type specimen.—The specimen upon which the original description of *Mus californicus* was based was lost before it reached any museum. In his description, Gambel says of it:

I captured but a single specimen of this species in a field near Monterey, upper California, which, with those of the former [*Dipodomys agilis*], I had the misfortune to lose.

Remarks.—This mouse easily ranks as the largest species of the genus in the United States. The only other California species with which it might be confused is *P. truei*, as a very large example of *truei* is sometimes found which in size approximates many small examples of *californicus*. This is particularly true of the skulls, which are sometimes almost exactly alike in size and contour. They may always be distinguished, however, by the dentition, as the rudimentary cusps in the lateral angles of the molars are well developed in *truei* and entirely absent in *californicus*. Specimens from within the range above defined vary somewhat. Those from Monterey, the type locality, fortunately represent neither extreme as regards either size or intensity of color. The characters of *californicus* which distinguish it from *insignis* (large size and dark color) are accentuated in specimens from Boulder Creek and other localities in the Santa Cruz Mountains. On the other hand, specimens from several localities in Santa Barbara, Ventura, and Los Angeles counties are referred to *californicus*, though unquestionably all are intermediate, and possibly some specimens from this region will prove to be actually more like *insignis* than *californicus*. Two immature and otherwise unsatisfactory specimens from Three Rivers and Cain Flat are some-

what doubtfully referred to *californicus*. These are the only records of the species from any part of the Sierra Nevada.

As shown by Allen,^a females of this species are slightly larger than males, as in most species of the genus. The presence of a fulvous pectoral spot is more usual in *californicus* than in *insignis*. In many individuals it is entirely absent, while others show all degrees of its development from a mere trace to entire occupation of the ventral surface. The tendency to a white tip at end of tail is also somewhat irregular. In a series of 18 adults from Monterey, 4, or about 20 per cent, have white-tipped tails, which is the same percentage (40 out of 207) noted by Allen (loc. cit.) in a very large series. As a rule the amount of white is small, but the tails of No. 35408 from Mountain View and No. 107821 from Pescadero Creek have fully an inch of terminal white. The pelage changes of this species are not peculiar, but on account of the size of the animal they may be followed more readily than in the smaller species. The juvenile pelage is slate gray (No. 5, Ridgway). The first evidence of the adolescent pelage is a faint fulvous wash on the sides; this increases in intensity until the sides are clothed in new glossy pelage, while the middle of the back still remains dull plumbeous. The growths on the two sides usually approach each other and finally unite in the middle of the back, the occiput, nape, and rump being the last parts to acquire the new coat. In many cases this method of change is followed exactly and the line of demarcation between the juvenile and first adult pelage is sharply distinct from beginning to end and the whole process is easily followed; in others the last stages of change are almost imperceptible. This first adult condition of pelage is closely similar to the later full pelage as described above under *Color*. It is paler and less rufescent than the full pelage; the light subterminal zone of color in the hairs which determines the general body color is narrower, thus allowing more of the plumbeous undercolor to show through. The black tends to be well distributed instead of being somewhat concentrated in the middle of the back as in the full pelage. Immature pelages are to be found in almost every series of specimens, as the animals seem to breed throughout the year. Specimens of equal-sized young in soft plumbeous pelage have been examined as follows: Jan. 2 (Santa Paula); Feb. 18 (Santa Monica); April 29 (Twin Oaks); May 11 (San Diego); June 25 (Bear Valley); Aug. 1 (Mountain View); Oct. 25 (Santa Cruz Mountains); Nov. 12 (Dulzura); Dec. 27 (Pacific Grove). This includes nearly every month in the year and both northern and southern localities.

The molt of the adult is somewhat irregular and does not seem to be entirely dependent upon season. The majority of specimens seem

^a Bull. Am. Mus. Nat. Hist., N. Y., VIII, p. 267, 1890.

to indicate two molts, one in early summer and another in late fall. Both of these are very insidiously accomplished. The winter pelage is acquired late in October or November and persists until the following spring.

The name parasitic mouse, first given to this species by Doctor Cooper, refers to the habit of living in or about the large 'nests' or 'houses' of *Neotoma fuscipes*. Other mice also inhabit these places and *P. californicus* is found elsewhere; moreover, it is probable that only deserted nests are frequented, so that the species is not strictly speaking parasitic. As the habit is very characteristic of *P. californicus*, however, the name may well be retained.

Specimens examined.—Total number 698, from the following localities:

California: Alum Rock Park, 172; Arroyo Seco River, near Paraiso Springs, 3; Bear Valley, San Benito County, 9; Bear Basin, Monterey County, 3; Berkeley, 14; Big Basin, Santa Cruz County, 1; Big Pine Mountain, 1; ^a Boulder Creek, 5; Cain Flat, Mineral King Road, 1; Calabasas, 1; Carmel River, 14; Carpinteria, 2; Cone Peak, Monterey County, 4; Fort Tejon, 2; Fremont Peak, Gabilan Range, 4; Gaviota Pass, 1; near Gilroy, 1; Hueneme (10 miles east), 3; Indian Canyon, 2; ^a Indian Valley, Monterey County, 4; King City, 1; La Honda, 31; Las Virgenes Creek, 2; Little Pine Canyon, 2; ^a Mansfield, 1; Mayfield, 2; Menlo, 2; Mono Flats, 2; ^a Monterey, 20; Mount Hamilton, 21; Mountain View, 7; Nordhoff, 1; Pacheco Pass, 4; Pacheco Peak, 6; Palo Alto, 2; Paso Robles, 4; Upper Pescadero Creek, 14; Pillarcitos Lake, San Mateo County, 1; Pine Valley, near Tassajara Springs, 2; Point Pinos, 2; Portola, 242; Posts, 3; Pozo, 1; San Luis Obispo, 5; San Mateo, 2; San Pablo Creek, Contra Costa County, 1; San Rafael Mountains, 2; ^a near San Simeon, 4; Santa Barbara, 1; Santa Monica, 3; Santa Paula, 12; head of Santa Ynez River, 3; ^a Stanford University, 7; Soledad, 1; Sur, 2; Sur River, near mouth, 4; Tassajara Springs (6 miles south), 10; Tejon Canyon, 4; Three Rivers, 1; Ventura River, 7; Woodside, San Mateo County, 7; Zaca Lake, 2.^a

PEROMYSCUS CALIFORNICUS INSIGNIS RHOADS. SOUTHERN PARASITIC MOUSE.

Peromyscus insignis Rhoads, Proc. Acad. Nat. Sci. Phila. (1895), pp. 33–34, Mar. 19, 1895.

Peromyscus californicus insignis Mearns, Bull. No. 56, U. S. Nat. Mus., p. 429, Apr. 13, 1907.

Type locality.—Dulzura, San Diego County, Calif.

Geographic distribution.—Upper and Lower Sonoran zones of the western valleys and foothills of southwestern California and thence south into northern Lower California.

Characters.—Similar to *Peromyscus californicus*, but slightly smaller and paler; skull smaller; molar teeth lighter.

^a Santa Barbara County.

Color.—Very similar to that of *P. californicus*, but averaging very slightly paler; rufous shades generally less intense; pectoral spot usually faint or absent; rufous at base of tail nearly obsolete; plumbeous undercolor paler; black-tipped hairs in middle of back less numerous.

Skull.—Similar to that of *P. californicus* but smaller; teeth smaller and lighter; anterior palatine foramina shorter; audital bullae very slightly smaller.

Measurements.—Average of 6 adult topotypes: Total length, 233 (220–245); tail vertebrae, 134 (124–140); hind foot, 25; ear from notch (dry), 20.3 (20–20.7).

Type specimen.—No. 8308 Collection Academy of Natural Sciences, Philadelphia; formerly No. 1308 Collection of S. N. Rhoads. ♂ adult. August 21, 1893. C. H. Marsh. Skin in good condition, underparts slightly greasy; skull with interparietal slightly indented and broken.

Remarks.—Typical *insignis* may be easily distinguished from typical *californicus* by its smaller size and light skull and teeth. The difference in color is slight, and therefore comparison should be confined to specimens absolutely comparable as regards both age and pelage. Fully adult specimens in winter pelage may be found that are practically indistinguishable. The first or young adult pelage of *insignis* is usually paler than in *californicus*; the worn and wearing summer pelage is also a trifle paler. However, it is possible to find specimens of each form so nearly alike in all pelages that it seems only safe to say that the tendency to a gray phase is stronger in *insignis*. *P. insignis* is more apt to be mistaken for *P. truei* than is *P. californicus*, but as stated under *californicus*, the dentition furnishes characters which are unmistakable.

Specimens examined.—Total number 251, from localities as follows:

California: Banning, 2; Cajon Pass, 7; Campo, 6; Coahuila Mountain, Riverside County, 1; Densmores, Riverside County, 1; Dulzura, 80; Glendora, 3; Grapeland, 3; Jacumba, 5; Jamul Creek, 2; La Jolla, 3; La Musa, 1; Mountain Spring, 2; Radec, 3; San Bernardino Peak, 5; San Bernardino Valley, 2; San Diego, 10; San Gabriel Mountains, 1; Santa Ana Mountains, 1; Santa Ysabel, 16; Temescal, 3; Twin Oaks, 18; Walker Basin, 1; ^a Witch Creek, 5.

Lower California: El Rayo, 2; Ensenada, 3; 20 m. east of Ensenada, 1; Juncolito Spring, 1; Las Encinas, 8; Nachoguero Valley, 22; Rancho Viejo, 2; Rosarito, 2; San Antonio, 6; San Pedro Martir Mountains, 2; San Quentin, 1; San Telmo, 4; San Ysidro Ranch, 1; Tecate Valley, 14; Trinidad, 1.

Key to subspecies of *Peromyscus eremicus*.

Habitat southern California.

Paler; underparts usually white. East of coast ranges.....*P. eremicus*
Darker; underparts usually buffy. West of coast ranges.....*P. e. fraterculus*

^a Collection of F. Stephens.

Habitat mainland of Lower California.

Underparts usually white.

Paler; tail shorter; molars large. Northeastern-----*P. eremicus*

Darker; tail longer; molars smaller. Southern -----*P. e. eva*

Underparts usually buffy with a pectoral spot. Northwestern-----*P. e. fraterculus*

Habitat islands off the coast of Lower California.

Underparts with an ochraceous buff pectoral spot.

Size larger. Cedros Island-----*P. e. cedrosensis*

Size smaller. Espiritu Santo Island-----*P. e. insulicola*

Underparts without pectoral spot.

Size larger; upperparts chiefly ochraceous. Cerralbo Island.

P. e. avitus

Size smaller; upperparts chiefly grayish. Margarita Island.

P. e. polypolius

Habitat Arizona, New Mexico, Texas, and Mexico.

Tail more or less bicolor.

Color paler; underparts white-----*P. eremicus*

Color darker; underparts white, often with a buffy

pectoral spot-----*P. e. anthonyi*

Tail dusky all around. Mexico-----*P. e. phœurus*

PEROMYSCUS EREMICUS (BAIRD). DESERT MOUSE.

(Pl. III, fig. 11; pl. VI, fig. 9; pl. VII, fig. 4; pl. VIII, fig. 3.)

Hesperomys eremicus Baird, Mamm. N. Am., Pac. R. R. Repts., VIII, pp. 479-480, 1857.

Peromyscus eremicus Allen, Bull. Am. Mus. Nat. Hist., N. Y., VII, p. 226, June 29, 1895.

Peromyscus eremicus arenarius Mearns, Proc. U. S. Nat. Mus., XIX, p. 138, May 25, 1896.—Near El Paso, Tex.

Peromyscus mcrriami Mearns, Proc. U. S. Nat. Mus., XIX, p. 138, May 25, 1896. Sonoyta, Sonora, Mex.

Type locality.—Old Fort Yuma, Calif., opposite Yuma, Ariz.

Geographic distribution.—Lower Sonoran zone of southeastern California and northeastern Lower California east of the mountain ranges as far south as the vicinity of San Luis Bay; eastward to western Texas, and south to border States of eastern Mexico; northward along the Colorado River, at least to the vicinity of the mouth of the Little Colorado, also extending from the Colorado River along the Virgin Valley to St. George, Utah, and northwestward, crossing southern Nevada, to the Death Valley region of California.

General characters.—Size medium; tail decidedly longer than head and body, finely annulated and closely covered with short hairs, with very slight or no pencil at tip; ears relatively large and leafy, very thinly haired or almost naked; sole of hind foot naked to end of calcaneum, at least medially; pelage soft and silky; color generally shades of rather pale buff; black lining and grizzling exceedingly fine and uniformly distributed over upperparts, not concentrated medially.

Color.—Adult topotype No. 60172, collected April 3, still in winter pelage: Ground color of upperparts ochraceous buff; entire dorsum with a fine sprinkling of dusky, this not concentrated at any point,

but uniformly distributed; a broad lateral line pure ochraceous buff; sides and top of head slightly grayish; tail dusky above, whitish below; underparts pure white or slightly tinged with yellowish or buff; traces of pectoral spot sometimes present. As the pelage wears, the black mixture in the upperparts becomes paler (brownish) and less distinct, and the ground color shows through more strongly. The lateral line is less sharply contrasted and gradually the entire upperparts become a dingy buff faintly sprinkled with cinnamon. Adolescent pelage: Similar in general to adult, but decidedly less buffy and more dusky, producing a general effect of pale drab; lateral line

narrow.

Skull.—Size medium; braincase rather high and somewhat elongate; infraorbital region well developed, much heavier than in *P. stephensi*; nasals rather broad, slightly concave near posterior endings; maxillaries always ending posterior to nasals; audital bullæ and anterior palatine foramina of moderate size.

Measurements.—

FIG. 11.—Distribution of *Peromyscus eremicus* and subspecies.

Average of 10 adults from northeastern Lower California, near the type locality: Total length, 183 (172–192); tail vertebrae, 101 (94–108); hind foot, 20.5 (20–21); ear from notch (dry), 17.5 (17.3–17.8). Three topotypes, respectively: 202, 193, 186; 107, 103, 96; 21, 21, 20.

Type specimen.—The original description of this species was based on 6 specimens, 3 from Fort Yuma, Cal., and 3 from Colorado Bottom, California, an indefinite locality, doubtless very near Yuma. Three of these are still in the U. S. National Museum in more or less imperfect condition. No. 14111, which, being the first mentioned, might naturally be considered the type, is represented by fragments of the skull only, the mandibular rami, a portion of one maxillary, and 5 loose teeth. The skin evidently has been lost or mislaid since Baird's work was done. No. 2575, which is in effect the type, is still preserved in alcohol and is in fairly good condition, having lost

but a small amount of hair on the sides and middle of the belly. Its skull has been removed and is practically perfect; the teeth are entirely unworn, indicating that the animal was scarcely adult. The third existing specimen, No. 1334, from Colorado Bottom, is a dry skin, somewhat distorted, but exhibiting the characters of the species very well; the fourth, from the same locality, is at present in the Museum of Comparative Zoology, Cambridge, Mass. If Fort Yuma be considered the type locality of *P. eremicus*, and there seems to be no reason why it should not, the above-mentioned alcoholic specimen No. 2575 becomes the type to all intents and purposes.

Remarks.—Typical *Peromyscus eremicus* occupies a comparatively extensive range in southern California, Arizona, New Mexico, and adjoining parts of Mexico, and is characteristic of the Lower Sonoran zone in this region. About the periphery of this range it intergrades with several more or less marked subspecies. More slightly characterized forms not recognized by name occur in several restricted areas, and throughout the range there are occasional slight variations in shade of color. It is easily distinguishable from the other species of the region, not only by its dentition, but by its long, terete, untufted tail and naked heels. It is very similar in color to *P. stephensi* but that species is smaller and has a penicillate tail. It does not undergo marked changes of pelage, and it molts in the same manner as *P. californicus*, of which it is scarcely more than a pale miniature. The form called *P. eremicus arenarius* appears to be too slight for recognition by name. A good series from the Franklin Mountains, Texas, near the type locality of *arenarius* reveals not the slightest difference in color from typical *eremicus* in exactly corresponding pelage. The only character is an exceedingly slight average decrease in the size of the ears. Another incipient form occurs in southern Utah, Nevada, and the Panamint and Death Valley region of California. The so-called *P. merriami* is, indeed, larger than typical *eremicus*, or at least larger than the majority of specimens from the habitat of typical *eremicus*, but only slightly larger, and not in the least different otherwise. The larger specimens of a series from one locality, Sonoyta, have been selected and called *merriami*, while the remaining smaller ones are unquestioned *eremicus*. Among the ten specimens identified by the original describer as *merriami* absolute uniformity in size does not obtain, or in other words there is a gradation from the smallest *eremicus* to the largest '*merriami*.' At other localities throughout the range of *eremicus* occasional specimens have been taken which are larger than the average and about the size of the Sonoyta specimens. Undenially there are more large individuals from Sonoyta than from any other locality, but it seems too much of an assumption that they are specifically distinct. Speci-

mens from Calamahue, Yubay, and neighboring localities in north-east Lower California are tentatively referred to *eremicus* although their slightly longer tails and creamy underparts seem to indicate a decided tendency toward *P. e. eva*.

Specimens examined.—Total number 824, from localities as follows:

Arizona: Adonde, 11; Beale Spring, 2; Big Sandy Creek, 2; Bill Williams River, 2; Colorado River at Boundary Monument No. 204, 16; Dolan Spring, 4; Ehrenberg, 1; Fort Grant, 7; Fort Huachuca, 8 (approaching *anthonyi*); Fort Lowell, 3; Fort Mohave, 4; Gila City, 9; Grand Canyon, 12; Granite Mountains, near Tule Wells, 1; Harper Ferry, 5; La Osa, 11; Little Meadows, 2; Mineral Park, 4; Mud Spring, 15; Nortons, 2; Painted Desert, 1; Phoenix, 2; San Pedro River, 1; Tinajas Altas, 9; Tucson, 1; Mountains near Tucson, 5; Tule Wells, 2; Willow Spring, 1; Yuma, 7.

