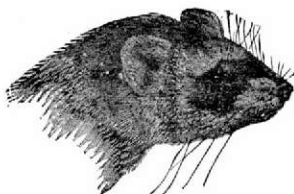


U. S. DEPARTMENT OF AGRICULTURE
DIVISION OF BIOLOGICAL SURVEY

NORTH AMERICAN FAUNA

No. 18

[Actual date of publication, September 20, 1900]



REVISION OF THE POCKET MICE OF THE GENUS PEROGNATHUS

BY

WILFRED H. OSGOOD
ASSISTANT BIOLOGIST, BIOLOGICAL SURVEY

Prepared under the direction of
Dr. C. HART MERRIAM
CHIEF OF DIVISION OF BIOLOGICAL SURVEY



WASHINGTON
GOVERNMENT PRINTING OFFICE
1900

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BIOLOGICAL SURVEY,
Washington, D. C., July 13, 1900.

SIR: I have the honor to transmit for publication, as No. 18 of North American Fauna, a 'Revision of the Pocket Mice of the Genus *Perognathus*,' by Wilfred H. Osgood, assistant in the Biological Survey. A preliminary revision of this group, based on the study of about 170 specimens, was published by me in 1889 as the first number of North American Fauna. In this early paper certain fundamental points in the history and synonym of the group were for the first time cleared up and the number of known forms was increased from 6 to 21. Five years later the rapid growth of the Biological Survey's collections enabled me to publish descriptions of a dozen additional species and to undertake a new revision of the group, which was brought down to date in 1896. The publication of this revision, with its accompanying illustrations, and colored maps showing the distribution of the various species, was deferred in order to obtain additional material still needed to settle a few remaining questions of distribution and relationship. This material was subsequently obtained, bringing the total number of specimens available up to 3,000; and my assistant, Mr. Osgood, to whom I had referred certain unsolved problems, undertook to bring the study of the whole group down to date. The result is here offered for publication.

Respectfully,

C. HART MERRIAM,
Chief, Biological Survey.

HON. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Introduction.	
History and material	9
Distribution	11
Color and pelages	11
Habits.....	12
Classification	12
New species	13
Genus <i>Perognathus</i> .	
Characters of subgenera	14
Key to species and subspecies.....	14
List of species and subspecies, with type localities	17
Descriptions.	
Subgenus <i>Perognathus</i>	18
Subgenus <i>Chelodipus</i>	41
Table of cranial measurements.....	62

ILLUSTRATIONS.

PLATES.

		Page.
PLATE I.	Skulls of <i>Perognathus flavus</i> , <i>P. amplus</i> , <i>P. merriami</i> , <i>P. bimaculatus</i> , <i>P. californicus</i> , <i>P. pernis</i> , <i>P. penicillatus</i> , and <i>P. rostratus</i>	66
II.	Skulls of <i>Perognathus panamintinus</i> , <i>P. columbianus</i> , <i>P. nevadensis</i> , <i>P. bryanti</i> , <i>P. margaritæ</i> , <i>P. peninsulae</i> , <i>P. arenarius</i> , <i>P. stephensi</i> , <i>P. nelsoni</i>	68
III.	Map showing distribution of the subgenus <i>Perognathus</i>	70
IV.	Map showing distribution of the subgenus <i>Chætodipus</i>	72

TEXT FIGURES.

FIG. 1.	Posterior view of skull of <i>Perognathus</i> (<i>Perognathus</i>) <i>bimaculatus</i>	14
2.	Posterior view of skull of <i>Perognathus</i> (<i>Chætodipus</i>) <i>intermedius</i>	14
3.	Skull of <i>Perognathus fasciatus</i>	19
4.	Skull of <i>Perognathus flavescens</i>	20
5.	Skull of <i>Perognathus apache</i>	26
6.	Skull of <i>Perognathus brevinasus</i>	30
7.	Skull of <i>Perognathus longimembris</i>	33
8.	Skull of <i>Perognathus olivaceus</i>	37
9.	Skull of <i>Perognathus formosus</i>	41
10.	Skull of <i>Perognathus baileyi</i>	42
11.	Skull of <i>Perognathus paradoxus</i>	44
12.	Skull of <i>Perognathus intermedius</i>	52
13.	Ear of (a) <i>Perognathus fallax</i> ; (b) <i>Perognathus femoralis</i>	57
14.	Skull of <i>Perognathus californicus</i>	58
15.	Skull of <i>Perognathus spinatus</i>	60

REVISION OF THE POCKET MICE OF THE GENUS PEROGNATHUS.

By WILFRED H. OSGOOD.

Assistant Biologist, Biological Survey.

INTRODUCTION.

HISTORY AND MATERIAL.

Pocket mice were first discovered by Maximilian, Prince of Wied, during his journey up the Missouri River. In 1839 he described and figured *Perognathus fasciatus* from specimens taken on the Missouri, near the mouth of the Yellowstone, in the present State of North Dakota. During the following half century several additional species were discovered; and in 1889 Dr. Merriam tentatively revised the group,¹ added many new species, and established the subgenus *Chætodipus* to include the large coarse-haired species. He also reviewed the history of the genus, so that it is now necessary to consider only events subsequent to 1889. Since then hardly a year has passed without the publication of additional species. In 1890 *fuliginosus* was proposed by Merriam;² in 1891 *femoralis*, by Allen;³ in 1892 *merriami*, by Allen;⁴ in 1893 *alticola* and *copei*, by Rhoads,⁵ and *infra-luteus*, by Thomas.⁶ During 1894 two papers by Merriam greatly increased the knowledge of the group. The first⁷ added *baileyi*, *canescens*, *columbianus*, *mexicanus*, *nelsoni*, *nevadensis*, *panamintinus*, and *stephensi*; the second,⁸ *arenarius*, *bryanti*, *margaritæ*, and *peninsulae*. In 1894 also, *conditi* and *pricei* were published by Allen⁹ and

¹ North Am. Fauna, No. 1, 1889.

² Ibid., No. 3, 74, 1890.

³ Bull. Am. Mus. Nat. Hist., N. Y., III, 281, 1891.

⁴ Ibid., IV, 45, 1892.

⁵ Proc. Acad. Nat. Sci. Phila., 1893, 404.

⁶ Ann. and Mag. Nat. Hist., 6th ser., XI, 406, 1893.

⁷ Proc. Acad. Nat. Sci. Phila., September, 1894, 262-268.

⁸ Proc. Calif. Acad. Sci., 2d ser., IV, 460, 1894.

⁹ Bull. Am. Mus. Nat. Hist., N. Y., VI, 318, 1894.

latirostris, by Rhoads;¹ in 1896 *nearnsi*, by Allen,² and in 1898 *pernix*, by Allen,³ and *bangsi*, *eremicus*, and *pacificus*, by Mearns.⁴

The preliminary revision of the genus *Perognathus* by Dr. Merriam in 1889 was based on less than 200 specimens, practically all that were available in this country at that time. Nearly 3,000 specimens, all accumulated in the past decade, have been used in the present revision. This large collection, like those recently studied in other groups, proves the existence of many new forms,⁵ shows the true status of doubtful ones, and clears up troublesome questions of relationship, nomenclature, and geographic distribution.

Most of the names of doubtful application in 1889 may now be disposed of definitely. In the case of *longimembris*, the name is found applicable to the species inhabiting the San Joaquin Valley, California, and a new name, *brevinasus*, is given to the San Bernardino form heretofore assumed to be true *longimembris*. The acquisition of topotypes settles previous questions regarding *flavus* and *mollipilosus*, and the possession of large series of specimens from Washington and Oregon makes it possible to fix the types of *lordi*, *parvus*, and *monticola*, though a slight uncertainty still attaches to the last. Abundance of material also makes available the name *hispidus*, under which *paradoxus* is placed as a subspecies, and of which *conditi* and *spilotus* become synonyms.