California: Banning, 11; Barstow, 19; Big Laguna, 1; Colorado Bottom, 2; Daggett, 1; Death Valley, 3; Fort Yuma, 13; Furnace Creek, 5; Grapevine Ranch, 8; La Puerta, 10; Mohave Desert, east of Morongo Valley, 2; Morongo Pass, 10; Needles, 6; New River, 1; Oro Grande, 1; Palm Groves, 6; Palm Springs, 47; Panamint Mountains, 3; Panamint Valley, 36; Pilot Knob, 5; Providence Mountains, 9; Resting Springs, 59; San Felipe Canyon (approaching *fraterculus*), 11; San Felipe Valley, 1; 12-mile Spring, 2; Vallecitos, 2; Victorville, 1; ^a Warrens Well, 2; Whitewater, 8.

Nevada: Amargosa River, 4; Ash Meadows, 28; Bunkerville, 2; Charleston Mountains, 6; Colorado River, Lincoln County, 2; Pahrump Valley, 32; St. Thomas, 1; Vegas Valley, 6.

New Mexico: Carlsbad, 5; Jarilla, 1; Organ Mountains, 7; San Andres Mountains, 6; Tularosa, 10; Mal Pais Spring, 25 miles north of Tularosa, 3.

Texas: Boquillas, 1; Chinute Mountains, 1; Comstock, 2; East Painted Cave, 1; Franklin Mountains, near El Paso, 19; Marfa, 10; near El Paso, 21; Langtry, 2; Presidio County, 3; Sierra Blanca, 2; Terlingua, 1.

Utah: St. George, 7; Santa Clara, 9.

MEXICO:

Chihuahua: Chihuahua, 31; Escalon, 10; near Fort Bliss, Tex., 1; Santa Rosalia, 4; Torreón, 1.

Coahuila: Carneros, 2 (aberrant); Jaral, 8; Jimulco, 6 (approaching *phæurus*); Monclova, 8.

Durango: Inde, 1.

Lower California: Agua Dulce, 1; ^b Black Mountain, 1; Calamahue, 4; ^b Cocopah Mountains, 6; Esperanza Canyon, 12 (approaching *fraterculus*); Gardner Lagoon, 2; Hardy River, 5; Matomi, 5; Palomar, 4; Parral, 6; The Remada, 6; Rosarito Divide, 1; San Francisquito, 16; ^b Seven Wells, 1; Yubay, 5.^b

Nuevo Leon: Sierra Encarnación, 1 (aberrant).

Sonora: Cerro Blanco, 3; Poso de Luis, 6; Providencia Mines, 11; Quitobaquito, 14; Sonoyta, 15.

^a Collection of J. Grinnell. ^b Approaching *P. e. eva*.

PEROMYSCUS EREMITICUS FRATERCULUS (MILLER).

Vesperimys fraterculus Miller, Am. Nat., XXVI, pp. 261-265, March, 1892.

Sitomys eremicus fraterculus Rhoads, Am. Nat., XXVII, p. 833, Sept., 1893.

Sitomys herroni Rhoads, Am. Nat., XXVII, pp. 832-833, Sept., 1893.—Reche Canyon, San Bernardino County, Calif.

Sitomys herroni nigellus Rhoads, Proc. Acad. Nat. Sci. Phila., pp. 257-258, Oct. 23 1894.—W. Cajon Pass, San Bernardino County, Calif.

[*Peromyscus*] *fraterculus* Trouessart, Catal. Mamm. pt. III, p. 515, 1897.

Peromyscus eremicus fraterculus Allen, Bull. Am. Mus. Nat. Hist., N. Y., X, p. 154, 1898.

Peromyscus homochroa Elliot, Field Col. Mus., Chicago, Zool. Ser., III, pp. 158-9, Apr., 1903.—San Quentin, Lower California.

Type locality.—Dulzura, San Diego County, Calif.

Geographic distribution.—Extreme southwestern California, west of the mountains from the vicinity of Los Angeles south to northwestern Lower California.

General characters.—Similar to *P. eremicus*, but decidedly darker; more reddish brown in summer, more blackish in winter; underparts creamy or buff instead of pure white; tail somewhat longer.

Color.—Cotype in winter pelage: Ground color of upperparts cinnamon rufous richly sprinkled with black, which is somewhat concentrated in middle of back; head with more or less grayish, particularly in postorbital region; underparts creamy white with a small rufous pectoral spot. No. 34086, San Diego, Calif., in slightly worn 'left-over' winter pelage: Ground color cinnamon-rufous, as in winter pelage; tips of hairs not black, but brown or brownish dusky, producing a more rufescent general effect than in the winter pelage.

Skull.—Practically as in *P. eremicus*.

Measurements.—Average of 3 specimens—2 cotypes and 1 topotype: Total length, 191; tail vertebrae, 112; hind foot, 20.

Type specimen.—A male and a female type were designated by the describer of this species in accordance with the one-time idea that this was desirable. At present these may be considered as cotypes of equal importance, or the male may be selected for a type, as has been done frequently by ornithologists in similar cases. Both specimens, Nos. $1\frac{2}{3}1\frac{1}{4}$ (♂) and $1\frac{1}{8}1\frac{5}{8}$ (♀), formerly in the private collection of Gerrit S. Miller, jr., are now in the British Museum.

Remarks.—*P. e. fraterculus* is a very well-marked subspecies. Typical specimens are so much deeper colored than *eremicus* that they are recognizable at a glance. It is geographically separated from *eremicus* by a more or less continuous range of mountains, in the interdigitating canyons of which intermediate specimens are found, some nearer to *fraterculus* and others referable to *eremicus*. Among such intermediates are those from Reche Canyon which have been called '*herroni*' and which are easily referable to *fraterculus* unless

such slight intermediates without definite range are to be recognized. The type of *herroni* is nearer *fraterculus* than most others from the San Bernardino Mountains, since it has the entire underparts suffused with buff, a condition never found in typical *eremicus*. '*P. h. nigellus*' appears to be identical with *fraterculus*. *P. e. fraterculus* ranges south along the coast of Lower California and meets *P. e. eva*, the specimens called '*propinquus*' being almost exact intermediates.

Specimens examined.—Total number 230, from localities as follows:

California: Aguanga, 3; Burbank, 1; Cajon Pass, 4; Campo, 3; Chihuahu Mountains, San Diego County, 1; Dulzura, 10; Glendora, 1; Hueneme (9 m. east), 2; Jamul Creek, near El Nido, 13; Jacumba, 11; Lytle Creek, 1 (approaching *eremicus*); Mountain Spring, 11 (approaching *eremicus*); Nordhoff, 1; Rader, 1; Reche Canyon, 10 (approaching *eremicus*); Redlands, 1; Riverside, 10; Rose Canyon, San Diego Co., 4; San Bernardino, 2; San Bernardino Valley, 19 (approaching *eremicus*); San Diego, 8; San Fernando, 5; Santa Ysabel, 8; Summit, Coast Range, San Diego County, 1; Temescal, 2; Mouth Tia Juana River, 2; Twin Oaks, 2; West Riverside, 2.

Lower California: Canyon Salado, 1; Ensenada, 4; Las Encinas, 2; Nachoguero Valley, 1; Piñon, 2; Rancho Viejo, 3; San Antonio, 7; San Antonio River, 8; San Fernando, 11; San Matias Spring, 9; San Quentin, 19; Socorro, 1; Tecate Valley, 14; Trinidad, 8; Valladores, 1.

PEROMYSCUS EREMICUS CEDROSENSIS ALLEN. CERROS ISLAND MOUSE

Peromyscus cedrosensis Allen, Bull. Am. Mus. Nat. Hist., N. Y., X, pp. 154-155, Apr. 12, 1898.

Type locality.—Cerro Island, off west coast of central Lower California.

Geographic distribution.—Cerro Island, Lower California.

General characters.—Similar to *P. e. eva*; color averaging slightly darker and richer; paler than in *P. e. fraterculus*; ears smaller; skull slightly larger with longer nasals.

Color.—Similar to that of *fraterculus*, but averaging paler; lateral line rather broad and conspicuous ochraceous buff; pectoral spot usually present; underparts buffy; tail slightly lighter below than above.

Skull.—Much as in *P. e. fraterculus*, but with rostrum and nasals averaging longer and more slender; rostrum somewhat depressed; braincase high and rounded.

Measurements.—Average of 8 topotypes: Total length, 193 (181-200); tail vertebrae, 110 (106-114); hind foot (dry), 20; ear from notch (dry), 16 (15.5-16.5).

Type specimen.—No. 11111 American Museum of Natural History, New York. ♂ adult. April 1, 1897. A. W. Anthony. Skin in good condition; skull badly broken, lacking all the anterior part of the cranium; rostrum, nasals, and upper molars in good condition.

Remarks.—This insular form is almost identical in color with the mainland intermediates between *fraterculus* and *eva*. The material representing it is in rather poor condition and it is difficult to observe any characters of importance. It is perhaps nearer in color to *fraterculus* than to *eva*, since its underparts are buffy with a well-marked pectoral spot. The color of the upperparts is intermediate. The rather elongate rostrum is perhaps the best character observable in the material at hand.

Specimens examined.—Total number 11, all from the type locality.

PEROMYSCUS EREMICUS EVA THOMAS.

Peromyscus eva Thomas, Ann. & Mag. Nat. Hist., Lond., Ser. 7, I, pp. 44-45, Jan., 1898.

Peromyscus eremicus propinquus Allen, Bull. Am. Mus. Nat. Hist., N. Y., X, p. 154, Apr. 2, 1898.—San Pablo Point, lat. 27° 20' N., Lower California.

Type locality.—San José del Cabo, Lower California, Mexico.

Geographic distribution.—Lower Sonoran zone of the central and southern part of the peninsula of Lower California, from Cape St. Lucas north to the vicinity of latitude 29° N., meeting the ranges of *P. eremicus* and *P. e. fraterculus*.

Characters.—Similar in general to *P. e. fraterculus*, but tail longer; pelage shorter and slightly harsher; color more rufescent; ears averaging slightly smaller; general appearance of a small *Oryzomys*; skull essentially as in *P. eremicus*.

Color.—Unworn pelage: Upperparts ochraceous buff copiously mixed with fine dusky lines uniformly distributed, except on lower sides; general effect of back between isabella color and cinnamon; lateral line usually distinct only from axillary region to hip, often widened on middle of side to a broad area of clear ochraceous buff; head, including nose, cheeks, and orbital region pale gray tinged with ochraceous; a narrow dusky orbital ring scarcely extending beyond eyelids; ears pale brownish, almost naked; underparts pure creamy white without pectoral spot; tail usually dusky above and slightly paler below, often quite uniform blackish all around; feet white, tarsal joints marked with dusky. Worn pelage: General effect of both sides and back bright ochraceous buff scarcely at all modified by the slight mixture of dusky cinnamon.

Skull.—Essentially as in *P. eremicus* and *P. e. fraterculus*, but averaging smaller with a smaller, narrower braincase and weaker molars.

Measurements.—Average of ten adults from Santa Anita: Total length, 198 (185-218); tail vertebrae, 114 (100-128); hind foot, 20.4 (20-21); ear from notch (dry), 16.6 (15.6-17.2).

Type specimen.—No. 98.3.1.88 British Museum. ♂ adult. July 29, 1896. Dane Coolidge. Specimen in good condition.

Remarks.—This is one of the most strongly marked forms of the *eremicus* series. Its resemblance to a small *Oryzomys* or some of the Mexican species of *Reithrodontomys*, as originally noted by Doctor Thomas, is quite striking. However, it can be ranked only as a subspecies of *eremicus*, for complete intergradation is found both with typical *eremicus* and with *P. e. fraterculus*. The supposed relationship to *aztecus* hazarded by Thomas after Coues is therefore out of consideration. Specimens from Cape St. Lucas northward to the vicinity of latitude 28° north are quite uniform in color and preserve the same general characters, the only important variation being in size. In this respect there is considerable variation in every series. The largest specimens are from Aguaje de Santana, from which locality the largest individual presents the following measurements: Total length, 228; tail vertebrae, 138; hind foot, 22. Other specimens from the same and neighboring localities do not differ materially from specimens of *eva* from the type locality. The supposed form called '*P. e. propinquus*' proves to be almost exactly intermediate between *eva* and *fraterculus*. Such a form can not be characterized and it can not be restricted to a definite range. It is placed under *eva* rather than *fraterculus* chiefly on account of its long tail. The difficulty of properly allocating such a form is well shown by a series of 6 specimens from San Andres. Three of these have white underparts without pectoral spots as in *eva*, while the remaining three have buffy underparts and pectoral spots as in *fraterculus*. The measurements, cranial characters, and color of upperparts are exactly intermediate. Specimens from Yubay, Calamahue, and San Francisquito apparently are intermediate between *eva* and typical *eremicus* and on the whole seem nearer *eremicus*. A skin without skull from Carmen Island may represent an undescribed form.

Specimens examined.—Total number 100, from localities as follows:

Lower California: Aguaje de Santana, 6; Calmalli, 2; Carmen Island, 1; Cape St. Lucas, 2; Comondu, 5; El Potrero, 3; La Paz, 1; Matancita, 2; Paso Hondo, 1; Pescadero, 1; Playa Maria Bay, 2 (approaching *fraterculus*); San Andres, 6 (approaching *fraterculus*); San Ignacio, 4; 20 m. west of San Ignacio, 9; San Jorge 6; San Jose del Cabo, 9; San Pablo Point, 4; Santa Anita, 23; Santa Clara Mountains, 2; Sierra Laguna, 4; Tres Pachitas, 4; Turtle (or San Bartolome) Bay, 3.

PEROMYSCUS EREMICUS INSULICOLA subsp. nov.

Type from Espiritu Santo Island, off east coast of southern Lower California, Mexico. No. 147010 U. S. National Museum, Biological Survey Collection. ♂ adult. Feb. 9, 1906. E. W. Nelson and E. A. Goldman.

Geographic distribution.—Confined to Espiritu Santo Island, Lower California.

Characters.—Similar to *P. e. eva*, but color slightly darker; pectoral region with an elongate stripe of ochraceous buff.

Color.—Much as in *P. e. eva*, but somewhat darker throughout; upperparts a deeper shade of ochraceous buff and mixture of dusky more copious, producing a more vinaceous general effect; underparts creamy white with a sharply defined elongate pectoral stripe extending backward to front of abdomen; tail chiefly dusky, scarcely lighter below than above.

Skull.—About as in *P. e. eva*; narrower and lighter, with weaker molars than in *avius*.

Measurements.—Two adult topotypes, respectively: Total length, 196, 200; tail vertebræ, 115, 113; hind foot, 20, 19.5; ear from notch (dry), 16.5, 16.7.

Remarks.—Although but few specimens from Espiritu Santo Island are available, they are so obviously different from *P. e. eva* of the adjacent mainland that it seems necessary to name them. The prominent pectoral spot and slightly darker upperparts distinguish them at once from typical *eva*, but in color they are very similar to specimens which are intermediate between *eva* and *fraterculus*. From these, however, they differ in having smaller skulls and weaker molars.

Specimens examined.—Total number 3, all from the type locality.

PEROMYSCUS EREMICUS AVIUS^a subsp. nov.

Type from Cerralbo Island, off east coast of southern Lower California, Mexico. No. 147024 U. S. National Museum, Biological Survey Collection. ♀ adult. Feb. 13, 1906. E. W. Nelson and E. A. Goldman.

Geographic distribution.—Confined to Cerralbo Island, Lower California.

Characters.—Similar to *P. e. eva*, but size slightly larger; ears smaller; color of underparts buffy instead of pure white; skull rather larger, with molar teeth relatively heavy.

Color.—Upperparts essentially as in *P. e. eva*, chiefly ochraceous buff mixed with fine lines of dusky, averaging slightly darker and richer than in *eva*; entire underparts except throat and inguinal region cream buff; tail quite definitely bicolor, blackish brown above, dull whitish below.

Skull.—Similar to that of *P. e. eva*, but larger and heavier; interparietal rather larger; molar teeth decidedly larger and heavier, about equaling those of *fraterculus*.

Measurements.—Average of 10 adult topotypes: Total length, 194 (186–209); tail vertebræ, 105 (100–116); hind foot, 21.6 (21.5–22); ear from notch (dry), 14.5 (13.4–16).

^a *avius*, out of the way; remote; unfrequented.

Remarks.—The principal characters distinguishing this form are its rather large size, small ears, buffy instead of white underparts, and large teeth. It is represented by a good series in which these characters are quite constant. Although the underparts are largely buffy, there is no indication of a pectoral spot. This form, therefore, differs from *insulicola* of Espiritu Santo Island in this respect as well as in its larger skull and teeth, etc.

Specimens examined.—Total number 17, all from the type locality.

PEROMYSCUS EREMICUS POLYPOLIUS subsp. nov.

Type from Margarita Island, off west coast of southern Lower California. No. 146074 U. S. National Museum, Biological Survey Collection. ♂ adult. Nov. 30, 1905. E. W. Nelson and E. A. Goldman.

Geographic distribution.—Confined to Margarita Island, Lower California.

Characters.—Somewhat similar to *P. e. eva*, but color much more grayish; skull with rostrum more depressed; braincase shorter and more inflated.

Color.—Unworn pelage: Upperparts from head to rump mixed gray, dusky, and pinkish buff, gray predominating on head, shoulders, and back and buffy becoming stronger toward rump; upper sides like back; lower sides broadly pinkish buff or pale ochraceous buff, this being reduced to a narrow streak on lower cheeks; underparts pale cream buff, never so nearly white as in *P. e. eva*; pectoral spot rarely developed; feet white, tarsal joints dusky, tail dusky above, dull whitish gray often mixed with dusky below. Worn pelage: Less grayish than unworn pelage; general effect of upperparts pinkish buff considerably modified by dusky and gray.

Skull.—Similar in general to that of *P. e. eva*, but rostrum more slender and more depressed; infraorbital part of zygomata weaker and more compressed; braincase relatively shorter, broader, deeper, and more inflated; molars slightly larger.

Measurements.—Average of 10 adult topotypes: Total length, 192 (183–200); tail vertebrae, 109.5 (100–117); hind foot, 19.5 (19–20); ear from notch (dry), 15.7 (14.6–16.8).