This material embraces all the specimens of *Perognathus* in the collections of the United States Biological Survey, the United States National Museum, the American Museum of Natural History, New York, and the private collections of Messrs. E. A. and O. Bangs and Dr. C. Hart Merriam. Besides these, various important specimens from other sources have been examined. All the types known to exist have been seen except those of *lordi*, *infraluteus*, and *pernix*, which are in the British Museum. In making acknowledgments, I wish first to express my obligations to Dr. C. Hart Merriam for the privilege of using his private collection and that of the Biological Survey, and also for much generous criticism and advice. For the privilege of using the collections in their charge, thanks are also due Dr. F. W. True, executive curator, and Mr. G. S. Miller, jr., assistant curator of mammals, in the United States National Museum; to Dr. J. A. Allen, curator of mammals and birds in the American Museum of Natural History; to Mr. Witmer Stone, curator of birds, Academy of Natural Sciences, Philadelphia; and to Mr. Outram Bangs, Mr. S. N. Rhoads, and Mr. W. W. Price.

¹ Am. Nat., XXVII, 185, 1894.

² Bull. Am. Mus. Nat. Hist., N. Y., VIII, 237, 1896.

³ Ibid., X, 149, 1898.

⁴ Ibid., X, 299, 1898.

⁵ Five new species and eight new subspecies are described in the present revision.

The illustrations of skulls in Plates I and II and a few of the text figures were drawn by Dr. James E. McConnell; the outline figures of skulls in the text are republished from the plates in North American Fauna No. 1.

DISTRIBUTION.

The genus *Perognathus* is confined to North America and is restricted to the region west of the Mississippi River. Its northern limit is Ashcroft, British Columbia; its southern, Tlalpam, in the valley of Mexico. On the east its limits coincide approximately with those of the arid divisions of the Austral and Transition zones; on the west it extends to the Pacific coast. It may be said in a general way that the subgenus *Perognathus* inhabits the Sonoran and the lower part of the Transition zones (see Pl. III), while *Chaetodipus* is seldom found outside of the Lower Sonoran zone except on the Great Plains (see Pl. IV). A curious exception to this distribution is found in central California, where *Perognathus* (*Chaetodipus*) *californicus* is found in the Upper Sonoran zone and *Perognathus* (*Perognathus*) *longimembris* in the Lower Sonoran. Pocket mice usually choose plains and deserts for their habitat, and one or more species may be found in nearly all the desert and semi-desert country in the western part of the United States. As a rule, they are not found in mountainous regions, except where the aridity is considerable and the conditions are otherwise favorable. They abound in southern California, Lower California, and the Great Basin region, and in Mexico large areas are well populated with them.

COLOR AND PELAGES.

The general pattern of marking and coloration found in the genus is subject to little variation. The upperparts show varying shades of buff with greater or less admixture of black; the underparts are nearly always white. Most species have a distinct side stripe or lateral line and a minute white subauricular spot. Among the desert forms are numerous examples of protective coloration and adaptation to environment. A peculiar rump armature found in some species of the subgenus *Chaetodipus* consists of grooved spiny bristles which extend beyond the rest of the pelage. What its function may be is little more than conjecture.

So far as known no species has more than one molt. This usually occurs in late summer after the breeding season, but is somewhat irregular, as specimens in entirely different pelages may be taken at the same place and date. The pelage acquired by the molt continues throughout the year, becoming more or less worn and patchy in early summer, just before its renewal;¹ hence in most species the seasonal

¹ Unless otherwise stated, the specimens described in this paper are in the new, unworn, or post-breeding pelage.

differences are not very great, the winter and spring pelage being simply paler than that of late summer and fall. The young invariably pass through a stage in which the pelage is soft and plumbeous.

HABITS.

The habits of pocket mice, as of most other small mammals, are not very well known. Most species are strictly nocturnal and very shy, and many of them are difficult to trap, as they do not readily take such bait as rolled oats or meat. They live in small burrows, from the entrances of which they throw out miniature mounds of earth like those of the pocket gopher. These burrows usually have two or more entrances, which often open under small bushes, and are closed with earth during the day, so that a casual observer might easily overlook them, particularly in the case of the smaller species. The food consists of seeds, which are carried in the cheek pouches and stored in chambers in the burrows. No species is known to hibernate, but it is possible that some of the more northern ones may do so.

CLASSIFICATION.

The genus *Perognathus* is a member of the family Heteromyidae, one of the most peculiar groups of New World mammals. The other genera of this family are *Heteromys*, *Dipodomys*, *Perodipus*, and *Microdipodops*. Of these, *Heteromys* may be readily separated from the others by its very hispid pelage, which consists almost entirely of grooved spines, and by its rather murine skull, smooth upper incisors, and small mastoids and audital bullæ.

The genus *Perognathus* is commonly divided into two subgenera—*Perognathus* proper, including the small soft-haired species, and *Chaetodipus*, containing the large coarse-haired and long-tailed forms. All the species except three fall naturally into one or the other of the two subgenera. One of these (*formosus*) is a *Perognathus* with strong inclination toward *Chaetodipus*; another (*baileyi*) presents the reverse case; and the third (*hispidus*) must be classed as a *Chaetodipus*, though it is aberrant in some ways. *P. femoralis* and *P. flavus* represent the extremes of the two subgenera and would certainly be placed in different genera if no other species were known, but between them may be found species showing almost every degree of differentiation. For convenience the genus has been divided into groups (see pp. 17-18) in order to show the affinities of the species and, to a certain extent, of the groups themselves.

In distinguishing species, dental peculiarities are of some service and cranial characters indispensable, showing relationship when external characters do not, and demonstrating intergradation to a degree of nicety otherwise almost unattainable. The best characters for com-

parison are the relative sizes of the mastoids and consequent dimensions of the interparietal. The shape of the interparietal varies somewhat, but its proportions and dimensions are generally reliable. The rostrum and interorbital space also furnish good characters. The hairiness of the feet is important, but of value only for separating species or groups in which other good differences are not apparent. The size and shape of the ears are also occasionally of use. In most species the males are slightly larger than the females, and in some the young adults are slightly different from fully mature individuals. Slight local variations are abundant; in some species it seems almost impossible to find two local series which are absolutely alike. But after making allowance for variation due to age and sex, individual variation will not be found very great; although so far as size is concerned it is greater in the *parvus* and *hispidus* groups than in the others.

NEW SPECIES.

Thirteen forms here characterized have not heretofore been described. These include five species and eight subspecies, as follows:

<i>Perognathus merriami gilvus</i>	<i>Perognathus penicillatus angustirostris</i>
<i>apache melanotis</i>	<i>pernix rostratus</i>
<i>callistus</i>	<i>goldmani</i>
<i>panamintinus brevinasus</i>	<i>artus</i>
<i>amplus</i>	<i>anthonyi</i>
<i>parvus magruderensis</i>	<i>californicus dispar</i>
<i>hispidus zacatecæ</i>	

All measurements in the present paper are in millimeters.

Genus **PEROGNATHUS** Maximilian, 1839.

- Perognathus* Maximilian, Nova Acta Acad. Cæs. Leop.-Carol., XIX, I, 369-373, Pl. XXXIV, 1839; Reise Nord-Am., I, 449, 1839. Type, *Perognathus fasciatus* Maximilian, 1839, from the Upper Missouri River.
- Cricetodipus* Peale, U. S. Expl. Exp'd., VIII, 52-54, 1848.
- Abromys* Gray, Proc. Zool. Soc. London, 1868, 202.
- Otognosis* Coues, Proc. Acad. Nat. Sci. Phila., 1875, 305.
- Chatodipus* Merriam, N. Am. Fauna No. 1, 5, 1889.

Characters.—Size medium or small; form murine, rather slender; tail nearly as long as or longer than head and body; ears small; hind legs and feet rather long; external cheek pouches lined with hair. Skull rather small and light, flattened above; mastoids very large; audital bullæ inflated, more or less triangular in outline, anteriorly apposed to pterygoids; jugals light and thread-like; rostrum attenuate, nasals somewhat tubular anteriorly; infraorbital foramen reduced to a lateral opening in the maxillary. Teeth 20; molars rooted and tuberculate; upper incisors strongly sulcate.

Characters of subgenera.