Remarks.—This form, like *margaritae* of the *maniculatus* group, is well distinguished from its relatives of the mainland. Its derivation from *P. e. eva* is scarcely to be doubted, however, and variation is occasionally sufficient to nearly or quite cover the characters shown by the majority of specimens. The gray color is quite distinctive, the head being nearly of the same gray color as usual in the *eremicus* group, but this color is continued on the shoulders and back, and the ochraceous is largely confined to the rump and lower sides. The back is a peculiar 'peppery' mixture of gray and dusky with slight tinges of buff.

Specimens examined.—Total number 22, all from the type locality.

PEROMYSCUS EREMICUS ANTHONYI (MERRIAM). ANTHONY DESERT
MOUSE.

Hesperomys (Vesperimus) anthonyi Merriam, Proc. Biol. Soc. Wash., IV, pp. 5-7, Apr. 15, 1887.

[*Peromyscus*] *anthonyi* Trouessart, Catal. Mamm., Pt. III, p. 517, 1897.

Peromyscus eremicus anthonyi Mearns, Bull. No. 56, U. S. Nat. Mus., p. 438, Apr. 13, 1907.

Type locality.—Camp Apache, Big Hachita Mountains, Grant County, N. Mex.

Geographic distribution.—Extreme southeastern Arizona and southwestern New Mexico in the vicinity of the Mexican boundary line and south through the State of Sonora west of the Sierra Madre to northern Sinaloa.

General characters.—Very similar to *P. eremicus*, but darker and more richly colored, but not so extreme in this respect as *P. e. fraterculus*; ears very slightly smaller; pectoral spot usually present.

Color.—No. 22529 from Deming, N. Mex. Winter pelage (Dec. 2): Ground color and broad lateral line rich ochraceous buff; entire upperparts heavily sprinkled with black, this not concentrated medially, but uniformly distributed; head grayish drab, suffused with buff, particularly on cheeks; underparts creamy white, except a prominent ochraceous buff pectoral spot,^a extending from breast between forelegs almost to middle of belly; tail blackish above and paler below, but not sharply bicolor; feet creamy white, 'ankles' dusky. Worn pelage: As in *P. eremicus*, but darker and duller. Immature: Much darker and more decidedly blackish than in *eremicus*.

Skull.—As in *P. eremicus*.

Measurements.—One adult male from Deming, N. Mex.: Total length, 197; tail vertebrae, 105; hind foot, 21. Average of 10 adults from Alamos, Sonora, Mexico: Total length, 194 (188-202); tail vertebrae, 108 (102-113); hind foot, 21.5 (21-22).

Type specimen.—No. 3333, Collection of C. Hart Merriam. ♂ immature. Collected May 10, 1886, by A. W. Anthony. Skin and skull in good condition, but showing no subspecific characters on account of immaturity.

Remarks.—The type locality of this subspecies, which was described before Mexican specimens had been collected, is unfortunately near the northern limit of the form, where it is beginning to merge with true *eremicus*. It reaches its greatest differentiation in southern Sonora, but at best is only slightly characterized by its richer and more blackish color, and although separated geographically, it closely resembles *fraterculus*. Skulls from different parts of its range vary slightly in size, but show no constant difference from those of typical *eremicus*.

^a Such a pectoral spot is very frequently but not always present.

Specimens examined.—Total number 121, from localities as follows:

Arizona: ° Calabasas, 1; Fairbank, 1; Fort Verde, 8; San Bernardino Ranch, 2; Tombstone, 1; Tonto Creek, 2; Tubac, 4.

Chihuahua: Near Batopilas, 12.

New Mexico:° Boundary line, 100 miles west of El Paso, 11; Camp Apache, Grant County, 5; Carrizalillo, 1; Deming, 5; Dog Spring, Grant County, 2; Florida Mountains, 1; Hachita, 4; Lat. 31° 47', long. 30° 15', 13; Redrock 1; Silver City 1.

Sonora: Alamos, 15; Camoa, 4; Guaymas, 2; Hermosillo, 17; Magdalena, 2; Oposura, 2.

Sinaloa: Culiacan, 4.

PEROMYSCUS EREMICUS TIBURONENSIS (MEARNS). TIBURON DESERT MOUSE.

Peromyscus tiburonensis Mearns, Proc. U. S. Nat. Mus. XIX, pp. 720–721, July 30, 1897.

Type locality.—Tiburon Island, off coast of Sonora, Mexico.

Geographic distribution.—Tiburon Island and immediately adjacent mainland.

General characters.—Decidedly smaller than *P. e. anthonyi*; skull slightly different; otherwise similar.

Color.—Darker than *P. eremicus*, about as in *P. e. anthonyi*. Type specimen with pure white underparts and no pectoral spot.

Skull.—Similar to that of *P. eremicus*, but smaller; rostrum more depressed; braincase relatively deeper; teeth and audital bullæ small, about in proportion to size of skull.

Measurements.—Dry skin of type: Total length, 170; tail vertebræ, 92; hind foot, 18; ear from notch, 15.

Type specimen.—No. 63186, U. S. National Museum. ♂ adult. Dec. 25, 1895. J. W. Mitchell. The skin of the type is a renovated specimen in fair condition. The tail vertebræ have not been removed and a small patch of hair is gone from the left side. The skull is perfect, except for one slightly broken zygoma.

Remarks.—Small size seems to be the only important character distinguishing this form from *P. e. anthonyi*. The tail of the type has the appearance of being more hairy than in most specimens from the mainland, but this may be due to its being a midwinter specimen, added to the fact that the skin of the tail is somewhat shriveled around the vertebræ instead of being smoothly stretched over a wire. Specimens from the mainland of Mexico on the Coastal Plain are indistinguishable from the type of *tiburonensis*. One, from Ortiz, though about the same size as *tiburonensis*, has a small pectoral spot as in *anthonyi*.

Specimens examined.—Total number 4, from localities in Mexico as follows:

Sonora: Batamotal, 2; Ortiz, 1; Tiburon Island, 1.

° Among these many approach *eremicus*.

PEROMYSCUS EREMICUS PHÆURUS Osgood.

Peromyscus eremicus phæurus Osgood, Proc. Biol. Soc. Wash., XVII, pp. 75-76, Mar. 21, 1904.

Type locality.—Hacienda la Parada, San Luis Potosi, Mexico.

Geographic distribution.—Middle part of the Mexican tableland in the States of San Luis Potosi, Zacatecas, and Nuevo Leon.

General characters.—Similar to *P. eremicus*, but darker, with tail uniform blackish brown above and below instead of decidedly bicolor, as in *eremicus*, or indistinctly bicolor, as in some specimens of *P. e. anthonyi*.

Color.—Similar in general to *eremicus*, but shades of buff deeper and entire upperparts much more heavily mixed with black; underparts, except tail, white; pectoral spot not present; tail blackish brown above and below, this most evident in winter pelage, when the hairiness of the tail is best developed; feet white, 'ankles' dusky.

Skull.—Practically as in *eremicus* and *anthonyi*.

Measurements.—Average of 9 adults: Total length, 189 (176-195); tail vertebrae, 98 (92-103); hind foot, 21; ear from notch (dry), 16 (15.2-16.8).

Type specimen.—No. 50438 U. S. National Museum, Biological Survey Collection. ♀ adult. Aug. 20, 1892. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—This form is the southernmost representative of the *eremicus* group. Its range is practically continuous with that of *eremicus*, which extends from west Texas down through Chihuahua, but it is cut off by mountain ranges from *anthonyi*, which, curiously, it most closely resembles. The extreme form of *anthonyi* from southern Sonora occasionally has the distal third of the tail black all around, and thus very much resembles *phæurus*. This is probably an accidental parallelism, as shown also by some specimens of *fraterculus* which are strikingly like *anthonyi*, although there is even greater isolation in this case.

Specimens examined.—Total number 28, from localities as follows:

Coahuila: Sabinas, 3; Saltillo, 2.

Nuevo Leon: Doctor Arroyo, 5.

San Luis Potosi: Ahualulco, 2; Hacienda La Parada, 7; Jesus Maria, 7.

Zacatecas: Canitas, 2.

PEROMYSCUS GOLDMANI Osgood.

Peromyscus goldmani Osgood, Proc. Biol. Soc., Wash., XVII, p. 75, Mar. 21, 1904.

Type locality.—Alamos, Sonora, Mexico.

Geographic distribution.—Known only from the type locality.

Characters.—Similar in general to *P. eremicus anthonyi*; size larger (hind foot 24 in type); pelage somewhat coarser; color more fulvous and more uniform; heel slightly hairy; tail long and cylin-

dricul, covered with short hairs; skull relatively heavy and rather elongate.

Color.—Entire upperparts and sides ochraceous buff, finely mixed with black, much darker and richer than in *anthonyi*, and without the grayish cast usually so characteristic of the *eremicus* group; underparts creamy white, with a small ochraceous buff pectoral spot.

Skull.—Larger, longer, and narrower than in *eremicus* or *anthonyi*; braincase relatively much narrower; nasals longer and more compressed posteriorly; interorbital constriction narrow; bony palate rather short.

Measurements.—Type: Total length, 217; tail vertebræ, 117; hind foot, 24; ear, from notch (dry), 18.2.

Type specimen.—No. 96340 U. S. National Museum, Biological Survey Collection. ♀ adult. Dec. 19, 1898. E. A. Goldman. Specimen in good condition.

Remarks.—In color and size this species resembles *P. spicilegus* closely, and, without examination of its skull and teeth, its affinity to the *eremicus* group would scarcely be suspected.

Specimens examined.—Total number 2, both from the type locality.

Subgenus **BAIOMYS** True.

Baiomys True, Proc. U. S. Nat. Mus., XVI, p. 758, Feb. 7, 1894.

Type.—*Hesperomys* (*Vesperimus*) *taylori* Thomas (= *Peromyscus taylori*).

Characters.—Size very small, hind foot usually less than 17; tail decidedly shorter than head and body; ears relatively small and slightly more rounded than in subgenus *Peromyscus*; soles of hind feet almost or quite naked; plantar tubercles 6; coronoid process of mandible large, broad, and strongly recurved; anterior palatine foramina long and usually ending posterior to the plane of the front of the first molars; posterior palatine foramina about opposite middle of *m* 2; interorbital space relatively wide, usually more than half as wide as widest part of frontals; upper incisors relatively heavy; accessory cusps of *m* 1 and *m* 2 very small and not obvious in transverse view until a late stage of wear; inner reëntrant angle of *m* 3 relatively small and usually obliterated at an early stage of wear.

Species.—*P. taylori* and *P. musculus*.

Remarks.—The members of this group are always recognizable by their small size. However, the discrepancy between them and the smallest forms (*pallescens* and *polionotus*) of the subgenus *Peromyscus* is very slight. The most decided character of *Baiomys* appears in the coronoid process of the mandible, which is nearly or quite as well developed as in *Onychomys*, but this too is rather variable in *Peromyscus*. The skull is characterized by slight peculi-

arities, none of which seem of more than specific value. The dentition is nearly as in typical *Peromyscus*, the deviation from the normal type being no greater than in various specific groups. The plantar tubercles number 6, as in *Peromyscus*, but they appear to be less variable in shape (see Pl. VIII, fig. 7).

Key to species of Subgenus *Baiomys*.

Size smaller; hind foot 13-15; greatest length of skull usually less than 20,

P. taylori. (p. 253)

Size larger; hind foot 15-17; greatest length of skull usually 20 or more,

P. musculus (p. 257)

Key to subspecies of *Peromyscus taylori*.

Habitat Texas and northeastern Mexico.

Color more grayish.....*P. taylori*

Color more sooty.....*P. t. subater*

Habitat western and central Mexico.

Color paler, general effect broccoll brown or fawn.....*P. t. paulus*

Color darker, chiefly sooty or very dark brown.....*P. t. analogus*

FIG. 12.—Distribution of the subgenus *Baiomys*.

PEROMYSCUS TAYLORI (THOMAS).

(Pl. IV, fig. 10; pl. VIII, fig. 7.)

Hesperomys (Vesperimus) taylori Thomas, Ann. & Mag. Nat. Hist., ser. 5, XIX, p. 66, Jan., 1887.

Peromyscus (Baiomys) taylori Allen, Bull. Am. Mus. Nat. Hist., N. Y., VIII, p. 65, Apr. 22, 1896.

Baiomys taylori Mearns, Bull. No. 56, U. S. Nat. Mus., p. 381, Apr. 13, 1907.

Type locality.—San Diego, Tex.

Geographic distribution.—Southern Texas from the vicinity of Matagorda Bay westward to Bexar County and thence south to the Rio Grande; south into Nuevo Leon and thence to southern Tamaulipas. Lower Sonoran zone.

Characters.—Size small (hind foot 13–15); tail much shorter than head and body; general color more grayish than in allied forms; skull smaller and lighter than in *P. musculus*.

Color.—Unworn pelage: Upperparts pale drab or écreu drab rather heavily mixed with dusky, producing a general effect of hair brown on the back and broccoli brown on the sides; head and face about like sides; no orbital ring, spot at base of whiskers, nor obvious lateral line; underparts smoke gray washed with cream buff; feet smoke gray; tarsal joints slightly dusky; ears thinly clothed with grayish hairs, producing same general effect as main body color; tail rather indistinctly bicolor, dull dusky above, smoke gray below. Worn pelage: More brownish than unworn pelage; general effect of upperparts grayish isabella color or wood brown slightly darker in middle of back.

Skull.—Size very small, decidedly smaller than that of *P. musculus*; dorsal outline evenly arched; nasals short and broad, slightly exceeded by ascending branches of premaxillæ; interorbital space broad and rather sharp-angled; palatine slits long and nearly parallel-sided; audital bullæ moderate. (For general characters, see subgeneric diagnosis.)

Measurements.—Average of 7 adults from Brownsville, Tex.: Total length, 97 (87–110); tail vertebræ, 38 (34–45); hind foot, 14.3 (13.4–15); ear from notch (dry), 9 (8.8–10). Of 5 adults from Camargo, Tamaulipas: 110 (104–118); 44 (40–50); 14.7 (14.5–15).

Type specimen.—No. 87.11.24.1 British Museum.

Remarks.—This is the smallest species of the genus *Peromyscus* and one of the smallest of all rodents. It differs from *musculus*, the only other species of the subgenus, chiefly in its smaller size. Its subspecies are but slightly characterized, being in most respects, save shade of color, like the typical form. Although as yet there are gaps of considerable extent between the known ranges of the subspecies, the forms are so closely allied that there is little doubt of complete intergradation.

Specimens examined.—Total number 102, from localities as follows:

Nuevo Leon: Monterey, 1; Santa Catarina, 1.

Tamaulipas: Alta Mira, 2; Camargo, 5; Hidalgo, 7; Matamoras, 5; Victoria, 6.

Texas: Beeville, 1; Boerne, 3; Brownsville, 31; Matagorda, 4; Matagorda Peninsula, 7; Rockport, 1; San Antonio, 26; San Diego, 2.

PEROMYSCUS TAYLORI SUBATER BAILEY.

Peromyscus taylori subater Bailey, N. Am. Fauna No. 25, pp. 102-103, Oct. 24, 1905.

Type locality.—Bernard Creek, near Columbia, Brazoria County, Tex.

Geographic distribution.—Coast region of southeastern Texas from the vicinity of Matagorda Bay eastward. Austroriparian zone.

Characters.—Similar to *P. taylori*, but darker and more sooty.

Color.—Unworn pelage: General effect of upperparts dark grayish brown or sepia, sometimes almost black in middle of back; sides usually showing more or less buffy; underparts cream buff to clay color, becoming slightly paler and more grayish on throat and chin; tail rather more distinctly bicolor than in *P. taylori*. Worn pelage: General effect of upperparts pale reddish sepia, slightly darker in middle of back.

Skull.—As in *P. taylori*.

Measurements.—Average of 7 topotypes: Total length, 99 (88-104); tail vertebræ, 39 (36-44); hind foot, 14.5 (14-15); ear from notch (dry), 9 (8-9.4).

Type specimen.—No. $\frac{3}{4}$ $\frac{2}{3}$ $\frac{1}{4}$ $\frac{1}{2}$ U. S. National Museum, Biological Survey Collection. ♀ adolescent. Feb. 25, 1892. W. Lloyd. Specimen in good condition.

Remarks.—This is a slight form differing from true *taylori* in its more sooty coloration. Intergradation with *taylori* apparently occurs in the vicinity of Matagorda Bay. The most extreme example (the type) is in unworn pelage and exceedingly dark, the middorsal region being almost black, but specimens in worn coat approach *taylori* more closely. The average difference in color, however, is considerable. At Richmond, Tex., Mr. Bailey (l. c.) found these mice "fairly common under the rich carpet of grass on the open prairie. Their tiny runways, leading from one little burrow to another, wound about over the surface of the ground among the plant stems and indicated habits so similar to those of *Microtus* that at first I thought I had discovered traces of a diminutive species of that genus."

Specimens examined.—Total number 15, from localities as follows:

Texas: Austin Bayou, near Alvin, 2; Bernard Creek, near Columbia, 7; Richmond, 4; Sour Lake, 1; Virginia Point, 1.

PEROMYSCUS TAYLORI PAULUS ALLEN.

Peromyscus paulus Allen, Bull. Am. Mus. Nat. Hist., XIX, pp. 598-599, Nov. 14, 1903.

Peromyscus alleni Osgood, Proc. Biol. Soc. Wash., XVII, pp. 76-77, Mar. 21, 1904.—Colima, Colima, Mexico.

Type locality.—Rio Sestin, northwestern Durango, Mexico.

Geographic distribution.—Lower Sonoran and Arid Tropical parts of western Mexico, from central Chihuahua south and west through Durango, Sinaloa, and Jalisco to Colima.

Characters.—Size, proportions, and cranial characters about as in *P. taylori*; color averaging more brownish and more strongly tinged with fawn.

Color.—Similar in general to that of *P. taylori* but averaging less grayish. Unworn pelage: General effect of upperparts broccoli brown tinged with fawn color. Worn pelage: General effect of upperparts brownish fawn color or almost clear fawn color.

Skull.—Not definitely distinguishable from that of *P. taylori*; nasals possibly averaging slightly shorter.

Measurements.—Type: Total length, 108; tail vertebræ, 44; hind foot (dry), 14. Two adults from Durango, Durango: Total length 110, 110; tail vertebræ, 49, 43; hind foot, 15, 14; ear from notch (dry), 9.6, 9.8.

Type specimen.—No. 21165 American Museum of Natural History, New York. ♂ adult. April 15, 1903. J. H. Batty. Specimen in fair condition.

Remarks.—It is surprising that this form differs so slightly from *P. taylori*. The only distinguishing character is the fairly constant tendency toward pinkish fawn color. Specimens from Colima representing '*allea*' show very little of this fawn color, but differ so slightly that they seem scarcely worthy of recognition. The cranial characters vary slightly, and chiefly in size, specimens from Colima being quite the smallest examined. In color there is scarcely any difference from *musculus*, which, however, is decidedly larger.

Specimens examined.—Total number 70, from localities as follows:

Chihuahua: Balleza, 1; Casas Grandes, 1.

Colima: Colima, 10.

Durango: Durango, 3; Rancho Santuario, 2; Rio Sestin, 15; Rosario, 1; San Gabriel, 2.

Jalisco: Atemajac, 12; Etzatlan, 6.

Sinaloa: Mazatlan, 5; Rosario, 8.

Tepic: Acaponeta, 4.

PEROMYSCUS TAYLORI ANALOGUS subsp. nov.

Type from Zamora, Michoacan. No. 120261 U. S. National Museum, Biological Survey Collection. ♂ adult. Jan. 15, 1903. E. W. Nelson and E. A. Goldman.

Geographic distribution.—West central Mexico, from Jalisco and Michoacan eastward to the Valley of Mexico.

Characters.—Size, proportions, and cranial characters about as in *taylori* and *paulus*; color decidedly darker; feet and toes usually more or less dusky.

Color.—Much as in *nigrescens* and *subater*, decidedly darker than in *paulus*, *musculus*, etc. Unworn pelage: General effect of sides, sepia; of back, blackish sepia; underparts slaty gray, heavily washed with wood brown; fore and hind feet and toes entirely dusky brownish or slightly mixed with grayish. Worn pelage: Upperparts varying from brownish sepia to raw umber, darkest in middle of back.

Skull.—Essentially as in *P. t. paulus*.

Measurements.—Type: Total length, 110; tail vertebræ, 48; hind foot, 14; ear from notch (dry), 9.9. Average of eight topotypes: 112 (105–123); 45.7 (39–53); 14.4 (13.5–15); 9.9 (9.6–10.3).

Remarks.—This form is very similar in color to *subater* and *nigrescens*. All three have doubtless developed dark hues from approximately the same cause, since all inhabit more humid regions than their paler relatives. *P. t. analogus* averages slightly larger than *paulus* and *taylori*, but the difference is not of great importance, as size is quite variable throughout the group. Specimens from Patzcuaro and Acambaro, Michoacan, and also from Mascota and Tepic apparently tend toward *paulus*. The dusky feet of this form are found in the majority, but not in all specimens.

Specimens examined.—Total number 83, from localities, as follows:

Jalisco: Ameca, 10; Mascota, 6; Ocotlan, 8.

Mexico: Tlalpam, 25.

Michoacan: Acambaro, 3; Los Reyes, 8; Patzcuaro, 4; Zamora, 10.

Tepic: Tepic, 9.

Key to subspecies of *Peromyscus musculus*.

Color paler, general effect broccoli brown or wood brown. Western and southern Mexico, *P. musculus*
 Color darker, chiefly rich dark brown or sooty.
 Color more brownish. State of Veracruz.....*P. m. brunneus*
 Color more blackish. Chiapas and Guatemala.....*P. m. nigrescens*

PEROMYSCUS MUSCULUS (MERRIAM).

(Pl. IV, fig. 11; pl. V, fig. 10; pl. VI, fig. 10; pl. VII, fig. 11.)

Sitomys musculus Merriam, Proc. Biol. Soc. Wash., VII, pp. 170–171, Sept. 29, 1892.

Peromyscus musculus Allen and Chapman, Bull. Am. Mus. Nat. Hist., N. Y., IX, p. 203, June 16, 1897.

Baiomys musculus Mearns, Bull. No. 50, U. S. Nat. Mus., p. 381, Apr. 13, 1907.

Type locality.—Colima, Colima, Mexico.

Geographic distribution.—Arid tropical parts of central and southern Mexico from the Isthmus of Tehuantepec north to central Veracruz and northwest to Colima and possibly to central Sinaloa.

Characters.—Similar in color and general characters to *P. taylori paulus*, but decidedly larger (hind foot 15–17); skull larger and heavier.

Color.—Practically as in *P. t. paulus*, averaging slightly less fawn. Unworn pelage: Ground color of upperparts clay color heavily mixed with dusky, producing a general effect varying from dark broccoli brown to isabella color, scarcely or not at all darker in middle of back; underparts dull cream buff, sometimes becoming grayish white on throat; feet white or grayish white, tarsal joint slightly dusky; tail indistinctly bicolor, brownish above, grayish white below. Worn pelage: Upperparts nearly uniform cinnamon, lightly sprinkled with dusky or sometimes paler, almost clay color.

Skull.—Decidedly larger than in *P. taylori* and subspecies: braincase actually and relatively broader; nasals usually not exceeded by ascending branches of premaxillæ; molars larger and heavier.

Measurements.—Average of 10 adult topotypes: Total length, 124.7 (116–135); tail vertebræ, 50.8 (42–56); hind foot, 16.5 (16–17); ear from notch (dry), 11.2 (10.5–12).

Type specimen.—No. $\frac{33411}{11}$ U. S. National Museum, Biological Survey Collection. ♂ adult. March 9, 1892. E. W. Nelson. Specimen in good condition.

Remarks.—The distinction between this species and *P. taylori* is chiefly one of size. Representatives of the two species are found together at least at one locality, Colima, and there they are distinct with no suggestion of interbreeding. At other localities, so far as known, only one species occurs, though each species varies in size so it is sometimes difficult to decide whether one is dealing with small examples of *musculus* or with large ones of the *taylori* series. The subspecies of *musculus*, like those of *taylori*, are chiefly characterized by color alone, apparently controlled by the relative humidity of their respective habitats. Specimens from Culiacan, Sinaloa, and Valparaiso, Zacatecas, are tentatively referred to *musculus*, though their skulls are somewhat peculiar.

Specimens examined.—Total number 204, from localities as follows:

Colima: Armeria, 8; Colima, 10.

Guerrero: Acapulco, 3; Ayusmapa, 1; Chilpancingo, 14; El Limon, 3; near Ometepec, 7; Rio Balsas, 1; Tlalixtaquilla, 3; Tlapa, 1.

Jalisco: Plantinar, 1; Zapotlan, 3.

Michoacan: La Huacana, 1; La Salada, 11.

Morelos: Cuernavaca, 9; Puente de Ixtla, 2; Yautepec, 12.

Oaxaca: Chicapa, 2; Huilotepec, 12; Juquila, 8; Llano Grande, 3; Oaxaca, 15; Pinotepa, 2; Reforma, 8; San Bartolo, 1; Tehuantepec, 26; near Totolapa, 1; Yaganiza, 1; Yalalag, 1.

Puebla: Acatlan, 1; Piaxtla, 4.

Sinaloa: Culiacan, 2.

Veracruz: Carrizal, 4; Chichicastle, 4; Santa Maria, 9.

Zacatecas: Valparaiso, 10.

PEROMYSCUS MUSCULUS BRUNNEUS ALLEN AND CHAPMAN.

Peromyscus musculus brunneus Allen and Chapman, Bull. Am. Mus. Nat. Hist., N. Y., IX, pp. 203-204, June 16, 1897.

Type locality.—Jalapa, Veracruz, Mexico.

Geographic distribution.—East central Mexico, in slightly more humid parts than those inhabited by *P. musculus*.

Characters.—Similar to *P. musculus*, but darker and more richly colored; very slightly smaller.

Color.—Similar in general to that of *P. musculus*, but darker and more brownish; general effect of upperparts varying from reddish sepia to raw umber and Prout brown; underparts dull clay color slightly mixed with grayish and slaty; feet whitish gray; tail very indistinctly bicolor, brownish above, soiled whitish gray below.

Skull.—Similar to that of *P. musculus*, but averaging slightly smaller; nasals somewhat shorter.

Measurements.—Average of 20 topotypes: Total length, 118 (110-130); tail vertebrae, 46.8 (40-51); hind foot, 15.3 (14.5-16.5); ear from notch (dry), 10.7 (10.4-11.2).

Type specimen.—No. $\frac{12531}{10848}$ American Museum of Natural History, New York. ♀ adult. April 13, 1897. F. M. Chapman. Skin in good condition; skull with small puncture in supraoccipital and unimportant breaks in zygoma and basioccipital.

Remarks.—This form is characterized chiefly by its rich brownish color. It inhabits slightly more humid places than typical *musculus*, which lives near it in comparatively arid conditions. Doubtless its range will prove to be rather more extensive than at present known. It is somewhat intermediate between *musculus* and *nigrescens*, but appears never to be as sooty as *nigrescens* and also differs slightly in cranial characters.

Specimens examined.—Total number 42, from localities as follows:

Veracruz: Jalapa, 39; Texolo, 3.

PEROMYSCUS MUSCULUS NIGRESCENS Osgood.

Peromyscus musculus nigrescens Osgood, Proc. Biol. Soc. Wash., XVII, p. 76, March 21, 1904.

Type locality.—Valley of Comitán, Chiapas, Mexico.

Geographic distribution.—Southern Mexico (State of Chiapas) and northern Guatemala.

Characters.—Similar to *P. musculus* and *P. m. brunneus*; but darker and more sooty; skull slightly characterized.

Color.—Upperparts mixed Vandyke brown and sooty, the sooty slightly concentrated in middle of back; underparts cream buff, to roots of hairs in middle of belly, on tips only at sides; feet usually

dull whitish gray, sometimes slightly brownish dusky; tail indistinctly bicolor, dusky above, grayish white mixed with brownish below.

Skull.—Slightly smaller and more elongated than in *P. musculus* and *P. m. brunneus*; braincase narrower; interorbital space narrower.

Measurements.—Average of ten adult topotypes: Total length, 115.5 (113–120); tail vertebrae, 43 (40–45); hind foot, 15 (14.5–16); ear from notch (dry), 11 (9.8–12).

Type specimen.—No. 76827 U. S. National Museum, Biological Survey Collection. ♀ adult. Dec. 9, 1895. E. W. Nelson and E. A. Goldman. Specimen in good condition.

Remarks.—In the *musculus* series this form is analogous to the dark forms of the *taylori* series. It differs slightly in cranial characters from *P. m. brunneus*, but is only a few degrees darker in color. Its range is apparently cut off from that of *brunneus* by the arid Isthmus of Tehuantepec, inhabited by typical *musculus*.

Specimens examined.—Total number 53, from localities as follows:

Chiapas: Ocozucua, 2; Ocuilapa, 4; San Bartolome, 2; San Vicente, 1; Tonala, 8; Tuxtla Gutierrez, 4; Valley of Comitán, 22; Valley of Jiquipilas, 1.

Guatemala: Jacaltenango, 8; Nentou, 1.

Table of external measurements of *Peromyscus*.

External measurements—averages and extremes.

Species.	Total length.		Tail vertebrae.		Hind foot.		Ear, from notch (dry).		Number measured.
	Average.	Extremes.	Average.	Extremes.	Average.	Extremes.	Average.	Extremes.	
<i>P. maniculatus</i>	179	174–198	84	75–95	21	19–23			10
<i>P. m. gracilis</i>	190	176–206	96.8	83–108	21.4	20.8–21.8	17.4	16.7–18.3	10
<i>P. m. abietorum</i>	177	171–187	91.6	82–97	21	20–22			10
<i>P. m. argentatus</i>	180	171–194	87.8	82–93	21.2	20–22			23
<i>P. m. eremus</i>	183	172–189	83	78–90	21		15.7	15–16	10
<i>P. m. nubiterrae</i>		173–188		93–98		19.5–21	15.8	15.2–16	2
<i>P. m. arcticus</i>	160	150–172	71	62–78	20	19–21	15.8	15–16.8	25
<i>P. m. oreas</i>	201	185–212	111	105–123	22.8	22–24	16.6	15.9–17.1	12
<i>P. m. hyalaus</i>	198.4	191–205	98	91–105	23	22–23.5	15.3	14.5–16.8	20
<i>P. m. algidus</i>	192	178–204	94	83–101	22.5	22–23.5	15.8	15–16.4	20
<i>P. m. keeni</i>	197		102		22.7		14.7	14–15.2	20
<i>P. m. macrorhinus</i>	208	200–217	112	105–117	24.5	24–25	16.1	15–17	6
<i>P. m. artemisiae</i>	167	153–180	75	69–86	20.5	19–22	16.1	14.8–18	6
<i>P. m. saturatus</i>	180.9		76.2		21.25				10
<i>P. m. hollisteri</i>	180.8	167–188	79.3	73–84	22.1	21–22.5	16.8	15.2–17.2	10
<i>P. m. austerus</i>	172	163–190	86	79–96	20.5	20–21	15	14–15.5	10
<i>P. m. rubidus</i>	193	189–203	96	90–100	21.5	21–22	15.8	15.2–16.9	6
<i>P. m. gambellii</i>	161	157–173	72.4	70–77	20		14.9	14.2–15.8	10
<i>P. m. rufinus</i>	160	150–170	70	56–75	20	19–21	15.5	14.1–16.6	15
<i>P. m. nebrascensis</i>	158	147–170	63.7	56–71	20.1	20–21	14.8	14–15.7	10
<i>P. m. luteus</i>	149	142–158	61.5	56–65	19.5	19–20.5	12.5		10
<i>P. m. bairdi</i>		161–140		70–54		19–18	12.6	11.5–14	2
<i>P. m. pallascens</i>	126	121–130	51	50–52	16	15–17	11.7	11.2–12.7	9
<i>P. m. blandus</i>	161	145–173	68	59–75	21.4	21–22	14.9	13.8–15.3	7
<i>P. m. fulvus</i>	162	150–183	71.5	65–78	22		15.5	14.2–16.9	10
<i>P. m. labecula</i>	173	168–182	72	64–82	22.5	22–24	14.9	14.5–15.5	10
<i>P. m. sonoriensis</i>	166	152–176	75	65–80	20.7	20–21.5	16.4	15.2–17.7	10
<i>P. m. coolidgei</i>	171	162–178	82	79–86	21		16.3	15.4–18	7
<i>P. m. margaritae</i>	163	157–168	77	74–81	21.3	20–22	16.5	14.6–17.5	10
<i>P. m. clementis</i>	164	156–172	74	68–78	20.6	20–21.5	15.3	14–17	10
<i>P. m. catalinae</i>	196	185–214	96	88–105	22	21–23	15.7	15–16.8	10
<i>P. m. dubius</i>	186	176–195	84	77–92	21	20–22	15.5	14.6–17.4	5

External measurements—averages and extremes—Continued.