I. PEROGNATHUS.

Size medium or small; pelage soft, no spines or bristles. Soles of hind feet more or less hairy (except in *formosus*). Mastoids greatly developed, projecting beyond plane of occiput; mastoid side of parietal longest. Interparietal width less than interorbital width (rarely equal in *longimembris*). Audital bullæ meeting or nearly meeting anteriorly. Supraoccipital without

II. CHÆTODIPUS.

Size medium or large; pelage harsh, often with spiny bristles on rump. Soles of hind feet naked. Mastoids relatively small, not projecting beyond plane of occiput; mastoid side of parietal equal to or shorter than other sides. Interparietal width equal to or greater than interorbital width. Audital bullæ separated by nearly full width of basisphenoid. Supraoccipital

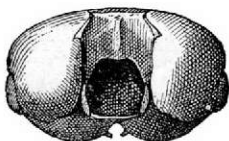


FIG. 1.—Posterior view of skull of *Perognathus* (*Perognathus*) *bimaculatus*.

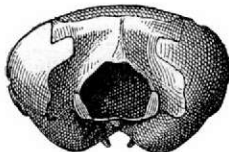


FIG. 2.—Posterior view of skull of *Perognathus* (*Chætodipus*) *intermedius*.

lateral indentations by mastoids (except in *formosus*); ascending branches of supraoccipital slender and thread-like.

with deep lateral indentations by mastoids (except in *hispidus*); ascending branches of supraoccipital heavy and laminate.

Key to species and subspecies.

[Based on typical adults.]

I. Subgenus PEROGNATHUS.

Antitragus lobed; hind foot more than 20.

Tail long and heavily crested; soles naked.....*formosus* (p. 40)

Tail moderate; soles of hind feet somewhat hairy.

Interparietal narrow, ratio of its width to basilar length of Hensel¹ about 25; color grayish; size large.

Mastoids moderate.....*lordi* (p. 39)

Mastoids larger.....*columbianus* (p. 40)

Interparietal wide, ratio of its width to basilar length of Hensel about 27.

Ears white; upper side of tail faintly dusky at tip.....*alticola* (p. 39)

Ears buff or dusky; upper side of tail dusky throughout entire length.

Size large, hind foot 23 to 26.....*magruderensis* (p. 38)

Size medium, hind foot 21 to 23.

Audital bullæ meeting anteriorly in a strong symphysis; color usually slaty buff.....*parvus* (p. 34)

Audital bullæ meeting anteriorly in a weak symphysis or not meeting; color cinnamon or ochraceous buff.

Premaxillæ exceeding nasals; color cinnamon buff; ears medium.

olivaceus (p. 37)

Premaxillæ not exceeding nasals; color ochraceous buff; ears large.

mollipilosus (p. 36)

¹ The basilar length of Hensel is measured from the anterior margin of the foramen magnum to the posterior rim of alveolus of the middle incisor.

Antitragus not lobed; hind foot 20 or less.

Tail longer than head and body.

Total length more than 150; mastoids very large.....*amplus* (p. 32)

Total length less than 150; mastoids moderate.

Interorbital space narrow (less than 5); basilar length of Hensel about 17.....*longimembris* (p. 33)

Interorbital space wide (5 or more); basilar length of Hensel 15 or less.

Hairs of belly plumbeous at base.....*nevadensis* (p. 31)

Hairs of belly white to roots.

Nasals short (about 7); tail 70 or less.....*brevinatus* (p. 30)

Nasals long (about 8); tail more than 70.

Color pale vinaceous buff.....*bangsi* (p. 29)

Color grayish buff.....*panamintinus* (p. 28)

Tail about equal to or shorter than head and body.

Size rather large; interparietal width 4 or more; hind foot 18 or more.

Inside of ears chiefly black.....*melanotis* (p. 27)

Inside of ears chiefly buff.

Color grayish olive buff.....*callistus* (p. 28)

Color buff or ochraceous buff.....*apache* (p. 26)

Size medium or small; hind foot less than 18.

Tail about 60.

Color olivaceous.

Hairs of belly white to roots.....*fasciatus* (p. 18)

Hairs of belly plumbeous at base.....*infraluteus* (p. 19)

Color not olivaceous.

Total length about 130; lower premolar smaller than last molar.

.....*flavescens* (p. 20)

Total length 120 or less; lower premolar about equal to last molar.

Rostrum heavy; mastoids small.....*merriami* (p. 21)

Rostrum light; mastoids larger.....*gilvus* (p. 23)

Tail about 50.

Lower premolar larger than last molar.....*pacificus* (p. 31)

Lower premolar smaller than last molar.

Hind foot about 15; color salmon buff.....*flavus* (p. 23)

Hind foot about 17.

Upper parts sooty or black.....*fuliginosus* (p. 25)

Upper parts salmon buff. (Northern Arizona).....*bimaculatus* (p. 24)

Upper parts buff, strongly mixed with black. (Central Mexico.)

.....*mexicanus* (p. 26)

II. Subgenus CHÆTODIPUS.

Rump with more or less distinct spines or bristles.

Lateral line well marked; pelage not very hispid; bristles moderate, usually confined to rump.

Ears elongate (length 10 to 12); mastoids quite small; ratio of mastoid breadth to basilar length of Hensel about 70.

Size medium; total length less than 200; hind foot about 24.. *californicus* (p. 58)

Size very large; length more than 200; hind foot about 26.

Interorbital space moderate; mastoids relatively small..... *dispar* (p. 58)

Interorbital space wider; mastoids larger..... *femoralis* (p. 57)

Ears rounded.

Ears large and orbicular (length about 10); color dark; rostrum heavy. (Mexico.)

- Mastoids large *goldmani* (p. 54)
 Mastoids small *artus* (p. 55)
 Ears medium (length about 8); rostrum light.
 Color of upperparts drab gray *canescens* (p. 54)
 Color of upperparts not drab gray.
 Pelage rather hispid; color dark; rostrum relatively heavy. (Central Mexico) *nelsoni* (p. 53)
 Pelage softer; color lighter; rostrum slender.
 Rump spines weak; interparietal strap-shaped; mastoids large. *intermedius* (p. 52)
 Rump spines stronger; interparietal somewhat produced anteriorly.
 Mastoids large *fallax* (p. 55)
 Mastoids smaller. (Cerros Island, Lower California) *anthonyi* (p. 56)
 Lateral line very faint or not evident; pelage very hispid; bristles strong, extending to sides.
 Size large; tail 120 or more. (San Jose Island, Lower California) *bryanti* (p. 61)
 Size smaller; tail less than 110; hind foot about 24 *peninsulæ* (p. 60)
 Size smaller; hind foot about 22.
 Mastoids moderate. (Southern California) *spinatus* (p. 59)
 Mastoids very small *margaritæ* (p. 61)
 Rump without spines or bristles.
 Tail not crested, shorter than head and body; skull in adults with a supraorbital bead.
 Size very large; hind foot about 26; color pale ochraceous. (Kansas and Nebraska) *paradoxus* (p. 74)
 Size smaller; hind foot about 24; color bright ochraceous. (Texas) *hispidus* (p. 42)
 Size large; hind foot about 26; color olive brown. (Zacatecas, Mexico) *zacatecæ* (p. 45)
 Tail crested, longer than head and body; skull without supraorbital bead.
 Size very large; tail much longer than head and body; interparietal width about equal to interorbital width *baileyi* (p. 41)
 Size medium or large; tail slightly longer than head and body; interparietal width exceeding interorbital width.
 Interorbital width less than 6; color of upperparts hair-brown. (West coast of Mexico.)
 Skull narrow and elongate; rostrum slender *pernix* (p. 50)
 Skull short; rostrum heavy *rostratus* (p. 51)
 Interorbital width more than 6; color of upperparts pale vinaceous buff to broccoli brown.
 Hind foot 20 to 21.
 Size small; tail short, less than 80; hind foot 20. (Lower California) *arenarius* (p. 50)
 Size larger; tail 90 or more; hind foot 21 *stephensi* (p. 49)
 Hind foot 22 to 26.
 Hind foot 23 to 26; color vinaceous buff.
 Large; rostrum very heavy *penicillatus* (p. 45)
 Smaller; rostrum slender *angustirostris* (p. 47)
 Color blackish brown *artus* (p. 55)
 Hind foot 22 to 24; color broccoli brown.
 Dark; rostrum heavy *pricei* (p. 47)
 Paler; rostrum slender *eremicus* (p. 48)

List of species and subspecies, with type localities.

Subgenus PEROGNATHUS.

Species and subspecies.	Type locality.
<i>Fasciatus</i> group:	
<i>Perognathus fasciatus</i> Maximilian	Near junction of Missouri and Yellowstone rivers, N. Dak.
<i>fasciatus infraluteus</i> (Thomas)	Loveland, Colo.
<i>flavescens</i> (Merriam)	Kennedy, Nebr.
<i>merriami</i> Allen	Brownsville, Tex.
<i>merriami gilvus nobis</i>	Eddy, N. Mex.
<i>flavus</i> Baird	El Paso, Tex.
<i>flavus bimaculatus</i> (Merriam)	Fort Whipple, Yavapai Co., Ariz.
<i>flavus fuliginosus</i> (Merriam)	San Francisco Mountain, Ariz.
<i>flavus mexicanus</i> Merriam	Tlalpam, Mexico, Mexico.
<i>apache</i> Merriam	Keam Canyon, Apache County, Ariz.
<i>apache melanotis nobis</i>	Casas Grandes, Chihuahua, Mexico.
<i>callistus nobis</i>	Kinney Ranch, Sweetwater Co., Wyo.
<i>Panamintinus</i> group:	
<i>Perognathus panamintinus</i> (Merriam)	Panamint Mountains, Cal.
<i>panamintinus bangsi</i> (Mearns)	Palm Springs, Cal.
<i>panamintinus brevinasus nobis</i>	San Bernardino, Cal.
<i>nevadensis</i> Merriam	Halleck, Nev.
<i>pacificus</i> Mearns	Mexican boundary, shore of Pacific Ocean.
<i>amplus nobis</i>	Fort Verde, Ariz.
<i>longimembris</i> (Coues)	Fort Tejon, Kern Co., Cal.
<i>Parvus</i> group:	
<i>Perognathus parvus</i> (Peale)	Oregon [The Dalles?].
<i>parvus mollipilosus</i> (Coues)	Fort Crook, Shasta Co., Cal.
<i>parvus olivaceus</i> (Merriam)	Kelton, Utah.
<i>parvus magruderensis nobis</i>	Mount Magruder, Nev.
<i>alticola</i> Rhoads	Squirrel Inn, San Bernardino Mountains, Cal.
<i>lordi</i> (Gray)	British Columbia.
<i>lordi columbianus</i> (Merriam)	Pasco, Wash.
<i>Fornosus</i> group:	
<i>Perognathus formosus</i> Merriam	St. George, Utah.
Subgenus CHÆTODIFUS.	
<i>Baileyi</i> group:	
<i>Perognathus baileyi</i> Merriam	Magdalena, Sonora, Mexico.
<i>Hispidus</i> group:	
<i>Perognathus hispidus</i> Baird	Charco Escondido, Tamaulipas, Mexico.
<i>hispidus paradoxus</i> (Merriam)	Trego County, Kans.
<i>hispidus zacatecæ nobis</i>	Valparaiso, Zacatecas, Mexico.
<i>Penicillatus</i> group:	
<i>Perognathus penicillatus</i> Woodhouse	San Francisco Mountain, Ariz.
<i>penicillatus angustirostris nobis</i>	Carriso Creek, Colorado Desert, Cal.
<i>penicillatus pricei</i> (Allen)	Oposura, Sonora, Mexico.
<i>penicillatus eremicus</i> (Mearns)	Fort Hancock, El Paso Co., Tex.
<i>stephensi</i> Merriam	Mesquite Valley, Cal.
<i>arenarius</i> Merriam	San Jorge, Lower California.

Species and subspecies.	Type locality.
<i>Pernix</i> group:	
<i>Perognathus pernix</i> Allen	Rosario, Sinaloa, Mexico.
<i>pernix rostratus</i> nobis	Camoa, Sonora, Mexico.
<i>Intermedius</i> group:	
<i>Perognathus intermedius</i> Merriam.....	Mud Spring, Mohave Co., Ariz.
<i>nelsoni</i> Merriam	Hacienda La Parada, San Luis Potosi, Mexico.
<i>nelsoni canescens</i> (Merriam).....	Jaral, Coahuila, Mexico.
<i>goldmani</i> nobis	Sinaloa, Sinaloa, Mexico.
<i>artus</i> nobis	Batopilas, Chihuahua, Mexico.
<i>fallax</i> Merriam	Reche Canyon, San Bernardino Co., Cal.
<i>anthonyi</i> nobis.....	Cerros Island, Lower California.
<i>Californicus</i> group:	
<i>Perognathus femoralis</i> Allen.....	Dulzura, San Diego Co., Cal.
<i>californicus</i> Merriam	Berkeley, Cal.
<i>californicus dispar</i> nobis	Carpenteria, Santa Barbara Co., Cal.
<i>Spinatus</i> group:	
<i>Perognathus spinatus</i> Merriam	Colorado River, Cal.
<i>spinatus peninsulae</i> Merriam.....	San Jose del Cabo, Lower California.
<i>bryanti</i> Merriam.....	San Jose Island, Lower California.
<i>margaritae</i> Merriam	Santa Margarita Island, Lower California.

Subgenus **PEROGNATHUS** Maximilian, 1839.

PEROGNATHUS FASCIATUS Maximilian. MAXIMILIAN POCKET MOUSE.

Perognathus fasciatus Maximilian, Nova Acta Acad. Cæs. Leop.-Carol., XIX, I, 369-373, Pl. XXXIV, 1839; Reise Nord-Am., I, 449, 1839; Merriam, N. Am. Fauna No. 1, 10, 1889.

Type locality.—Upper Missouri River near its junction with the Yellowstone.

Distribution.—Upper Sonoran and Transition zones of eastern Montana and Wyoming, east into the adjoining parts of North and South Dakota.

General characters.—Size rather small, exceeding *P. flavus*, but not equaling *P. apache*; ears medium, antitragus not lobed; tail subterete, evenly haired, slightly shorter than head and body; proximal half of sole of hind foot hairy.

Color.—Upperparts grayish olivaceous, finely lined with black; hairs clear plumbeous basally, followed by a zone of black-tipped grayish buff; sides not noticeably paler than back; underparts pure white; lateral line bright buff (due to absence of black-tipped hairs), extending from nose to end of tail; tail indistinctly tricolor, dusky above, buffy on sides, and white below; orbital region and ill-defined ring around ears buff; subauricular spot present. *Spring pelage*: General color paler, more buffy and often lacking the olive tinge; contrast with lateral line not marked. *Young*: Dull plumbeous above with slight admixture of buffy.

Skull.—Size small; cranium somewhat arched; interparietal pentagonal, moderately wide; mastoids well developed, slightly project-

ing; audital bullæ scarcely meeting anteriorly; coronoid and angular processes of mandible long and slender; lower premolar about equal to or slightly smaller than last molar.

Measurements.—Average of four adults from Tilyou ranch, Montana (near junction of Missouri and Yellowstone): Total length, 134.7; tail vertebrae, 64.5; hind foot, 17.
Skull: (See table, p. 62.)

Remarks.—In bright new pelage *P. fasciatus* presents a very attractive appearance. Its diminutive size, peculiar greenish back, pure white underparts, and bright buff lateral line make a combination quite unusual among our small mammals. One specimen (No. 65017) from Rosebud Agency, S. Dak., collected May 13, 1894, is at the molting stage, and the incoming hairs show the extreme of this peculiar coloration. The head, back, and rump show small patches of bright, even iridescent, greenish, about which is the duller grayish of the old pelage. Another specimen (No. 65664) is further advanced, the only remains of the old pelage being slight traces on head and back and a large dark-buff rump patch. The species presents little geographic variation. Specimens from Bighorn Basin have somewhat peculiar skulls, but the aberrance is very slight.

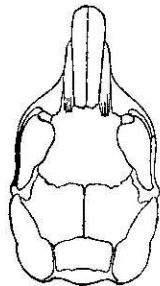


FIG. 3.—Skull of *Perognathus fasciatus*.