Species.	Total length.		Tail vertebrae.		Hind foot.		Ear, from notch (dry).		Number measured.
	Average.	Extremes.	Average.	Extremes.	Average.	Extremes.	Average.	Extremes.	
<i>P. m. geronimensis</i> ...	178	170-182	81	79-85	22.4	21-23	16	14.5-17.3	10
<i>P. m. cineritius</i> ...	175	171-184	76	75-78	21.8				3
<i>P. m. magdalenae</i> ...	184	175-200	88	82-96	22.8	22-23	16.6	15.5-17.8	7
<i>P. sitkensis</i> ...	224		113.6		26.5		18.5	14.9-17.8	10
<i>P. a. prevostensis</i> ...	216	205-230	105	97-116	26.2	25-28	15.6	14.4-16.4	45
<i>P. polionotus</i> ...	130	125-137	47	41-52	16.6	15.6-17.7	13	12-13.4	5
<i>P. p. niveiventris</i> ...	139	128-153	52	50-60	18.1	17-19	12.4	11.6-13.5	10
<i>P. p. phasma</i> ...	138.5		53		18.7		14		10
<i>P. p. rhoadsi</i> ...	126		47		17				10
<i>P. melanotis</i> ...	155	132-168	64	58-66	20.7	20-21.5	18	17-19.2	6
<i>P. leucopus</i> ...	166.5	158-177	77	73-80	20.5	20-21	13.7	13.4-14	6
<i>P. l. noveboracensis</i> ...	173.4	163-188	77.5	73-83	21.4	21-22	14.3	13.6-14.7	10
<i>P. l. ammodytes</i> ...	173	161-190	79	71-88	20	19.5-21			10
<i>P. l. fusus</i> ...	194.4	190-203	90.7	85-96	22.4	21.5-23.5			6
<i>P. l. aridulus</i> ...	169	160-177	69	63-73	22	21-23	14.1	13.6-15.5	4
<i>P. l. ochraceus</i> ...		173-189		82-82		22.5-22.5			2
<i>P. l. tornillo</i> ...	182	171-202	82.6	75-97	22.5	21-24	14.5	13.9-15.3	10
<i>P. l. arizonae</i> ...	186	178-193	82.6	78-85	22.6	22-24			5
<i>P. l. texanus</i> ...	178	160-195	77	68-91	21.5	20.5-22.8	14.8	14.1-15.6	10
<i>P. l. mesomelas</i> ...	169		76		23		13.5		1
<i>P. l. castaneus</i> ...	163	156-169	73	68-79	21.5	20-22	12.5	11.3-13.6	30
<i>P. l. affinis</i> ...		180-182		81-84		22-24	14.3	13.5-15	2
<i>P. l. cozumelae</i> ...	184	163-198	83.8	76-90	23.3	22-24	14.6	13.7-15.7	10
<i>P. gossypinus</i> ...		160-171		72-71		24-23	15.7	15-16.8	2
<i>P. g. megacephalus</i> ...	196	188-205	84	78-90	24	23-26	15.5	15-16.3	6
<i>P. g. palmaris</i> ...	178.8	172-183	74.5	69-78	21.1	20-22	14.7	14-15	7
<i>P. g. anastaseae</i> ...	167.5		69.5		21.4				6
<i>P. boyleyi</i> ...	197	183-202	103	92-112	22	21-23	16.4	15.3-17.5	10
<i>P. b. rowleyi</i> ...	191	180-207	99	91-109	21.6	21-23	17.2	16-18	10
<i>P. b. attwateri</i> ...	205	196-218	103	97-112	24.3	23-25	16.2	15.5-17.2	10
<i>P. b. spicilegus</i> ...	198	189-210	101	95-108	23.4	23-25	16.3	15.4-17.3	8
<i>P. b. simulus</i> ...	208		111		23		15		3
<i>P. b. madrensis</i> ...	224		120		26		15.6	14.7-17.2	12
<i>P. b. evides</i> ...	222	212-230	112	105-123	23.6	23-25	13.6	12.6-14.5	10
<i>P. b. levipes</i> ...	208	198-234	108	97-123	24	23-25	16.2	15.6-16.7	10
<i>P. b. aztecus</i> ...	229	215-238	113	107-121	24.5	24-26	15.2	14.5-16	5
<i>P. oaxacensis</i> ...	246	241-260	127	120-135	27		16.7	15.8-17.5	6
<i>P. hylcoetes</i> ...	227	220-237	113	106-117	26.1	25-27	18	17.5-18.5	6
<i>P. pectoralis</i> ...	201	195-209	110.7	102-115	21	20-22	15.5	15.4-17.2	10
<i>P. p. eremicoides</i> ...		180-195		102-111		20-21	15.3	14.3-16.6	2
<i>P. p. laeolanius</i> ...	187	185-192	96	94-100	22.1	22-23	15.8	15-16.2	2
<i>P. truel</i> ...	186	180-195	92	86-102	23.5		22.4	21.5-24	10
<i>P. t. gilberti</i> ...	200	188-206	98	87-103	22.5	22-24	19.2	18-21	5
<i>P. t. martirensis</i> ...	213	205-222	116.5	112-122	24		21.7	21-23	6
<i>P. t. lagunae</i> ...	193	182-210	105	97-118	22.4	21.5-23	19	18-19.8	10
<i>P. t. gratus</i> ...	204	191-225	110.5	103-125	22.8	22-24	18.6	17.5-20.2	10
<i>P. t. gentilis</i> ...	201	194-210	111.7	103-120	23.8	23-24.5	18.7	18-19.3	10
<i>P. nasutus</i> ...	195	180-210	99	91-105	22.2	22-24	18.7	18.5-20.5	5
<i>P. polius</i> ...	218.5	210-234	117	111-120	25.8	25-26	18.1	17.2-18.5	8
<i>P. difficilis</i> ...	233	212-255	127	115-143	26.3	25.5-28	21.6	19.7-23	10
<i>P. d. amplius</i> ...	248	235-260	136	128-145	27	26-28	20.9	19.5-21.8	10
<i>P. d. felpensis</i> ...	241.5	225-248	127	118-132	26.8	25.5-27.5	20.4	19-21.7	10
<i>P. bullatus</i> ...			93		23		25		1
<i>P. melanophrys</i> ...	269	262-275	149	146-155	28		19.3	18.5-21	3
<i>P. m. zamorae</i> ...	259	249-280	144	137-152	28.4	27-30	20	19-21	7
<i>P. m. consobrinus</i> ...	256	250-260	135	131-139	27.5	26.5-28	19	18-19.8	5
<i>P. xerurus</i> ...		246-248		142-140		28-28	21.5		2
<i>P. mekisturus</i> ...	249		155		24		18.4		1
<i>P. lepturus</i> ...	228	218-238	115	112-119	27	26-28	17.3	16.4-18.2	7
<i>P. lophurus</i> ...	208		105		24.5		16		4
<i>P. simulatus</i> ...	169		87		21		14.3		10
<i>P. guatemalensis</i> ...	267	252-290	138	132-153	30.7	30-32	20.6	20-21.5	1
<i>P. furvus</i> ...	263	248-282	131	123-145	27.9	26-29	21.9	20-23	14
<i>P. nudipes</i> ...	261	250-280	130	121-135	28.6	26-30	19.1	18.4-19.4	6
<i>P. mexicanus</i> ...	246	235-254	128	118-133	26.6	26-27	19	17.7-20.5	4
<i>P. m. totontepecus</i> ...	257	244-268	131	124-136	28.2	28-29	16.9	16-17.8	5
<i>P. m. saxatilis</i> ...	244	233-258	127	120-138	27.6	27-29	18.2	16.6-19.5	10
<i>P. m. tepensis</i> ...	245	234-254	129	121-136	28	27-28.5	17.7	17-18.6	10
<i>P. m. gymnotis</i> ...		191-220		92-104		23-24	16	15-17	2
<i>P. allophylus</i> ...	202		95		25		17		1
<i>P. banderanus</i> ...	234	228-245	119	115-127	25		18	17.2-18.5	5
<i>P. b. victor</i> ...	233	225-240	117	115-121	24.5	24-25	16.2	16-16.5	3
<i>P. b. angelensis</i> ...	235	222-258	120	112-128	27	26.5-28	17.3	17-17.7	7
<i>P. yucatanicus</i> ...	216	208-232	112	105-122	23.8	23-26	17	15.2-18.3	10
<i>P. y. badius</i> ...	193.4		96.7		23.5		16.4	16-16.8	10
<i>P. atitlanus</i> ...	228		115		28		20.6		1
<i>P. megaloops</i> ...	282		150		31		19		1

External measurements—averages and extremes—Continued.

Species.	Total length.		Tail vertebrae.		Hind foot.		Ear, from notch (dry).		Number measured.
	Average.	Extremes.	Average.	Extremes.	Average.	Extremes.	Average.	Extremes.	
<i>P. m. auritus</i>	288		148		30.5		23.3		1
<i>P. m. melanurus</i>	259	238-278	135	127-145	27.3	26-28.5	17	15.8-17.8	10
<i>P. melanocarpus</i>	262		132		30		19		1
<i>P. zarhynchus</i>	316	305-327	170.7	162-178	35.7	33.5-38	22.2	21.2-24	10
<i>P. thomasi</i>	330	310-350	175	162-188	32.8	32-34	23	21.4-24.8	7
<i>P. nelsoni</i>		302-318		172-170		35-32	20		3
<i>P. flavidus</i>	341.6	320-375	181.2	155-205	31.8	31-33	22.5	20-24	10
<i>P. nuttalli</i>	181	170-190	85	80-93	19.7	19-20	15.5	14.4-16.4	10
<i>P. n. aureolus</i>	172.5	164-184	83	80-88	18.8	17-20	14.1	13.4-14.6	7
<i>P. floridanus</i>	199.8	190-221	86.2	80-95	26.6	26-27.5	22.5	22-25	10
<i>P. californicus</i>	243	238-260	133	127-146	27	26-29	22.3	21.3-23.5	10
<i>P. c. insignis</i>	233	220-245	134	124-140	25		20.3	20-20.7	6
<i>P. eremicus</i>	183	172-192	101	94-108	20.5	20-21	17.5	17.3-17.8	10
<i>P. e. fraterculus</i>	191		112		20		16.4	15.5-17	3
<i>P. e. cedrosensis</i>	193	181-200	110	106-114	20		16	15.5-16.5	8
<i>P. e. eva</i>	198	185-218	114	100-128	20.4	20-21	16.6	15.6-17.2	10
<i>P. e. insulicola</i>		196-200		115-113		20-19.5		16.5-16.7	2
<i>P. e. avius</i>	194	186-209	106	100-116	21.6	21.5-22	14.5	13.4-16	10
<i>P. e. polypoli</i>	192	183-200	109.5	100-117	19.5	19-20	15.7	14.6-16.8	10
<i>P. e. anthonyi</i>	194	188-202	108	102-113	21.5	21-22	16		10
<i>P. e. tiburonensis</i>	170		92		18		15		1
<i>P. e. phaeurus</i>	189	176-195	98	92-103	21		16	15.2-16.8	9
<i>P. goldmani</i>	217		117		24		18.2		1
<i>P. crinitus</i>	176	172-184	95	92-97	21		16.3	15.4-17.5	9
<i>P. c. auripectus</i>	177.7	174-182	93	89-98	20.8	20-21	17.3	16.6-18	10
<i>P. c. stephensi</i>	170	161-176	94	88-101	20		16	15.3-16.5	10
<i>P. taylori</i>	97	87-110	38	34-45	14.3	14.5-15	9	8.8-10	7
<i>P. t. subater</i>	99	88-104	39	36-44	14.5	14-15	9	8-9.4	7
<i>P. t. paulus</i>		108-110		43-49		14-15		9.6-9.8	2
<i>P. t. analogus</i>	112	105-123	45.7	39-53	14.4	13.5-15	9.9	9.6-10.3	8
<i>P. musculus</i>	124.7	116-135	50.8	42-56	16.5	16-17	11.2	10.5-12	10
<i>P. m. brunneus</i>	118	110-130	46.8	40-51	15.3	14.5-16.5	10.7	10.4-11.2	20
<i>P. m. nigrescens</i>	115.5	113-120	43	40-45	15	14.5-16	11	9.8-12	10

Cranial measurements of *Peromyscus*.

Species.	Locality.	Greatest length.	Basilar length.	Zygomantic breadth.	Inter-orbital constriction.	Inter-parietal.	Nasals.	Sheaf of bony palate.	Palatine slit.	Diameter.	Post-palatal length.	Maxillary tooth-row.
<i>P. maniculatus</i>	Nain, Labrador	26.5	20.4	13.8	3.9	9.5 x 2.5	11	4.2	5.5	7.5	.....	3.9
<i>P. m. gracilis</i>	Tower, Minnesota	26	19.6	13.1	4	9 x 2.3	10.2	4	5.4	7	9.2	3.4
Do.....	do.....	25.8	20.1	12.3	3.7	8.7 x 2.3	10.4	4.1	5	7	9.2	3.4
<i>P. m. abietorum</i>	James River, Nova Scotia	25.4	19.3	12.7	3.7	9.1 x 2.3	10.5	4.1	5	6.9	8.6	3.3
<i>P. m. argentatus</i>	Grand Manan, New Brunswick	25.4	19.3	12.7	3.7	9.1 x 2.3	10.5	4.1	5	6.9	8.6	3.3
<i>P. m. eremicus</i>	Magdalen Islands, Quebec	26.2	20.6	13.7	3.8	8.3 x 2.3	10.7	4	4.9	7.2	9.3	3.7
<i>P. m. subterraneus</i>	Roan Mountain, North Carolina	24.3	19.2	12.6	3.5	8 x 2.3	8.3	4.5	4.8	6.6	8.5	3.8
Do.....	do.....	23.4	17.9	12.2	3.5	8 x 2.3	10	3.8	5	6.6	8.2	3.5
<i>P. m. arcticus</i>	Fort Simpson, Canada	23.4	17.9	12.2	3.5	8 x 2.3	10	3.8	5	6.6	8.2	3.5
Do.....	do.....	25.4	20.2	13	3.9	8.4 x 2.3	10.1	4.1	5.1	7	8.9	3.7
<i>P. m. leucurus</i>	do.....	25.3	19.3	13.6	4.2	8.9 x 2.3	10.7	4.4	5.1	6.5	9	3.7
<i>P. m. oregonus</i>	Mount Baker Range, British Columbia	27	20.8	13.2	3.8	9 x 2.3	10.5	4.6	5.1	7.1	8.3	3.7
Do.....	Mount Rainier, Washington	27.4	20.6	13.9	4.1	10 x 3.2	11.7	4.6	5.1	7.1	8.3	3.7
Do.....	do.....	26.9	21	12.8	3.8	8.9 x 2.5	10.6	4	5.9	7.4	9.5	3.7
<i>P. m. hyemalis</i>	Prince of Wales Island, Alaska	26.9	21	13.2	3.8	9.6 x 3.2	10.5	4	5.9	7.4	9.5	3.7
Do.....	do.....	27	21	14	3.9	9.4 x 3	10.9	4.2	6	7.4	8.8	3.9
<i>P. m. albidus</i>	Bennett, British Columbia	27.1	21	13.4	4.2	10 x 3	10.4	4	6	7.3	9.6	3.6
<i>P. m. keeni</i>	Skidegate, British Columbia	27	20.7	13.8	4.2	10 x 3	9.9	4	5.7	7.5	9	3.8
Do.....	do.....	27	21.3	14.3	4.1	9.5 x 2.8	10.1	4.2	6	8	9.1	3.9
<i>P. m. macrorhinus</i>	Skeena River, British Columbia	28.8	22.5	14	4.1	9.5 x 2.8	11.5	4.1	6.0	8.2	9.9	4.2
Do.....	do.....	29	22.3	15.2	3.9	10 x 2.6	11.4	4.3	6.5	8.5	9.5	4.2
Do.....	do.....	28	21.9	14.5	4.1	8.7 x 2.8	11.4	3.8	6.0	8	9	4
<i>P. sitkensis</i>	Sitka, Alaska	30.7	24	15.4	4.2	10.3 x 3.1	13.1	4.6	6.8	8.6	10.5	4.3
Do.....	do.....	29.5	23	15	4.3	10 x 2.9	12.7	4.5	6.6	8.5	10	4.4
<i>P. s. prevostensis</i>	Prevost Island, British Columbia	30.4	23.7	16.1	4.4	10 x 3.5	11.9	5	6.1	8.9	10.1	4.6
Do.....	do.....	29.8	23	14.9	4.3	9.0 x 3	11.3	4.5	6.3	8.2	9.5	4.4
<i>P. m. artemisiae</i>	Ashcroft, British Columbia	26	20.3	13	.....	.....	11.8	4.5	6	7.6	9.9	4
Do.....	do.....	26.5	20.7	13.2	4.3	9 x 2.4	11.2	3.9	5.9	7.1	9.6	3.8
<i>P. m. saturatus</i>	Saturna Island, British Columbia	26.3	20.6	14	4	8.3 x 2.4	10.5	3.7	5.5	7.1	9.5	3.9
<i>P. m. hoillesti</i>	San Juan Island, Washington	27.1	21.1	14.5	4	8.4 x 2.8	10.8	3.9	5.5	7.5	9.7	3.8
<i>P. m. austerus</i>	Stellacoom, Wash.	25.0	19.2	12.5	3.8	8.4 x 2.8	8.8	3.6	5	6.4	8.4	3.4
Do.....	do.....	24	18.7	11.1	3.3	9 x 2.5	9.7	3.1	5	6	8.1	3.2
<i>P. m. rubidus</i>	Mendocino, California	26	19.7	13.3	4	9.3 x 2.2	9.5	3.1	5.2	6.6	8.4	3.8
<i>P. m. gambeli</i>	Monterey, California	25	19.5	13.9	3.7	8.5 x 2.3	9.8	3.5	5.2	6.3	8.6	3.6
<i>P. m. rufinus</i>	San Francisco Mountain, Arizona	26.6	20.5	13.9	3.9	8.5 x 2.3	10.3	4	5.4	6.7	8.8	3.9
Do.....	do.....	25.5	19.9	13	4	.....	10.5	4	5.4	6.4	8.9	3.6
Do.....	do.....	24.8	19	12.4	3.8	.....	9.9	4	4.6	6.4	8.6	3.4
<i>P. m. nebrascensis</i>	Calf Creek, Montana	26.5	19.9	14	4	.....	10.3	4	4.3	6.8	9	3.9

* Type.

Crabid measurements of *Peromyscus*—Continued.