Specimens examined.—Total number, 39, from localities as follows:

Montana: Calf Creek, 2; Clark Fork, 2; Big Porcupine Creek, 1; Frenchman River, 3; Lake Basin, Yellowstone County, 2; Powderville, 1; Sage Creek, Bighorn Basin, 1; Tilyou ranch, 27 miles above mouth of Yellowstone River, 6; Wolf Creek, 1; Mouth of Yellowstone, 1.

North Dakota: Forty miles north of Medora, 1.

South Dakota: Cheyenne River, Custer County, 1; Corral Draw, 4; Lugenbeel County, 2; Pine Ridge, 3; Rosebud Agency, 1; Quinn Draw, 3; Smithville, 1.

Wyoming: Kirby Creek, Bighorn Basin 2; Newcastle, 1.

PEROGNATHUS FASCIATUS INFRALUTEUS (Thomas). BUFF-BELLIED POCKET MOUSE.

Perognathus infraluteus Thomas, Ann. and Mag. Nat. Hist., 6th ser., XI, 406, May, 1893.

Type locality.—Loveland, Larimer County, Colo.

Distribution.—Known only from the type locality.

General characters.—Similar to *P. fasciatus*, but smaller and different in color of underparts, which are yellowish buff instead of white; pelage harsher.

Color.—Upperparts as in *P. fasciatus*, but more buffy; underparts buff with traces of white on inguinal and pectoral regions; eye-ring buff, more prominent than in *fasciatus*.

Skull.—Essentially as in *fasciatus*, but smaller and with slightly wider interparietal, as in *flavescens*.

Measurements.—Average of eight young adults from the type locality: Total length, 128; tail vertebræ, 59; hind foot, 17. *Skull:* (See table p. 62.)

Remarks.—The distinguishing character of this form is the buff color of its underparts. This, however, is not invariable, as one specimen in the series from the type locality is pure white below, and thus, but for minor characters, indistinguishable from *fasciatus*. The specimens examined are all young adults, which may partially account for their peculiarities. In typical *fasciatus* the underparts are pure white in both young and old.

Specimens examined.—Total number, 10, all from the type locality, Loveland, Colo.

PEROGNATHUS FLAVESCENS (Merriam). PLAINS POCKET MOUSE.

Perognathus fasciatus flavescens Merriam, N. Am. Fauna No. 1, 11, 1889; Allen, Bull. Am. Mus. Nat. Hist., N. Y., VIII, 247, 1896.

Perognathus copei Rhoads, Proc. Acad. Nat. Sci. Phila., 1893, 404.

Type locality.—Kennedy, Nebr.

Distribution.—Upper Austral plains of South Dakota, Nebraska, and Kansas; south possibly to northern Texas, and west to base of Rocky Mountains.

General characters.—Proportions much as in *P. fasciatus*; size slightly smaller; pelage harsher; color buff, lined with black, never showing the strong olivaceous appearance of *fasciatus*.

Color.—*April specimens:* Above, light-grayish buff mixed with dusky; below, white; lateral line, eye-ring, and postauricular spot, clear buff; subauricular spot prominent; large spot on inflexed part of ear white; tail indistinctly bicolor; feet and legs white.

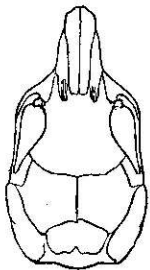


FIG. 4.—Skull of *Perognathus flavescens*.

Skull.—Similar to that of *fasciatus*, but a trifle smaller; interparietal wider; angular process of mandible shorter and broader; lower premolar smaller than last molar.

Measurements.—Average of six adults from Kennedy, Nebr.: Total length, 129.5; tail, 61.5; hind foot, 17.3. *Skull:* (See table, p. 62.)

Remarks.—This species is closely related to *P. fasciatus*, but is entirely distinct. Intergradation between the two is not probable, since typical examples of both have been taken at the same place, Rosebud Indian Agency, S. Dak. They doubtless occur together at other points, but in all cases color alone will be found sufficient to distinguish them.

P. copei from Mobeetie, Tex., was based on a single very imperfect specimen, and its status is accordingly doubtful. Its skull shows no tangible departure from that of true *flavescens*. Possibly it represents

a slight southern race of *flavescens*, or it may prove to be an intergrade between that species and *merriami*. Four distorted and desiccated individuals from Santa Fe, N. Mex., have also been doubtfully referred to *flavescens*.

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

Colorado: Boulder County, 1; Greeley, 3; Pueblo, 4; Sterling, 5.

Kansas: Cairo, 4.

Nebraska: Cherry County, 10; Ewing, 1; Kennedy, 6; Lakeside, 1; Lincoln County, 1; Loup Fork, 1; Myrtle, 2; Perch, Rock County, 9; Pole Creek, 40 miles from Fort Riley, 1; Thomas County, 5; Verdigris, 1.

South Dakota: Rosebud Agency, 2; Vermilion, 2.

New Mexico: Santa Fe, 4.

Texas: Mobeetie, 1.

PEROGNATHUS MERRIAMI Allen. MERRIAM POCKET MOUSE.

Perognathus flavus Baird, Mamm. N. Am., 423, 1857 (part); Merriam, N. Am. Fauna No. 1, 12, 1889; Allen, Bull. Am. Mus. Nat. Hist., N. Y., VIII, 58, 1896.

Cricetodipus flavus Thomas, Proc. Zool. Soc. London, 1888, 449.

Perognathus merriami Allen, Bull. Am. Mus. Nat. Hist., N. Y., IV, 45, Mar., 1892.

Perognathus mearnsi Allen, *ibid.*, VIII, 237, Nov., 1896.

Type locality.—Brownsville, Tex.

Distribution.—Subtropical region of southern Texas and northeastern Mexico, and Lower Sonoran of central Texas. The known range extends from Alta Mira, Tamaulipas, northward to Washburn, Tex., and from this point southwestward to the vicinity of Roswell, N. Mex.; on the east it reaches San Antonio, and on the west follows up the Rio Grande as far as Comstock.

General characters.—Size smaller than *flavescens*; tail about equal to or slightly shorter than head and body, very scantily haired; pelage somewhat softer than in *flavescens* but not as in *flavus*; ears small and orbicular; colors bright; proximal half of sole of hind foot hairy.

Color.—Above, ochraceous buff densely mixed with black, forming an imperfectly defined dorsal stripe from the nose to the tail; below, pure white; sides bright buffy ochraceous, lateral line scarcely distinct; ears buff without, dusky within; spot behind ears clear buff; subauricular spot pure white, sharply contrasted with the surrounding black and ochraceous; light orbital area comparatively extensive; transverse nose stripes prominent, intensely black; tail slightly darker above than below; feet and forelegs white. *Late fall and winter pelage:* Heavier, softer, and lighter colored.

Skull.—General shape much as in *P. flavescens*, but smaller and slightly more angular; rostrum much heavier; maxillary branches of zygomata often squarely 'elbowed'; zygomata nearly parallel; interparietal more nearly quadrate than in *flavescens*, much wider than in *flavus*; lower premolar about equal to last molar.

Measurements.—Average of twenty adults from Brownsville, Tex.: Total length, 116.3; tail vertebræ, 57; hind foot, 16. *Skull:* (See table, p. 62.)

Remarks.—*P. merriami* is a very distinct species, more closely related to *P. flavescens* and *P. flavus* than to any other form. From *flavescens* it differs in size, color, hairiness of tail, and cranial characters. From *flavus*, to which it has some superficial resemblance, it is distinguishable by its slightly larger size, less hairy tail, smaller mastoids, heavier rostrum, wider interparietal, relatively larger lower premolar, and by other characters. In 1889 Dr. Merriam used a specimen of this species from Mason, Tex., as the basis of his description of *P. flavus*, of which no typical specimens were then extant. His prediction that this specimen would prove different from the El Paso animal was verified when actual topotypes of the latter were obtained. Subsequent authors, however, have continued to use the characters pointed out by Merriam on the basis of this specimen, and slight confusion has occasionally resulted.

The differences due to season are well shown by the large series examined. Early spring specimens (April) still wear the winter coat, which in June and early July often becomes so much worn that the plumbeous bases of the hairs are exposed. In late July and August the summer molt, the only one known, takes place. The new hair comes in rapidly and evenly, progressing from the head backward until the animals are in the bright post-breeding pelage, which is at its height in September and October. In winter there is but a slight change—a greater or less elimination of black and a general thickening of the pelage. The changes after this are evidently only those which result from wear.