Species.	Locality.	Greatest length.	Basilar length.	Zygomorphic breadth.	Inter-orbital constriction.	Inter-parietal.	Nasals.	Sheaf of bony palate.	Palate time slots.	Diacetema.	Post-palatal length.	Maxillary tooth-row.
<i>P. m. nebrascensis</i>	Call Creek, Montana.	25.4	19.3	13.4	4		10	3.9	5	6.7	8.1	3.6
Do.	do.	25.2	19.3	13.3	4	8 x 2	9.8	3.5	5.1	6.7	8.9	3.7
<i>P. m. leucis a.</i>	Kennedy, Neb.	24.8	19	13	4.1	8.3 x 2	10.4	3.6	5.4	6.7	8.7	3.4
Do.	do.	23.7	18.2	13	3.6	8 x 1.6	9.1	3.6	4.9	6.6	8.2	3.6
<i>P. m. baldi</i>	Racine, Wis.	22.9	17.8	12.4	4	8 x 2.4	9.5	3.6	5	6.2	8.7	3.2
Do.	do.	22.9	17.8	11.7	3.6	7 x 2	8.9	3.3	4	6.5	8.2	3.2
<i>P. m. pallidus a.</i>	San Antonio, Tex.	22.4	15.6	11.6	3.6	8 x 2.1	7.8	3.3	4	6.5	7.7	3.1
Do.	do.	23.5	18.5	12.8	3.7	8 x 2.1	9.2	3.7	4.8	6.7	8.7	3.2
<i>P. polionotus a.</i>	Gainesville, Fla.	22.4	17.9	11.8	3.7	8 x 2.7	8.8	3.6	4	6.4	7.3	3
Do.	do.	23.5	17.9	12.2	3.7	8 x 2.6	9	3.4	4.6	6.4	8.2	3.2
<i>P. m. niveiventris a.</i>	Opposite Mico, Fla.	24	18.1	12.6	3.8	8.7 x 2.4	9.1	3.9	4.7	6.1	8.2	3.3
Do.	do.	24	19.1	13	3.9	8.2 x 2.7	9	4	4.2	6	8	3.5
Do.	do.	22.8	17.7	12.2	3.9	8.5 x 2.4	8.3	3.9	4.1	5.7	7.6	3.3
<i>P. p. phasma a.</i>	Anastasia Island, Florida.	23.3	17.7	12	4.1	8.2 x 2.8	9.6	4.1	3.6	5.5	8.2	3.4
<i>P. p. rhodsi a.</i>	Anclote River, Florida.	22.2	17	11.5	3.6	8 x 2	7.9	3.6	4.1	5.6	7.3	3.2
<i>P. m. blaudus a.</i>	Escalon, Chihuahua.	25.4	19.7	12.5	4	8 x 1.9	9.8	3.5	5.7	6.7	9.1	3.8
<i>P. m. fulvus a.</i>	Oaxaca, Mexico.	25	19.5	12.8	4	8 x 2.1	10	3.7	5.6	6.5	8.7	3.8
<i>P. m. laticula a.</i>	Ocotlan, Jalisco	25.7	21	14	3.7	7.2 x 2.5	11	3.7	5.8	7.3	9.5	4.1
Do.	do.	27.4	21.5	14	3.8	8.4 x 2.7	10.6	4.1	5.9	7.4	9.8	4.4
<i>P. m. sonoriensis</i>	Sanja Cruz River, Sonora.	27.3	20.3	13.4	3.8	9.4 x 2.8	10.8	4.3	5	6.8	9.1	3.9
Do.	do.	25.9	20.1	13.4	3.5	8.2 x 2.3	10.7	4.2	5.4	6.9	8.9	3.8
<i>P. m. coolidgei</i>	San Jose del Cabo, Lower California.	25.4	20	13.4	3.8	8.4 x 2.3	9.4	3.7	5.4	6.9	9.2	3.9
Do.	do.	25.7	20	13.1	3.7	8.6 x 2.7	10	4	5.2	6.9	8.9	3.8
<i>P. m. margaritae a.</i>	Margarita Island, Lower California.	25.7	19.4	13.2	3.7	9 x 3	9.6	3.6	5.2	6.3	9.2	3.6
<i>P. m. clementis</i>	San Clemente Island, California.	25.8	20.5	13.1	3.9	8.7 x 2.5	9.4	4.1	5.2	6.4	9.2	3.8
Do.	do.	27.3	20.5	13.8	4	8.7 x 2.2	10.7	3.8	6	7.2	8.9	3.9
<i>P. m. calaline a.</i>	San Catalina Island, California.	28.3	19.8	13.3	3.9	8.7 x 2.3	9.9	3.9	5.2	6.4	9.2	3.9
Do.	do.	26.4	21.4	13.8	3.8	8.6 x 2.7	11	3.8	5.8	7.3	10	3.8
<i>P. m. dubius a.</i>	Santa Cruz Island, California.	26.4	20.2	14	4.1	8.5 x 3.3	9.4	3.9	5.3	6.8	9.7	3.8
Do.	Todos Santos Island, Lower California.	27.3	21	13.8	4.1	8.7 x 2.3	10.9	3.9	5.5	7	9.7	4
Do.	do.	26.8	20.7	13.7	3.9	8.9 x 2.1	11	3.7	5.5	7.2	9.6	3.6
<i>P. m. geronimus.</i>	San Geronimo Island, Lower California.	26.8	20.4	13.9	4	9 x 2.8	10.7	3.9	5.5	6.8	9.1	4
Do.	do.	27	22	14.1	3.9	9.5 x 3	9.6	3.4	6	7.2	9.8	4
<i>P. m. cierritus a.</i>	San Roque Island, Lower California.	27	20.8	14	3.7	9.4 x 2.8	11	4	5.5	7	9.8	3.8
<i>P. m. madalense</i>	Madalena Island, Lower California.	27	20.8	14	3.9	9.5 x 3	10	3.4	6	7.2	9.8	3.8
<i>P. melnotus a.</i>	Las Vigas, Veracruz.	27	20.8	14	3.7	9.4 x 2.8	11	4	5.5	7	9.8	3.8
Do.	do.	25.6	19.9	13.3	4	8.4 x 2.5	10	4	5.4	6.8	9	3.5
<i>P. leucopus</i>	Honou, La.	26.3	19.5	13	4	8.3 x 2.5	10.4	3.9	5	6.7	8.9	3.5
<i>P. l. novaeboracensis</i>	Lake George, New York.	25.2	20.7	13.2	4.2	8.3 x 2.5	11	4	5.2	7.5	10	3.6
<i>P. l. annulatus a.</i>	Monroe Island, Massachusetts.	28	21.7	14.5	4.3	8.9 x 3	10	4.3	5.5	7.3	9.3	4
<i>P. l. fuscus a.</i>	Martins Vineyard, Mass.	28	21.7	14.5	4.3	8.9 x 3	10	4.3	5.5	7.3	9.3	4
<i>P. l. aridulus a.</i>	Fort Custer, Mont.	26.8	20.7	14.3	4.3	8.9 x 3	10	4.3	5.5	7.3	9.3	4

Cranial measurements of *Peromyscus*—Continued.

Species.	Locality.	Greatest length.	Basilar length.	Zygomastic breadth.	Inter-orbital constriction.	Inter-parietal.	Nasals.	Sheaf of bony palate.	Palatine slits.	Diameter.	Post-palatal length.	Maxillary tooth-row.
<i>P. nasutus</i>	Gold Hill, Colo.....	29.4	21.9	14.5	4.4	10.3 x 3	11.2	4.2	5.5	7.4	10.1	4.3
Do.....	do.....	28.7	21.4	13.5	4.3	9.9 x 2.9	11.1	4.2	5.6	7.4	9.5	4.2
<i>P. colinus</i>	Colonia Garcia, Chihuahua.....	25.9	22.9	14.8	4.5	10.5 x 2.8	11.6	4.4	6	7.4	10.6	4.7
<i>P. difficilis</i>	Volcanes Mountains, Zacatecas.....	25.1	22.4	14.5	4.5	10 x 3	11.2	4.2	5.8	7.2	11	4.9
Do.....	do.....	30.2	23	15	4.5	10.4 x 3.7	11.2	4.6	6.2	7.5	11	4.8
<i>P. d. amplius</i>	Cortlanhuca, Oaxaca.....	30.4	23	15.4	4.5	10.4 x 3.7	11.9	4.5	6.3	7.9	10.2	4.8
Do.....	do.....	31.5	24.1	15.1	4.5	10.4 x 3.3	11.9	4.7	6.3	8.3	11	4.6
<i>P. d. felipensis</i>	Cerro San Felipe, Oaxaca.....	32.2	24.5	15.3	4.7	10.4 x 4	12.1	4.7	6.4	8.6	11.3	4.9
Do.....	do.....	31.1	24	15.5	4.7	10 x 3.8	12.1	4.3	6.3	8.2	11.3	4.8
<i>P. bullatus</i>	Perote, Veracruz.....	31.9	22	14.5	4.5	10 x 3	11.6	4.6	5.4	8.3	10	4.2
Do.....	do.....	32.2	23	15.4	5	.....	11.6	4.6	6.0	8.3	10	4.2
<i>P. melanophrys</i>	Tonalá, Chiapas.....	31.3	25	16.5	4.9	.....	11.1	4.4	6.0	7.7	.....	4.7
<i>P. m. consobrinus</i>	Berriozabal, Zacatecas.....	30.8	23.3	16.3	4.9	.....	10.2	4.4	5.7	7.1	.....	4.9
<i>P. m. zamore</i>	Durango, Durango.....	30	23.8	15.3	4.9	9 x 3	11.1	4.4	5.7	7.4	10.4	4.9
<i>P. xerurus</i>	Chalchicomula, Puebla.....	25.9	20.6	13.8	3.6	11 x 3.7	9.1	4	5.7	6.5	8.6	4.7
<i>P. lepturus</i>	Mt. Zempoaltepec, Oaxaca.....	30.6	23.6	15.7	4.4	11 x 3.7	11.8	4	5.7	6.5	8.6	4.7
<i>P. lophurus</i>	Todos Santos, Guatemala.....	27.3	20.8	14.7	4.3	10 x 4.5	10	4	5.4	6	8.5	3.9
Do.....	Jico, Veracruz.....	24.4	18	12.5	4.3	8.2 x 3	9	3.5	4.6	6	12.6	3.1
<i>P. guatemalensis</i>	Todos Santos, Guatemala.....	33.5	26.4	16.6	5	10.8 x 3.4	12.9	5	6.6	9	12.5	3.1
<i>P. furvus</i>	Jalapa, Veracruz.....	33.1	27.3	17	5.3	12.3 x 4	14.2	6	6.6	9	12.5	3.1
<i>P. nudipes</i>	Volcan Irazu, Costa Rica.....	33.7	24.3	15.6	5.2	11.4 x 3.1	12.7	4.9	6.6	8.7	11.7	3.2
<i>P. mexicanus</i>	Mirador, Veracruz.....	31.7	24.3	16.3	4.8	10.8 x 4	12.2	4.6	6.6	8.4	11.4	4.5
Do.....	Papantla, Veracruz.....	33.2	25.3	16.4	4.8	11.5 x 3.1	13	4.8	6.5	8.5	12.7	4.8
<i>P. m. totontepecus</i>	Totontepec, Oaxaca.....	33	25.3	16.5	5.3	11 x 4	13.5	4.8	6.3	8.9	11.7	4.9
Do.....	Orizaba, Veracruz.....	34	26	14.9	5	11.1 x 3.8	12.2	4.2	6.1	8.3	11.5	4.7
<i>P. m. saxatilis</i>	Jacaltenango, Guatemala.....	31.8	24	15.4	4.9	10.8 x 3.9	13.8	5	6.3	8.2	11.9	4.5
Do.....	do.....	33.3	25	15.4	5.4	.....	12.7	4.7	6	8.2	11.9	4.5
<i>P. m. tepensis</i>	Teapa, Tabasco.....	30.5	23.1	15.2	5.4	.....	12.4	4.4	5.8	8.6	10.9	4.3
<i>P. m. gymnotis</i>	Guatemala.....	31.4	24	15.2	5	.....	12.4	4	6.2	8.2	10.6	4.3
Do.....	do.....	30.6	23.9	15	5	11 x 4.4	12	4	5.2	8	10.8	4.2
<i>P. banderanus</i>	Valle de Banderas, Tepic.....	31.3	23.4	15.6	4.7	10.3 x 4	11.3	4.8	6	8.5	10.4	4.6
Do.....	Hda. Magdalena, Colima.....	31.3	23.4	15.6	5.2	10.6 x 3.6	11.7	4.8	6	8.5	10.4	4.4
<i>P. b. angelensis</i>	Puerto Angel, Oaxaca.....	30.9	23.5	14.5	4.4	10.5 x 3.3	11.7	4.8	5.3	7	9.9	4.1
<i>P. yucatanicus</i>	Chichenitzá, Yucatan.....	28.2	20.7	14.1	4.7	9.2 x 3.1	10.4	4.2	5.3	8.2	11.2	4.6
<i>P. y. badus</i>	Apozote, Campeche.....	31	24.6	14.6	5	10.7 x 3.8	11.5	4.8	6	9.1	12	5.3
<i>P. allanensis</i>	Todos Santos, Guatemala.....	31	24.6	14.6	5	10.7 x 3.8	11.5	4.8	6	9.1	12	5.3
<i>P. megalops</i>	Near Ozootepec, Oaxaca.....	34.1	26.2	17	5.9	10.6 x 4	12.9	5.4	7	9.6	12	5.5
Do.....	do.....	33.5	26	17	5.5	10 x 3.4	14.3	5.4	6.9	9.6	12	5.5
<i>P. m. auritus</i>	Near Oaxaca, Oaxaca.....	34.8	27	16.8	5.5	9.8 x 3.7	12.4	4.8	7	8.6	11.3	5.4
<i>P. m. melanurus</i>	Pluma, Oaxaca.....	33.1	25	16.2	5.3	.....	12.4	4.8	7	8.6	11.3	5.4

	31.6	24.3	15.2	5.4	12 x 3.2	12	4.4	7.3	8.3	11	5.4
<i>P. melanocarpus</i> ^a	38.7	29.5	17.9	5.5	12 x 3.2	16	5.3	8.7	10.8	13.1	5.4
<i>P. xanthochus</i> ^a											
SUBGENUS MEGA-DONTOMYS.											
<i>P. thomasi</i> ^a	38	29.9	18.7	5.4	12 x 5	14.9	6.1	8.1	10.2	13.4	6
<i>P. nelsoni</i> ^a	36.8	28.6	18.3	5.2	10.7 x 4.3	14.3	6	7.8	9.7	12.8	6.3
<i>P. flavidus</i> ^a	40.6	31.2	19.4	6.2	12.6 x 5	17.4	6.7	7.3	10.9	14.3	5.9
SUBGENUS OCHRO-TOMYS.											
<i>P. nuttalli</i>	27	21	14.7	4.6	9 x 3	9.8	4.3	5.1	7.1	9.6	4
Do.....	28.2	20.3	14.2	3.6	9.7 x 3	9.4	4.3	5	7.2	9	3.9
<i>P. n. aureolus</i>	26	20.4	13.9	4.2	7.9 x 2.7	9.2	4.1	4.8	7.1	9.2	3.4
Do.....	25.3	19.5	13.1	4.1	8.9 x 2.3	9.6	3.9	4.7	6.9	9	3.7
SUBGENUS PODOMYS.											
<i>P. floridanus</i>	30.6	22.9	14.9	4.9	9.7 x 2.9	11.7	4.8	5.7	7.9	10.3	4.4
Do.....	28.9	21.5	14.9	4.6	9 x 3	11	4.3	5.6	7	9.9	4.6
SUBGENUS HAPLO-MYLOMYS.											
<i>P. californicus</i>	31	25	16	4.7	11 x 4	11.2	4.6	6.3	8.3	11.6	4.7
<i>P. c. insignis</i>	28.5	21.5	14.2	4.5	10.2 x 3	10.3	4.1	5.6	7	10.2	4
<i>P. eremicus</i>	25.7	19.5	12.7	3.9	9.5 x 2.6	9.4	4.1	4.7	6	8.9	3.9
<i>P. e. cedrosensis</i>	25.8	19.2	13.3	4		10.4	3.9	5.2	6.8	8.2	3.7
<i>P. e. eva</i>	25	19.3	12.7	4	8.9 x 2.7	9.2	3.5	5.1	6.2	9	3.3
<i>P. e. insulicola</i> ^a	25.9	19.3	12.4	3.9	9.3 x 3.3	9.5	3.5	5.2	6.3	9.2	3.6
<i>P. e. avius</i> ^a	25.9	20	13.4	4	9 x 3.3	8.9	4	4.8	6.5	9.2	4
<i>P. e. polypollus</i> ^a	24	18	12.2	4	9.4 x 3	8.7	3.7	4.8	5.8	8	3.9
<i>P. e. tiburonensis</i> ^a	24	18.2	12			8					3.4
<i>P. goldmani</i> ^a	27.3	21.1	14.2	4	8.6 x 3.2	9.6	4.2	5	6.6	10	4
SUBGENUS BAIONYS.											
<i>P. taylori</i>	18.5	14.3	9.9	3.4	5.6 x 1.6	6.5	2.7	4	4.6	6.5	3
<i>P. t. subata</i> ^a	18	13.6	10	3.5	5.5 x 1.5	6.8	2.5	4	4.4	6.1	3
<i>P. t. paulus</i> ^a	18	14	9.5	3.6	6 x 1.4	6	2.8	3.8	4	6.3	3
<i>P. t. analagus</i> ^a	18	14	9.8	3.3	5.9 x 2.2	6.2	2.6	3.5	4.5	6	2.9
<i>P. musculus</i> ^a	21	15.7	11.3	3.8	8 x 2.3	8	3.2	4.2	4.9	7	3.2
<i>P. m. brunneus</i> ^a	19.8	15	10.3	3.9	7 x 1.5	7	2.8	4.2	4.5	7	3
<i>P. m. nigrescens</i> ^a	20.1	15.2	10.5	3.4	6.4 x 2.1	8	2.8	4.3	4.5	7	3.2

^a Type.

PLATE II.

[About one and one-third times natural size.]

- Fig. 1. *Peromyscus maniculatus* (Wagner). Labrador. (No. 3666 Mus. Comp. Zool., Cambridge, Mass.)
2. *Peromyscus maniculatus arcticus* (Mearns). Topotype. Fort Simpson, Mackenzie, Canada. Adult male. (No. 133957 U. S. Nat. Mus., Biological Survey Coll.)
3. *Peromyscus maniculatus austerus* (Baird). Topotype. Steilacoom, Wash. Adult male. (No. 42935 U. S. Nat. Mus., Biological Survey Coll.)
4. *Peromyscus maniculatus hylaeus* Osgood. Type. Hollis, Prince of Wales Island, Alaska. Adult male. (No. 127038 U. S. Nat. Mus., Biological Survey Coll.)
5. *Peromyscus maniculatus gracilis* (Le Conte). Mountain View, N. Y. Adult female. (No. 93635 U. S. Nat. Mus., Biological Survey Coll.)
6. *Peromyscus maniculatus hollisteri* Osgood. Type. Friday Harbor, San Juan Island, Washington. Adult male. (No. 130316 U. S. Nat. Mus., Biological Survey Coll.)
7. *Peromyscus sitkensis* Merriam. Topotype. Sitka, Alaska. Adult male. (No. 73816 U. S. Nat. Mus., Biological Survey Coll.)
8. *Peromyscus maniculatus keeni* (Rhoads). Cumshewa Inlet, Moresby Island, Queen Charlotte Islands, British Columbia. Adult female. (No. 100726 U. S. Nat. Mus., Biological Survey Coll.)
9. *Peromyscus maniculatus pallescens* Allen. Topotype. San Antonio, Tex. Adult male. (No. 87876 U. S. Nat. Mus., Biological Survey Coll.)
10. *Peromyscus maniculatus bairdi* (Hoy and Kennicott). Onaga, Kan. Adult female. (No. 33851 U. S. Nat. Mus., Biological Survey Coll.)
11. *Peromyscus polionotus* (Wagner). Gainesville, Fla. Adult female. (No. 4659 Coll. of C. Hart Merriam.)
12. *Peromyscus maniculatus gambeli* (Baird). Topotype. Monterey, Calif. Adult female. (No. 44780 U. S. Nat. Mus., Biological Survey Coll.)

SKULLS OF PEROMYSCUS.

1. *P. maniculatus*.
2. *P. m. aretiensis*.
3. *P. m. austerus*.
4. *P. m. hylaeus*.

5. *P. m. gracilis*.
6. *P. m. hollisteri*.
7. *P. sitkensis*.
8. *P. m. keeni*.

9. *P. m. pallescens*.
10. *P. m. bairdi*.
11. *P. polionotus*.
12. *P. m. gambeli*.

PLATE III.

[About one and one-third times natural size.]