Variations in this species are chiefly in size. Specimens from Padre Island, Texas, are smaller than typical ones, and those from some localities in Tamaulipas are abnormally large. *P. mearnsi* is not distinguishable, having been based on *merriami* in winter pelage.

Specimens examined.—Total number, 153, from localities as follows:

New Mexico: Forty miles west of Roswell, 1 (intermediate).

Texas: Austin, 1; Blocker Ranch, 1; Brownsville, 73; Comstock, 2; Kerrville, 6; Mason, 1; Padre Island, 3; Painted Cave, 1; Watson Ranch, San Antonio, 22; Santa Rosa, 10; San Diego, 3; Turtle Creek, Kerr County, 1; Washburn, 2 (intermediate).

Nuevo Leon: Aldama, 1; Doctor Cos, 1; Linares, 1.

Tamaulipas: Alta Mira, 1; Hidalgo, 7; Matamoras, 2; Mier, 5; Reynosa, 2; Victoria, 6.

PEROGNATHUS MERRIAMI GILVUS subsp. nov. DUTCHER POCKET MOUSE.

Type from Eddy, N. Mex. ♂ ad., No. $\frac{41222}{41273}$, U. S. Nat. Mus., Biological Survey Coll. Collected September 18, 1892, by Dr. B. H. Dutcher. Orig. No., 329.

Distribution.—Western Texas and southeastern New Mexico. Lower Sonoran zone.

General characters.—Size and proportions about the same as those of *merriami*, slightly larger than *flavus*; color as in *merriami*, but

slightly paler; pelage softer. Skull superficially resembling that of *flavus*, but in detailed characters agreeing more closely with that of *merriami*.

Color.—Paler and more yellowish than *merriami*; back and sides well mixed with black; lateral line wide; postauricular spots rather prominent; tail whitish below, slightly dusky above.

Skull.—Like that of *merriami*; rostrum more slender; maxillary branches of zygomata lighter; mastoids larger. Contrasted with that of *flavus*, it has smaller mastoids, wider interparietal, larger lower premolar, and slightly wider interorbital space.

Measurements.—*Type*: Total length, 118; tail vertebræ, 58; hind foot, 16.5. One topotype: Total length, 122; tail vertebræ, 60; hind foot, 16.5. *Skull*: (See table, p. 62.)

Remarks.—This subspecies combines to some extent the characters of *flavus* and *merriami*. Nevertheless, careful study makes it perfectly evident that these are two distinct species, between which no real connection exists. All the evidence tends to show that *gilvus* has been derived from *merriami*. That its differentiation has been in the direction of *flavus* is probably an accidental circumstance, and does not indicate close relationship. The fact that typical *flavus* occurs with *gilvus* at its type locality (Eddy, N. Mex.), is interesting in this connection. Intergradation of *gilvus* with *merriami* is indicated by specimens from Comstock and Washburn, Tex., and also by a single individual taken 40 miles west of Roswell, N. Mex.

Specimens examined.—Total number, 7, from localities as follows:

New Mexico: Eddy, 4.

Texas: Big Spring, 1; Presidio County, 1; Stanton, 1.

PEROGNATHUS FLAVUS Baird. BAIRD POCKET MOUSE.

Perognathus flavus Baird, Proc. Acad. Nat. Sci. Phila., 1855, 332; Mamm. N. Am., 423, 1857 (part); Allen, Bull. Am. Mus. Nat. Hist., N. Y., VII, 215, 1894.

Type locality.—El Paso, Tex.

Distribution.—Upper and Lower Sonoran zones from northeastern Colorado and western Nebraska to northern Mexico, extending westward into central Arizona and eastward to western Texas. In central Arizona its range meets that of the subspecies *bimaculatus* and in north-central Mexico it merges with that of *mexicanus*.

General characters.—Size very small; ears medium; pelage very soft; tail moderately haired, shorter than head and body; proximal half of hind sole hairy.

Color.—Above, pinkish buff, lightly mixed with black; below, pure white; black-tipped hairs most numerous in median dorsal region, produced anteriorly beneath ears to cheeks; face and orbital region more or less free from dusky; lateral line not sharply contrasted; postauricular spot clear buff, very prominent; subauricular spot present,

but inconspicuous; ears light buff outside, blackish inside; tail pale buffy, almost concolor, very faintly dusky above.

Skull.—Mastoid and audital bullæ greatly developed, interparietal very small, pentagonal or subquadrate, nearly as long as wide; rostrum quite slender; maxillary branches of zygomata angular; interorbital space well constricted; lower premolar noticeably smaller than last molar.

Measurements.—Average of ten adults from Fort Huachuca, Ariz.: Total length, 112.5; tail vertebræ, 50; hind foot, 15.8. *Skull*: (See table, p. 62.)

Remarks.—This species exhibits quite a departure from those preceding. Its small size, short tail, and conspicuous postauricular spots serve to mark it externally, while its short, broad skull, with full bulging mastoids and small interparietal distinguish it cranially. In its wide range some local differentiations might well be expected, but none of importance have been found. Its subspecies are not very strongly characterized and perfect intergradation with each is plainly evident.

Specimens examined.—Total number, 131, from localities as follows:

Arizona: Calabasas, 1; Chiricahua Mountains, 2; Dos Cabezas, 4; Fairbank, 2; Fort Grant, 5; Fort Huachuca, 41; Fort Lowell, 2; Mammoth, 1; Tanner Canyon, Huachuca Mountains, 4; Willcox, 15.

Colorado: Burlington, 1; Canyon City, 1; Fort Garland, 2; Greeley, 6; Loveland, 11.

Nebraska: Alliance, 1.

New Mexico: Chico Springs, 1; Deming, 2; Eddy, 1; Dog Spring, Grant County, 1; Taos, 1.

Oklahoma: Beaver River, Beaver County, 1.

Texas: El Paso, 8; Sierra Blanca, 1.

Chihuahua, Mexico: Chihuahua, 10; Escalon, 3; Gallego, 3.

PEROGNATHUS FLAVUS BIMACULATUS (Merriam). YAVAPAI POCKET MOUSE.

Perognathus bimaculatus Merriam, N. Am. Fauna No. 1, 12, 1889; Allen, Bull. Am. Mus. Nat. Hist., N. Y., VII, 216, 1895.

Perognathus apache Allen, *ibid*, V, 71, 1893 (part).

Type locality.—Fort Whipple, Yavapai County, Ariz.

Distribution.—Central and northeastern Arizona and southeastern Utah.

General characters.—Similar to *P. flavus*, but larger.

Color.—As in *flavus*, but with a greater abundance of black-tipped hairs on dorsum; underparts white with occasional traces of buff; lateral line quite distinct; ears clear buff outside, blackish inside.

Skull.—Much larger than in *flavus*; interparietal relatively smaller; mastoids very large; lower premolar smaller than last molar as in *flavus*.

Measurements.—Average of ten adults from the type locality: Total length, 118; tail vertebræ, 53; hind foot, 17. *Skull*: (See table, p. 62.)

Remarks.—Typical adult specimens of *bimaculatus* are so much larger than *flavus* as to be very easily distinguishable, but immature or undersized examples are apt to give trouble. The average difference in size, however, is considerable and fully warrants recognition. When specimens of equal age are compared, the subspecies may be easily separated from the typical form by its larger ears and feet.

Specimens examined.—Total number, 82, from localities as follows:

Arizona: Fort Whipple, 23; Holbrook, 8; Keam Canyon, 1; Walnut, 1; Winslow, 21.

New Mexico: Fort Wingate, 4.

Utah: Noland Ranch, San Juan River, 9; Riverview, 25.

PEROGNATHUS FLAVUS FULIGINOSUS (Merriam). DUSKY POCKET MOUSE.

Perognathus fuliginosus Merriam, N. Am. Fauna No. 3, 74, 1890.

Type locality.—Cedar belt northeast of San Francisco Mountain, Arizona.

Distribution.—Lava beds in the vicinity of San Francisco Mountain, Arizona.