- FIG. 1. *Peromyscus leucopus tornillo* Mearns. Juarez, Chihuahua, Mexico.
Adult male. (No. 58368 U. S. Nat. Mus., Biological Survey Coll.)
2. *Peromyscus gossypinus* (Le Conte). Riceboro, Ga. Adult male. (No. 45081 U. S. Nat. Mus., Biological Survey Coll.)
3. *Peromyscus leucopus cozumelæ* Merriam. Topotype. Cozumel Island, off Yucatan, Mexico. Adult female. (No. 108440 U. S. Nat. Mus., Biological Survey Coll.)
4. *Peromyscus leucopus mesomelas* Osgood. Topotype. Orizaba, Veracruz, Mexico. (No. 58208 U. S. Nat. Mus., Biological Survey Coll.)
5. *Peromyscus odracensis* Merriam. Topotype. Cerro San Felipe, Oaxaca, Mexico. Adult female. (No. 68598 U. S. Nat. Mus., Biological Survey Coll.)
6. *Peromyscus lophurus* Osgood. Type. Todos Santos, Guatemala. Adult male. (No. 77219 U. S. Nat. Mus., Biological Survey Coll.)
7. *Peromyscus simulatus* Osgood. Type. Jico, Veracruz, Mexico. Adult female. (No. 55028 U. S. Nat. Mus., Biological Survey Coll.)
8. *Peromyscus hylocetes* Merriam. Topotype. Patzcuaro, Michoacan, Mexico. Adult male. (No. 50421 U. S. Nat. Mus., Biological Survey Coll.)
9. *Peromyscus crinitus* (Merriam). Topotype. Shoshone Falls, Idaho. Adult female. (No. 31656 U. S. Nat. Mus., Biological Survey Coll.)
10. *Peromyscus crinitus stephensi* Mearns. Panamint Mountains, California. Adult male. (No. 40788 U. S. Nat. Mus., Biological Survey Coll.)
11. *Peromyscus cremicus* (Baird). Hardy River, Lower California, Mexico. Adult male. (No. 81868 U. S. Nat. Mus., Biological Survey Coll.)
12. *Peromyscus leucopus texanus* (Woodhouse). Brownsville, Tex. Adult male. (No. 41753 U. S. Nat. Mus., Biological Survey Coll.)

SKULLS OF PEROMYSCUS.

1. <i>P. l. tornillo.</i>	5. <i>P. oaxacensis.</i>	9. <i>P. crinitus.</i>
2. <i>P. gossypinus.</i>	6. <i>P. lophurus.</i>	10. <i>P. c. stephensi.</i>
3. <i>P. l. cozumelæ.</i>	7. <i>P. simulatus.</i>	11. <i>P. eremicus.</i>
4. <i>P. l. mesomelas.</i>	8. <i>P. hylocetes.</i>	12. <i>P. l. texanus.</i>

PLATE IV.

[About one and one-third times natural size.]

- FIG. 1. *Peromyscus boylei* (Baird). Topotype. Middle Fork American River, California. Adult male. (No. 43232 U. S. Nat. Mus., Biological Survey Coll.)
2. *Peromyscus boylei levipes* Merriam. Type. Mount Malinche, Tlaxcala, Mexico. Adult male. (No. 53673 U. S. Nat. Mus., Biological Survey Coll.)
3. *Peromyscus boylei spicilegus* Allen. Topotype. San Sebastian, Jalisco, Mexico. Adult female. (No. 58543 U. S. Nat. Mus., Biological Survey Coll.)
4. *Peromyscus boylei simulus* Osgood. Type. San Blas, Tepic, Mexico. Adult male. (No. 88088 U. S. Nat. Mus., Biological Survey Coll.)
5. *Peromyscus boylei aztecus* (Saussure). Topotype. Mirador, Veracruz, Mexico. Adult female. (No. 58543 U. S. Nat. Mus., Biological Survey Coll.)
6. *Peromyscus truci* (Shufeldt). Topotype. Fort Wingate, N. Mex. Adult female. (No. 46789 U. S. Nat. Mus., Biological Survey Coll.)
7. *Peromyscus pectoralis eremicoides* Osgood. Type. Mapimi, Durango, Mexico. Adult male. (No. 57729 U. S. Nat. Mus., Biological Survey Coll.)
8. *Peromyscus nasutus* (Allen). Gold Hill, Colo. Adult female. (No. 69264 U. S. Nat. Mus., Biological Survey Coll.)
9. *Peromyscus truci gratus* Merriam. Topotype. Tlalpam, D. F., Mexico. Adult male. (No. 50613 U. S. Nat. Mus., Biological Survey Coll.)
10. *Peromyscus taylori* (Thomas). Brownsville, Tex. Adult female. (No. 48813 U. S. Nat. Mus., Biological Survey Coll.)
11. *Peromyscus musculus* Merriam. Topotype. Armeria, Colima, Mexico. Adult female. (No. 45441 U. S. Nat. Mus., Biological Survey Coll.)
12. *Peromyscus lepturus* Merriam. Topotype. Mount Zempoaltepec, Oaxaca, Mexico. Adult male. (No. 68615 U. S. Nat. Mus., Biological Survey Coll.)

SKULLS OF PEROMYSCUS.

1. *P. boyleyi*.
2. *P. b. levipes*.
3. *P. b. spicilegus*.
4. *P. b. simulus*.

5. *P. b. aztecus*.
6. *P. truei*.
7. *P. p. eremicoides*.
8. *P. nasutus*.

9. *P. t. gratus*.
10. *P. taylori*.
11. *P. musculus*.
12. *P. lepturus*.

PLATE V.

[About one and one-third times natural size.]

- FIG. 1. *Peromyscus banderanus* Allen. Hacienda Magdalena, Colima, Mexico. Adult male. (No. 45336 U. S. Nat. Mus., Biological Survey Coll.)
2. *Peromyscus guatemalensis* Merriam. Topotype. Todos Santos, Guatemala. (No. 76852 U. S. Nat. Mus., Biological Survey Coll.)
3. *Peromyscus melanophrys* (Coues). Yaganiza, Oaxaca, Mexico. Adult male. (No. 68606 U. S. Nat. Mus., Biological Survey Coll.)
4. *Peromyscus yucatanicus* Allen and Chapman. La Vega, Yucatan, Mexico. Adult female. (No. 108424 U. S. Nat. Mus., Biological Survey Coll.)
5. *Peromyscus megalops* Merriam. Mountains near Chilpancingo, Guerrero, Mexico. Adult male. (No. 70188 U. S. Nat. Mus., Biological Survey Coll.)
6. *Peromyscus difficilis* (Allen). Topotype. Valparaiso Mountains, Zatecas, Mexico. Adult female. (No. 91829 U. S. Nat. Mus., Biological Survey Coll.)
7. *Peromyscus furrus* Allen and Chapman. Jico, Veracruz, Mexico. Adult female. (No. 55021 U. S. Nat. Mus., Biological Survey Coll.)
8. *Peromyscus mexicanus* (Saussure). Topotype. Mirador, Veracruz, Mexico. Adult male. (No. 58547 U. S. Nat. Mus., Biological Survey Coll.)
9. *Peromyscus* (*Peromyscus*) *leucopus northboracensis* (Fischer). Montauk Point, New York. Adult male. (No. 56714 U. S. Nat. Mus., Biological Survey Coll.)
10. *Peromyscus* (*Reithomys*) *musculus* (Merriam). Armeria, Colima, Mexico. Adult female. (No. 45441 U. S. Nat. Mus., Biological Survey Coll.)
11. *Peromyscus* (*Ochrotomys*) *nuttalli* (Harlan). Dismal Swamp, Virginia. Adult male. (No. 75198 U. S. Nat. Mus., Biological Survey Coll.)
12. *Peromyscus* (*Haplomylomys*) *cremicus* (Baird). Hardy River, Lower California, Mexico. Adult male. (No. 81868 U. S. Nat. Mus., Biological Survey Coll.)
13. *Peromyscus* (*Megadontomys*) *thomasi* Merriam. Topotype. Mountains near Chilpancingo, Guerrero, Mexico. Adult female. (No. 70413 U. S. Nat. Mus., Biological Survey Coll.)
14. *Peromyscus* (*Podomys*) *floridanus* (Chapman). Cape Canaveral, Florida. Adult female. (No. 23416 U. S. Nat. Mus., Biological Survey Coll.)

SKULLS OF PEROMYSCUS.

1. <i>P. banderanus</i> .	6. <i>P. difficilis</i> .	11. <i>P. nuttalli</i> .
2. <i>P. guatemalensis</i> .	7. <i>P. furvus</i> .	12. <i>P. eremicus</i> .
3. <i>P. melanophrys</i> .	8. <i>P. mexicanus</i> .	13. <i>P. thomasi</i> .
4. <i>P. yucatanicus</i> .	9. <i>P. l. noveboracensis</i> .	14. <i>P. floridanus</i> .
5. <i>P. megalops</i> .	10. <i>P. musculus</i> .	

PLATE VI.

[About one and one-third times natural size.]

- FIG. 1. *Peromyscus* (*Peromyscus*) *zarhynchus* Merriam. Topotype. San Cristobal, Chiapas, Mexico. Adult male. (No. 76097 U. S. Nat. Mus., Biological Survey Coll.)
- 2, 2 A. *Peromyscus* (*Megadontomys*) *flavidus* Bangs. Topotype. Boquete, Chiriqui, Panama. (No. 10331 Mus. Comp. Zool., Cambridge, Mass.)
- 3, 3 A. *Peromyscus* (*Megadontomys*) *thomasi* Merriam. Topotypes. Mountains near Chilpancingo, Guerrero, Mexico. (3. No. 70144; 3a. No. 70143 U. S. Nat. Mus., Biological Survey Coll.)
4. *Peromyscus* (*Peromyscus*) *leucopus* (Rafinesque). Houma, La. Adult female. (No. 46011 U. S. Nat. Mus., Biological Survey Coll.)
- 5, 5 A. *Peromyscus* (*Haplomylomys*) *californicus* (Gambel.) Topotype. Monterey, Calif. Adult male. (No. 44777 U. S. Nat. Mus., Biological Survey Coll.)
- 6, 6 A. *Peromyscus* (*Podomys*) *floridanus* (Chapman). Cape Canaveral, Florida. Adult female. (No. 23416 U. S. Nat. Mus., Biological Survey Coll.)
- 7, 7 A. *Peromyscus* (*Ochrotomys*) *nuttalli* (Harlan). Dismal Swamp, Virginia. Adult female. (No. 95886 U. S. Nat. Mus., Biological Survey Coll.)
- 8, 8 A. *Peromyscus* (*Peromyscus*) *leucopus noveboracensis* (Fischer). Jaw. 8. East Hartford, Connecticut. Adult male. (No. 64349 U. S. Nat. Mus., Biological Survey Coll.) 8A. Montauk Point, New York. Adult male. (No. 56714 U. S. Nat. Mus., Biological Survey Coll.)
9. *Peromyscus* (*Haplomylomys*) *cremicus* (Baird). Jaw. Hardy River, Lower California, Mexico. Adult male. (No. 81868 U. S. Nat. Mus., Biological Survey Coll.)
10. *Peromyscus* (*Baiomys*) *musculus* (Merriam). Jaw. Armeria, Colima, Mexico. Adult female. (No. 45441 U. S. Nat. Mus., Biological Survey Coll.)

SKULLS AND JAWS OF PEROMYSCUS.

1. *P. zarhynchus*.
 2. *P. flavidus*.
 3. *P. thomasi*.
 4. *P. leucopus*.

5, 5A. *P. californicus*.
 6, 6A. *P. floridanus*.
 7, 7A. *P. nuttalli*.

8, 8A. *P. l. noveboracensis*.
 9. *P. eremicus*.
 10. *P. musculus*.

PLATE VII.

[About one and one-third times natural size.]

- FIG. 1. *Peromyscus floridanus* (Chapman). Cape Canaveral, Florida. Adult female. (No. 23416 U. S. Nat. Mus., Biological Survey Coll.)
2. *Peromyscus nuttalli* (Harlan). Dismal Swamp, Virginia. Adult male. (No. 75198 U. S. Nat. Mus., Biological Survey Coll.)
3. *Peromyscus leucopus noveboracensis* (Fischer). East Hartford, Conn. Adult male. (No. 64349 U. S. Nat. Mus., Biological Survey Coll.)
4. *Peromyscus eremicus* (Baird). Hardy River, Lower California, Mexico. Adult male. (No. 81868 U. S. Nat. Mus., Biological Survey Coll.)
5. *Peromyscus thomasi* Merriam. Topotype. Mountains near Chilpancingo, Guerrero, Mexico. Adult male. (No. 70144 U. S. Nat. Mus., Biological Survey Coll.)
6. *Peromyscus mexicanus* (Saussure). Topotype. Mirador, Veracruz, Mexico. Adult male. (No. 58547 U. S. Nat. Mus., Biological Survey Coll.)
7. *Peromyscus bullatus* Osgood. Type. Perote, Veracruz, Mexico. Adult female. (No. 54405 U. S. Nat. Mus., Biological Survey Coll.)
8. *Peromyscus flavidus* Bangs. Topotype. Boquete, Chiriqui, Panama. (No. 10331 Mus. Comp. Zool., Cambridge, Mass.)
9. *Peromyscus boylei* (Baird). Topotype. Middle Fork American River, California. Adult male. (No. 43232 U. S. Nat. Mus., Biological Survey Coll.)
10. *Peromyscus truei* (Shufeldt). Topotype. Fort Wingate, N. Mex. Adult female. (No. 46789 U. S. Nat. Mus., Biological Survey Coll.)
11. *Peromyscus musculus* (Merriam). Armeria, Colima, Mexico. Adult female. (No. 45441 U. S. Nat. Mus., Biological Survey Coll.)
12. *Peromyscus maniculatus gracilis* (Le Conte). Mountain View, N. Y. Adult female. (No. 93635 U. S. Nat. Mus., Biological Survey Coll.)

SKULLS OF PEROMYSCUS.

1. *P. floridanus*.
2. *P. nuttalli*.
3. *P. l. noveboracensis*.
4. *P. eremicus*.

5. *P. thomasi*.
6. *P. mexicanus*.
7. *P. bullatus*.
8. *P. flavidus*.

9. *P. boylei*.
10. *P. truei*.
11. *P. musculus*.
12. *P. m. gracilis*.

PLATE VIII.

[Teeth about seven and one-half times natural size; soles about two and one-half times.]

Figs. 1, 1a, 1b, 1c. *Peromyscus (Megadontomys) thomasi* Merriam.

1. Side view of upper molars. (No. 126887 U. S. Nat. Mus., Biological Survey Coll.)

1a. Worn crowns of upper molars. (No. 126889 U. S. Nat. Mus., Biological Survey Coll.)

1b. Worn crowns of lower molars. (No. 126889 U. S. Nat. Mus., Biological Survey Coll.)

1c. Sole of hind foot. (No. 126889 U. S. Nat. Mus., Biological Survey Coll.)

2, 2a, 2b, 2c. *Peromyscus (Peromyscus) leucopus noveboracensis* (Fischer).

2. Side view of upper molars. (No. 44939 U. S. Nat. Mus., Biological Survey Coll.)

2a. Worn crowns of upper molars. (No. 96930 U. S. Nat. Mus., Biological Survey Coll.)

2b. Worn crowns of lower molars. (No. 96929 U. S. Nat. Mus., Biological Survey Coll.)

2c. Sole of hind foot. (No. 82924 U. S. Nat. Mus., Biological Survey Coll.)

3. *Peromyscus eremicus* (Baird). Side view of upper molars. (No. 81870 U. S. Nat. Mus., Biological Survey Coll.)

4. *Peromyscus (Haplomylomys) californicus* Gambel. Crowns of upper molars. (No. 97134 U. S. Nat. Mus., Biological Survey Coll.)

5, 5a. *Peromyscus (Ochrotomys) nuttalli* (Harlan).

5. Worn crowns of upper molars. (No. 75198 U. S. Nat. Mus., Biological Survey Coll.)

5a. Sole of hind foot. (No. 140805 U. S. Nat. Mus., Biological Survey Coll.)

6. *Peromyscus (Peromyscus) maniculatus gracilis* (Le Conte). Sole of hind foot. (No. 147327 U. S. Nat. Mus., Biological Survey Coll.)

7. *Peromyscus (Baikomys) taylori* (Thomas). Sole of hind foot. (No. 18287 U. S. Nat. Mus.)

8. *Peromyscus (Podomys) floridanus* Chapman. Sole of hind foot. (No. 111458 U. S. Nat. Mus.)

F. von Irtzen, del.

MOLAR TEETH AND SOLES OF PEROMYSCUS.

- 1, 1a, 1b, 1c. *P. thomasi*.
 2, 2a, 2b, 2c. *P. l. noveboracensis*.
 3. *P. eremicus*.
 4. *P. californicus*.

- 5, 5a. *P. nuttalli*.
 6. *P. m. gracilis*.
 7. *P. taylori*.
 8. *P. floridanus*.

INDEX.

[New names in black face type; synonyms in *Italics*.]

A.

- abletorum, *Peromyscus*, 46.
affinis, *Hesperomys*, 133.
Peromyscus, 133.
Vesperimus, 133.
akeleyi, *Peromyscus*, 63.
albifrons, *Peromyscus*, 108.
algidus, *Peromyscus*, 56.
allez, *Peromyscus*, 255.
allophylus, *Peromyscus*, 206.
altitaneus, *Peromyscus*, 197.
americanus, *Mus*, 117.
Sitomys, 117.
Vesperimus, 113, 117.
ammodytes, *Peromyscus*, 121.
amplus, *Peromyscus*, 181.
analogus, *Peromyscus*, 256.
anastasiae, *Peromyscus*, 141.
angelensis, *Peromyscus*, 210.
anthonyi, *Hesperomys*, 249.
Peromyscus, 249.
Vesperimus, 249.
arboreus, *Peromyscus*, 117.
arcticus, *Hesperomys*, 40, 49.
Peromyscus, 49.
arenarius, *Peromyscus*, 104, 239.
argentatus, *Peromyscus*, 46.
aridulus, *Peromyscus*, 122.
arizonae, *Peromyscus*, 126.
Sitomys, 126.
Arvicola emmonsi, 117.
nuttalli, 224.
auritus, *Peromyscus*, 214.
artemisiae, *Peromyscus*, 58.
Sitomys, 58.
attwateri, *Peromyscus*, 147.
aureolus, *Calomys*, 225.
Mus, 225.
Peromyscus, 225.
auropectus, *Peromyscus*, 231.
Sitomys, 231.
austerus, *Hesperomys*, 63.
Peromyscus, 63.
avicus, *Peromyscus*, 247.

B.

- badius*, *Peromyscus*, 212.
Batomys, 82, 252.
Batomys musculus, 257.
taylori, 253.

boirdii, *Mus*, 79.

- Peromyscus*, 79.
balialis, *Peromyscus*, 104.
banderanus, *Peromyscus*, 207.
beatae, *Peromyscus*, 153.
bellus, *Peromyscus*, 147.
blandus, *Peromyscus*, 84.
boylii, *Hesperomys*, 142.
boylei, *Peromyscus*, 142.
brunneus, *Peromyscus*, 259.
bullatus, *Peromyscus*, 183.

C.

- cacabatus*, *Peromyscus*, 195.
californicus, *Mus*, 234.
Peromyscus, 234.
Calomys aureolus, 225.
campestris, *Hesperomys*, 117.
canadensis, *Sitomys*, 42.
canus, *Peromyscus*, 127.
carolinensis, *Mus*, 135.
castaneus, *Peromyscus*, 183.
catalinae, *Peromyscus*, 97.
ceollii, *Peromyscus*, 109.
cedrosensis, *Peromyscus*, 244.
cherrii, *Hesperomys*, 75.
Vesperimus, 75.
cineritius, *Peromyscus*, 100.
clementis, *Peromyscus*, 96.
cognatus, *Hesperomys*, 136.
Color descriptions, 21-22.
comptus, *Peromyscus*, 214.
consobrinus, *Peromyscus*, 188.
coolidgei, *Peromyscus*, 94.
cozumelae, *Peromyscus*, 135.
Cricetus myoides, 117.
crinitus, *Hesperomys*, 229.
Peromyscus, 229.
cristobalensis, *Peromyscus*, 217.

D.

- deserticolus*, *Hesperomys*, 89.
difficilis, *Peromyscus*, 178.
Vesperimus, 178.
dubius, *Peromyscus*, 98.
dyschilus, *Peromyscus*, 169.

E.

- Economic status, habits and, 26-28.
emmonsi, *Arvicola*, 117.

eremicoides, *Peromyscus*, 163.
eremicus, *Hesperomys*, 239.
Peromyscus, 239.
eremus, *Peromyscus*, 47.
eva, *Peromyscus*, 245.
evides, *Peromyscus*, 152.
exiguus, *Peromyscus*, 99.

F.

fellipensis, *Peromyscus*, 182.
flaccidus, *Peromyscus*, 125.
flavidus, *Megadontomys*, 221.
Peromyscus, 221.
floridanus, *Hesperomys*, 227.
Peromyscus, 227.
fraterculus, *Peromyscus*, 243.
Sitomys, 243.
Vesperimus, 243.
fulvus, *Peromyscus*, 80.
furvus, *Peromyscus*, 196.
fusus, *Peromyscus*, 122.

G.

gadowi, *Peromyscus*, 185.
gambell, *Hesperomys*, 67.
Peromyscus, 67.
Sitomys, 67.
gaurus, *Peromyscus*, 145.
gentilis, *Peromyscus*, 173.
Genus Peromyscus, characters, 33.
geronimensis, *Peromyscus*, 99.
giliberti, *Peromyscus*, 169.
Sitomys, 169.
goldmani, *Peromyscus*, 251.
gossypinus, *Hypudaeus*, 135.
gossypinus, *Hesperomys*, 135.
Peromyscus, 135.
gracilis, *Hesperomys*, 42.
Peromyscus, 42.
gratus, *Peromyscus*, 173.
guatemalensis, *Peromyscus*, 193.
gymnotis, *Peromyscus*, 205.

H.

Habits and economic status, 26-28.
Haplomylomys, 33, 228.
hemionotis, *Peromyscus*, 171.
herroni, *Sitomys*, 243.
Hesperomys, 32.
Hesperomys affinis, 133.
anthonyi, 249.
arcticus, 40, 49.
austerus, 63.
aztecus, 156.
boylii, 142.
campestris, 117.
cherrii, 75.
cognatus, 136.
crinitus, 229.
deserticolus, 89.
eremicus, 239.
floridanus, 227.
gambell, 67.
gossypinus, 135.

Hesperomys gracilis, 42.
leucopus, 113.
macropus, 227.
maniculatus, 40.
megalotis, 165.
melanophrys, 184.
mexicanus, 198.
nebrascensis, 75, 77.
niveiventris, 105.
nudipes, 195.
nuttalli, 224.
parasiticus, 234.
rufinus, 72.
sonoriensis, 89.
taylori, 253.
texana, 127.

History and nomenclature, 11-14.

hollisteri, *Peromyscus*, 62.
homochroia, *Peromyscus*, 243.
hylaicus, *Peromyscus*, 53.
hylocetes, *Peromyscus*, 159.
Hypudaeus gossypinus, 135.

I.

insignis, *Peromyscus*, 237.
insolatus, *Sitomys*, 89.
insulanus, *Peromyscus*, 141.
insulicola, *Peromyscus*, 246.
 Intergradation, 17-19.

K.

Keys, 23.
koenl, *Peromyscus*, 55.
Sitomys, 55.

L.

labecula, *Peromyscus*, 87.
laccianus, *Peromyscus*, 164.
laceyi, *Peromyscus*, 148.
lagunae, *Peromyscus*, 172.
lasius, *Peromyscus*, 165.
lepturus, *Peromyscus*, 190.
leucopus, *Hesperomys*, 113.
Mus, 113.
Musculus, 113.
Peromyscus, 113.
Vesperimus, 113.
leucurus, *Peromyscus*, 185.
levipes, *Peromyscus*, 153.
lophurus, *Peromyscus*, 192.
luteus, *Peromyscus*, 77.

M.

macropus, *Hesperomys*, 227.
macrorhinus, *Peromyscus*, 57.
Sitomys, 57.
madrensis, *Peromyscus*, 152.
magdalenae, *Peromyscus*, 101.
major, *Sitomys*, 145.
maniculatus, *Hesperomys*, 40.
Peromyscus, 40.
margaritae, *Peromyscus*, 95.
martirensis, *Peromyscus*, 171.
Sitomys, 171.

Material, 10-11.

mournii, *Vesperimus*, 127.

Measurements, 22-23.

table of cranial, 263.

table of external, 260.

medius, *Peromyscus*, 67.*megacephalus*, *Peromyscus*, 138.*nitomys*, 138.*Megadontomys*, 33, 218.*Megadontomys flavidus*, 221.*nelsoni*, 221.*thomasi*, 219.*megalops*, *Peromyscus*, 213.*megalotis*, *Hesperomys*, 165.*mektisturus*, *Peromyscus*, 189.*melanocarpus*, *Peromyscus*, 216.*melanotis*, *Peromyscus*, 109.*melanophrys*, *Hesperomys*, 184.*Peromyscus*, 184.*melanurus*, *Peromyscus*, 215.*merriami*, *Peromyscus*, 239.*mesomelas*, *Peromyscus*, 132.*metallicola*, *Peromyscus*, 145.*mexicanus*, *Peromyscus*, 198.*Hesperomys*, 198.*michiganensis*, *Mus*, 117.*Peromyscus*, 79.*minnesotae*, *Peromyscus*, 117.*mississippiensis*, *Peromyscus*, 138.*montipinoris*, *Peromyscus*, 166.*Mus americanus*, 117.*aureolus*, 225.*bairdi*, 79.*californicus*, 234.*carolinensis*, 135.*leucopus*, 113.*michiganensis*, 117.*novedoracensis*, 117.*polionotus*, 104.*musculoides*, *Peromyscus*, 133.*Musculus leucopus*, 113.*musculus*, *Batomys*, 257.*Peromyscus*, 257.*Sitomys*, 257.*myoides*, *Cricetus*, 117.

N.

nasutus, *Peromyscus*, 176.*Vesperimus*, 176.*nebrascensis*, *Hesperomys*, 75, 77.*Peromyscus*, 75, 77.*nelsoni*, *Megadontomys*, 221.*Peromyscus*, 221.

New subspecies, 32.

nicaraguae, *Peromyscus*, 203.*nigellus*, *Sitomys*, 243.*nigrescens*, *Peromyscus*, 259.

Nomenclature, history and, 11-14.

novedoracensis, *Mus*, 117.*Peromyscus*, 117.*nubiterrae*, *Peromyscus*, 47.*nudipes*, *Hesperomys*, 195.*Peromyscus*, 195.*Vesperimus*, 195.*nuttalli*, *Arvicola*, 224.*Hesperomys*, 224.*Peromyscus*, 224.

O.

oaxacensis, *Peromyscus*, 158.*ochraceus*, *Peromyscus*, 124.*Ochrotomys*, 33, 222.*oreas*, *Peromyscus*, 51.*oresterus*, *Peromyscus*, 89.*oricabae*, *Peromyscus*, 202.

P.

pallascens, *Peromyscus*, 83.*palmaris*, *Peromyscus*, 139.*parasiticus*, *Hesperomys*, 234.*Peromyscus*, 145.*paulus*, *Peromyscus*, 255.*pavidus*, *Peromyscus*, 173.*pectoralis*, *Peromyscus*, 160.*Pelages*, 19-21.*penicillatus*, *Peromyscus*, 145.*perimexurus*, *Peromyscus*, 65.*Peromyscus*, genus, 32-33.

subgenus, 33-34.

Peromyscus abietorum, 45-46.*akeleyi*, 63.

affinis, 133-134.

albifrons, 108-109.*algidum*, 56.*allez*, 255.*allophylus*, 206-207.*altianus*, 197-198.*ammodytes*, 121-122.*amplus*, 181-182.*analogus*, 256-257.*anastasae*, 141.*angelensis*, 210.*anthonyi*, 249-250.*arborcus*, 117.*arcticus*, 40-51.*arenarius*, 104, 239.*argentatus*, 46.*aridulus*, 122.*arizonae*, 126-127.*artemisiae*, 58-61.*attwateri*, 147-149.*aureolus*, 225-226.*auripectus*, 231-232.*auritus*, 214-215.*austerus*, 63-65.*avina*, 247-248.*aztecus*, 156-158.*badius*, 212.*bairdi*, 79-83.*ballois*, 104.*banderanus*, 207-209.*beatae*, 153.*bellus*, 147.*blandus*, 84.*boylei*, 142.*brunneus*, 259.*bullatus*, 183-184.*oscebatu*, 195.*californicus*, 234-237.*osmus*, 127.*castaneus*, 133.*catalinae*, 97.*ocotilli*, 109.*cedrosensis*, 244-245.*cineritius*, 100.

Peromyscus *elementis*, 96.
comptus, 214.
coolidgei, 94.
consobrinus, 188.
cozumelae, 135.
crinitus, 229-231.
crinobalenata, 217.
difficilis, 178-181.
dubius, 98.
dysellus, 169.
eremicoides, 163-164.
eremicus, 239-242.
eremus, 47.
eva, 245-246.
evides, 152.
exiguus, 99.
felipensis, 182-183.
flaccidus, 125.
flavidus, 221-222.
floridanus, 227-228.
fraterculus, 243-244.
fulvus, 86.
furvus, 196.
fusus, 122.
gadovii, 185.
gambeli, 67.
gaurus, 145.
gentilis, 175.
geronimensis, 99.
gilberti, 169-171.
goldmani, 251.
gossypinus, 135-138.
gracilis, 42-45.
gratus, 173-174.
guatemalensis, 193-195.
gymnotis, 205-206.
hemionotis, 171.
hollisteri, 62.
homochroa, 243.
hylaeanus, 53.
hylocetes, 159-160.
insignis, 237-238.
insulanus, 141.
insulicola, 246-247.
keeni, 55.
labecula, 87.
laceianus, 164-165.
laceyi, 148.
lagunae, 172.
lasius, 165.
lepturus, 190-192.
leucopus, 113-117.
leucurus, 185.
levipes, 153-155.
lophurus, 192.
luteus, 77-79.
macrorhinus, 57.
madrensis, 152.
magdalenae, 101.
maniculatus, 40-42.
margaritae, 95.
martirensis, 171-172.
medius, 67.
megacephalus, 138-139.
megalops, 213-214.
mekisturus, 189.
melanocarpus, 216-217.

Peromyscus *melanophrys*, 184-186.
melanotis, 109-112.
melanurus, 216-216.
merriami, 239.
mesomelas, 132.
metallicola, 145.
mexicanus, 198-201.
michiganensis, 79.
minnesotae, 117.
mississippiensis, 188.
montipinoris, 166.
musculoides, 138.
musculus, 257-258.
nasutus, 170-177.
nebrascensis, 75-77.
nelsoni, 221.
nicaraguae, 208.
nigrescens, 259-260.
niveiventris, 105.
noveboracensis, 117-121.
nubiterrae, 47.
nudipes, 195-196.
nuttalli, 224-225.
oaxacensis, 158-159.
ochraceus, (124-125.)
oreas, 51-53.
orizabae, 202.
oresterus, 89.
pallascens, 83-84.
palmaris, 139-140.
parasiticus, 145.
paulus, 255-256.
pavidus, 173.
pectoralis, 160-162.
penicillatus, 145.
perimekurus, 65.
petraeus, 232.
phaeurus, 251.
phasma, 107.
pollonotus, 104-105.
pollus, 177-178.
polypollus, 248.
prevostensis, 102.
propinquus, 245.
rhoadsi, 107-108.
rowleyi, 145-147.
rubidus, 65-67.
rufinus, 72-74.
sagax, 173.
saturatus, 61.
saxatilis, 203-204.
scitulus, 229.
simulatus, 193.
simulus, 151.
sitkensis, 101-102.
sonoriensis, 89.
spicilegus, 149-151.
stephensi, 232-234.
subarcticus, 58.
subater, 255.
subgriscus, 104.
taylori, 253-254.
teapensis, 204.
tehuantepecus, 109.
texanus, 127-131.
thomasi, 219-220.
tliluronensis, 250.

Peromyscus tornillo, 125-126.
totontepecus, 202-203.
truel, 165-169.
umbrinus, 40.
vicinior, 209.
zenurus, 188-189.
yucatanicus, 211.
zamelas, 109.
zamora, 187.
zathynchus, 217-218.
zelotes, 173.
petratus, *Peromyscus*, 232.
phacurus, *Peromyscus*, 251.
phasma, *Peromyscus*, 107.
pinalis, *Sitomys*, 145.
Podomys, 33, 226.
pollionotus, *Mus*, 104.

Peromyscus, 104.

pollus, *Peromyscus*, 177.
polypoliis, *Peromyscus*, 248.
prevostensis, *Peromyscus*, 102.
propinquus, *Peromyscus*, 245.

R.

Records of specimens, 23-24.
rhoadsi, *Peromyscus*, 107.
robustus, *Sitomys*, 142.
rowleyi, *Peromyscus*, 145.
Sitomys, 145.
rubidus, *Peromyscus*, 65.
rufinus, *Hesperomys*, 72.
Peromyscus, 72.

S.

sagax, *Peromyscus*, 173.
saturatus, *Peromyscus*, 61.
saxatilis, *Peromyscus*, 203.
scitulus, *Peromyscus*, 229.
simulatus, *Peromyscus*, 193.
simulus, *Peromyscus*, 151.
sitkensis, *Peromyscus*, 101.
Sitomys, 32.

Sitomys americanus, 117.
arizonae, 126.
artemisiae, 58.
auripectus, 231.
canadensis, 42.
fraterculus, 243.
gambelii, 67.
gilberti, 169.
herroni, 243.
insolatus, 89.
keenii, 55.
major, 145.
martirensis, 171.
megacephalus, 138.
nigellus, 243.
macrorhinus, 57.
musculus, 257.
pinalis, 145.
robustus, 142.
rowleyi, 145.
subgriseus, 104.
thurberi, 67.

sonoriensis, *Hesperomys*, 89.
Peromyscus, 80.

Species and subspecies, list of, 28-31.

apicillegus, *Peromyscus*, 149.
stephensi, *Peromyscus*, 232.
subarcticus, *Peromyscus*, 58.
subater, *Peromyscus*, 255.
Subgenera, 24-26.
Subgenera, key to, 32.
Subgenus *Balomys*, 252.
Haplomyiomys, 228.
Megadontomys, 218.
Ochrotomys, 222.
Peromyscus, 33.
Podomys, 226.
subgriseus, *Peromyscus*, 104.
Sitomys, 104.

T.

taylori, *Balomys*, 253.
Hesperomys, 253.
Peromyscus, 253.
Vesperimus, 253.
teapensis, *Peromyscus*, 204.
tehuantepecus, *Peromyscus*, 199.
teeana, *Hesperomys*, 127.
texanus, *Peromyscus*, 127.
thomasi, *Megadontomys*, 219.
Peromyscus, 219.
thurberi, *Sitomys*, 67.
tiburonensis, *Peromyscus*, 250.
tornillo, *Peromyscus*, 125.
totontepecus, *Peromyscus*, 202.
Trinodontomys, 33.
truel, *Hesperomys*, 165.
Peromyscus, 165.

Type localities, list of, 28-31.

U.

umbrinus, *Peromyscus*, 40.

V.

Variation, 14-16.

Vesperimus, 32.
Vesperimus affinis, 133.
americanus, 113, 117.
anthonyi, 249.
cherryi, 75.
difficilis, 178.
fraterculus, 243.
leucopus, 113.
moarnsi, 127.
nasutus, 176.
nudipes, 195.
taylori, 253.

vicinior, *Peromyscus*, 209.

X.

zenurus, *Peromyscus*, 188.

Y.

yucatanicus, *Peromyscus*, 211.

Z.

zamelas, *Peromyscus*, 109.
zamora, *Peromyscus*, 187.
zathynchus, *Peromyscus*, 217.
zelotes, *Peromyscus*, 173.