General characters.—Size and proportions those of *P. bimaculatus*; color very different.

Color.—Upperparts black or nearly black, except buff postauricular spots; lateral line and underparts ochraceous buff, except throat and breast, which are white.

Skull.—As in *bimaculatus*.

Measurements.—*Type:* Total length, 116; tail vertebræ, 58; hind foot, 18.

Remarks.—This form is doubtless a recent offshoot from *flavus* which has acquired dark colors to harmonize with the black lava rock which it inhabits. The fact that the conditions determining its differentiation are so plainly evident should be no reason for not recognizing the subspecies, even though its range be limited.

Specimens examined.—Total number, 3, from localities as follows:

Arizona: Cedar Belt, San Francisco Mountain, 1; Turkey Tanks, 1; Wolf Creek, 1.

PEROGNATHUS FLAVUS MEXICANUS Merriam. MEXICAN POCKET MOUSE.

Perognathus flavus mexicanus Merriam, Proc. Acad. Nat. Sci., Phila., September 27, 1894, 265-266.

Type locality.—Tlalpam, Mexico, Mexico.

Distribution.—Upper and Lower Sonoran zones of the southern half of the table-land of Mexico.

General characters.—Similar to *P. flavus* but larger and darker.

Color.—Similar to that of *flavus*, but averaging much darker, the buff being richer and the fuliginous more extensive; postauricular spots and lateral line ochraceous, well contrasted; underparts white.

Skull.—As in *flavus*, but larger.

Measurements.—Average of 12 young adults from Tlalpam, Mexico: Total length, 115.7; tail, 53.7; hind foot, 17.4.

Remarks.—Some specimens of *mexicanus* are much like true *flavus*, but many are almost as dark as *fuliginosus*. In these the contrast of dusky back and sides with ochraceous lateral line and pure white underparts is very striking. In size *mexicanus* almost equals *bimaculatus*.

Specimens examined.—Total number, 29, from localities in Mexico, as follows:

Guanajuato: Celaya, 2; Guanajuato City, 2.

Hidalgo: Ixmiquilpan, 2.

Jalisco: Huejuquilla, 1.

Mexico: Tlalpam, 13.

San Luis Potosi: Ahualulco, 1; Hacienda La Parada, 3; Jesus Maria, 3.

Zacatecas: Berriozabal, 1; Valparaiso Mountains, 1.

PEROGNATHUS APACHE Merriam. APACHE POCKET MOUSE.

Perognathus apache Merriam, N. Am. Fauna No. 1, 14, 1889; *ibid.*, No. 3, 73, 1890;

Allen, Bull. Am. Mus. Nat. Hist., N. Y., V, 71, 1893 (part); *ibid.*, VII, 216, 1895.

Perognathus flavus subsp. Merriam, N. Am. Fauna No. 3, 73, 1890.

Type locality.—Keam Canyon, Apache County, Ariz.

Distribution.—Eastern Arizona, western New Mexico, and southern Utah.

General characters.—Size large, about equaling *longimembris*; pelage rather soft; tail scantily haired; antitragus not lobed; posterior three-fifths of hind sole hairy.

Color.—Above, rich buff, with light admixture of black, effecting a suspicion of olivaceous; lateral line moderately well defined; below, pure white; ears buff, very faintly dusky within, a white spot on inflexed part and on inferior margin; tail white below, buff above with traces of dusky toward tip. In the early spring 'left-over' pelage the color is a beautiful clear buff with very few dusky-tipped hairs.

Skull.—Size large, equaling *longimembris* and *parvus*; mastoids well developed; audital bullæ apposed anteriorly; interparietal pentagonal, of moderate size; angular process of mandible short and upturned, not long and widespread as in *longimembris*; lower premolar smaller than last molar. Compared with *longimembris* it has larger more bulging mastoids, heavier rostrum, wider interorbital space, shorter nasals, and smaller lower premolar.

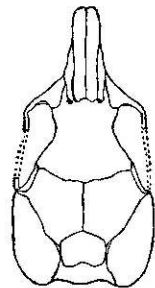


FIG. 5.—Skull of *Perognathus apache*.

Measurements.—Average of four adults from the type locality: Total length, 139.5; tail vertebrae, 67.5; hind foot, 18.5. *Skull:* (See table, p. 62.)

Remarks.—Apart from its subspecies, *P. a. melanotis*, *P. apache* is closely related to no other form except *P. callistus*. In color and size it bears some resemblance to *P. longimembris*, which is quite distant from it geographically. The only other similar form found within its range is *P. flavus bimaculatus*. From this it is distinguished by its larger size, heavy rostrum, and large wide interparietal. Specimens from Walnut, Ariz., are much deeper in color than usual.

Specimens examined.—Total number, 28, from localities as follows:

Arizona: Holbrook, 5; Keam Canyon, Navajo County, 8; Painted Desert, 2; Walnut, Coconino County, 4; Winslow, 1.

New Mexico: Deming, 3; Espanola, 1; Fort Wingate, 1; San Pedro, 1; Santa Fe, 3.

Utah: Noland Ranch, San Juan River, 1; Riverview, 1.

PEROGNATHUS APACHE MELANOTIS subsp. nov. BLACK-EARED POCKET MOUSE.

Type from Casas Grandes, Chihuahua, Mexico. ♀ ad., No. 97416, U. S. Nat. Mus., Biological Survey Coll. Collected May 21, 1899, by E. A. Goldman. Orig. No., 13750.

Distribution.—Known only from the type locality.

Characters.—Similar to *P. apache*, but darker; inside of ears black instead of buff; skull small and otherwise peculiar.

Color.—General color richer buff than that of *P. apache*; upperparts strongly mixed with black, particularly in median dorsal region; inside and inflexed parts of ears black, edges of ears and subauricular spot white; tail bicolor, dusky above, buffy white below; orbital region clear buff; underparts pure white.

Skull.—Similar to that of *P. apache*, but smaller; mastoids and audital bullae much smaller; interparietal and interorbital space relatively wider.

Measurements.—*Type:* Total length, 133; tail vertebrae, 65; hind foot, 19.5. *Skull:* (See table, p. 62.)

Remarks.—The single specimen upon which this form is based is characterized by both external and cranial peculiarities which are much more than ordinary individual variation. A series of specimens from the type locality would doubtless show the majority of the peculiarities of the type to be constant.

PEROGNATHUS CALLISTUS sp. nov. BEAUTIFUL POCKET MOUSE.

Type from Kinney Ranch, Green River basin, near Bitter Creek, Sweetwater County, Wyo. ♂ yg. ad., No. 88245, U. S. Nat. Mus., Biological Survey Coll. Collected May 14, 1897, by J. Alden Loring. Orig. No., 4122.

Distribution.—Known only from the type locality and vicinity.

General characters.—Size medium, smaller than *apache*; skull quite similar; color very different.

Color.—Above, grayish olive buff uniformly mixed with black; below, pure white; lateral line cream buff, well defined; ears whitish outside, dusky within; postauricular spot creamy buff, quite prominent; tail white below, dusky above.

Skull.—Similar to *apache*, but somewhat heavier and more arched; interparietal slightly wider (though mastoids are larger); audital bullæ scarcely meeting anteriorly.

Measurements.—*Type*: Total length, 135; tail vertebræ, 63; hind foot, 18. *Skull*: (See table, p. 62.)

Remarks.—This species is the most delicately colored of the genus. It has the attractive coloration of *fasciatus*, but softer and more delicate. Its position is evidently between *fasciatus* and *apache*, and its nearest relations are clearly with the latter. Its large size immediately separates it from *fasciatus*, which it resembles externally, especially before maturity.

Specimens examined.—Total number, 7; 6 from Kinney Ranch, Bitter Creek, and 1 from Green River, Wyoming.

PEROGNATHUS PANAMINTINUS (Merriam). PANAMINT POCKET MOUSE.

Perognathus longimembris panamintinus Merriam, Proc. Acad. Nat. Sci. Phila., September 27, 1894, 265.

Type locality.—Perognathus Flat (altitude, 5,200 feet), Panamint Mountains, California.

Distribution.—Panamint Mountains, California, and eastward through southern Nevada to St. George, Utah.

General characters.—Size medium; tail long and moderately hairy; proximal third of hind sole hairy; pelage full, long, and silky; ears moderate.

Color.—Above, grayish buff, often with a pearly appearance caused by a pale buff ground color overlaid by dark-tipped hairs; lateral line pale buff, not sharply defined; subauricular spot small and inconspicuous; forelegs buffy or white; underparts white; tail, above dusky, strongly so distally, below buff or whitish.

Skull.—Size medium; nasals long and narrow; maxillary branches of zygomata gradually narrowing anteriorly; interorbital space wide; lower premolar larger than last molar. Compared with that of *flavus* the skull of *panamintinus* is more elongate, with smaller mastoids, and wider interparietal.

Measurements.—Average of 30 specimens from the type locality: Total length, 143; tail vertebrae, 78; hind foot, 19.7. *Skull:* (See p. 62.)

Remarks.—All the pocket mice without lobed antitragus found in California belong to the *panamintinus* group. *P. panamintinus* itself is easily recognizable by its proportions and dental peculiarities, as well as by its pearly gray color and long soft pelage. Its subspecies are closely related to it; *bangsi* inhabits the arid saline valleys southwest of the Panamint Mountains; *brevinasus* is also found to the southwest; and an incipient form not recognized by name is found in eastern Nevada. From this it appears that strictly typical *panamintinus* is confined to the Panamint Mountains.

Specimens examined.—Total number, 46, from localities as follows:

California: Panamint Mountains, 27.

Nevada: Ash Meadows, 1; Oasis Valley, 1; Oasis Valley (ten miles west), 1; Pahranaagat Valley, 3; Pahroc Spring, 6; Panaca, 5; Vegas Valley, 1.

Utah: St. George, 1.

PEROGNATHUS PANAMINTINUS BANGSI¹ (Mearns). BANGS POCKET MOUSE.

Perognathus longimembris bangsi Mearns, Bull. Am. Mus. Nat. Hist., N. Y., X, 300, August 31, 1898.

Type locality.—Palm Springs, Colorado Desert, California.

Distribution.—Desert valleys of southern and southeastern California. Lower Sonoran zone.

General characters.—Similar to *panamintinus*, but smaller and paler.

Color.—Above, pale vinaceous buff, very lightly mixed with black, seldom showing the pearly effect of *panamintinus*; lateral line perfectly blended with sides; lower parts, including feet and fore legs, pure white; ears buffy white, thinly haired, a prominent white spot at the base of each and another on the inflexed portion; tail buff on upper side, rarely showing traces of dusky except at extreme tip, whitish on lower side; transverse nose spots nearly obsolete.

Skull.—Smaller than that of *panamintinus* with relatively smaller mastoids and wider interparietal; otherwise very similar.

Measurements.—*Type:* Length, 138; tail vertebrae, 80; hind foot, 19.

Remarks.—This pallid variety differs from *panamintinus* in color and size only. A convenient character for distinguishing it is the

¹The following subspecies related to *P. panamintinus bangsi* has recently been described in the Proc. Biol. Soc. Wash., XIII, 153, June 13, 1900. Owing to absence in the field, the author has been unable to examine the type.—Ed.

PEROGNATHUS PANAMINTINUS ARENICOLA Stephens.

“*Type* from San Felipe Narrows, San Diego County, California. No. 99828, ♂, U. S. Nat. Mus., Biological Survey Coll. Collected April 11, 1892.

“*Characters.*—Similar to *P. panamintinus bangsi* but paler and whiter; mastoids greatly swollen and projecting much further back than the occiput; interparietal very small. Total length, 141; tail vertebrae, 82; hind foot, 19.”

color of the upper side of the tail, which is normally dusky in *panamintinus* and buffy in *bangsi*. The specimens from the more eastern localities are larger than those of the Colorado Desert and possibly should be considered intermediate between the latter and true *panamintinus*.

Specimens examined.—Total number, 56, from localities as follows:

California:¹ Argus Mountains (east base), 3; Ash Creek, Owens Lake, 5; Banning, 1; Bishop, Owens Valley, 1; Borax Flat, 4; Cabazon, 10; Hot Springs Valley, 7; Haway Meadows, 1; Little Owens Lake, 5; Moran, 2; Olancho, 1; Palm Springs, 2; Salt Wells Valley, 12; Whitewater, 2.

PEROGNATHUS PANAMINTINUS BREVINASUS subsp. nov. SHORT-NOSED
POCKET MOUSE.

Type from San Bernardino, Cal. ♀ ad., No. 14883, Coll. of C. Hart Merriam. Collected May 2, 1885, by F. Stephens.

Distribution.—Known from a few scattered localities in extreme southwestern California. Upper Sonoran zone.

General characters.—Similar in general to *panamintinus* and *bangsi*; color darker; tail shorter; skull peculiar.

Color.—Above, pinkish buff, much varied with black; below, pure white; lateral line pinkish buff, not very sharply defined; postauricular spot buff, more prominent than in *bangsi*; hairs of back and especially of rump, clear buff nearly to roots, often showing no plumbeous whatever; ears dusky; subauricular spot small; orbital ring buffy; tail buff or buffy white, faintly dusky above; transverse nose stripes blackish, well defined. *Young*: Dull slaty; hairs of back dirty whitish, with plumbeous tips.

Skull.—Size medium, slightly smaller than in *panamintinus*; rather short, broad, and somewhat flattened; mastoids large and elevated from plane of cranium; interparietal moderate, smaller than in *panamintinus*; nasals much shorter than in *panamintinus*; zygomata more angular anteriorly; interorbital space relatively wide; audital bullæ not quite meeting in front; lower premolar larger than last molar.

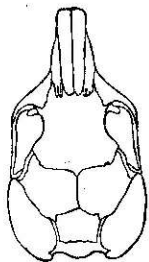


FIG. 6.—Skull of
Perognathus brevina-
nasus.

Measurements.—*Type*: Total length, 4.9 in. (124 mm.); tail vertebrae, 2.6 in. (66 mm.); hind foot (measured dry), 17.4 mm. Average of three adult males from Ferndale, San Bernardino County, Cal.: Total length, 130; tail, 68; hind foot (measured dry), 18.2.

Skull: (See table, p. 62.)

Remarks.—This is the *P. longimembris* of recent authors which requires a name, since *longimembris* applies only to the San Joaquin

¹For details in regard to these localities, and others of the same general region mentioned in this paper, see N. Am. Fauna, No. 7, 361-384.

Valley animal. It ranges near *P. p. bangsi*, but is evidently confined to a higher zone. Whether it intergrades with *panamintinus* or *bangsi* is not satisfactorily shown by the present material. Possibly it should be considered a distinct species.

Specimens examined.—Total number, 61, from localities as follows:

California: Burbank, 1; Ferndale, San Bernardino County, 7; Jacumba, 7; San Bernardino, 44; Summit, Coast Range, San Diego County, 2.

PEROGNATHUS NEVADENSIS Merriam. NEVADA POCKET MOUSE.

Perognathus nevadensis Merriam, Proc. Acad. Nat. Sci. Phila., September 27, 1894, 264.

Type locality.—Halleck, Nev.

Distribution.—Upper Sonoran zone of central Nevada; northward to southern Oregon and northern Utah.

General characters.—Similar in general to *P. panamintinus*; differing in somewhat smaller size, color of underparts, and slight cranial characters.

Color.—Much as in *panamintinus* but darker, and with belly colored like sides.

Skull.—Very similar to that of *panamintinus*; nasals a trifle shorter; zygomata more angular anteriorly; interparietal shorter and broader, occipital side strongly concave; lower premolar larger than last molar.

Measurements.—Average of twenty-four adults from the type locality: Total length, 133; tail vertebrae, 72.4; hind foot, 18.7.

Skull: (See table, p. 62.)

Remarks.—*P. nevadensis* and *P. panamintinus* are closely related. Whether they are directly connected at the present time remains to be seen. Specimens from Flowing Springs, Nev., are considerably larger than typical, and also interesting as showing a very worn pelage, which is pale grizzled cinnamon with all markings more or less obsolete.

Specimens examined.—Total number, 55, from localities as follows:

Nevada: Austin, 1; Battle Mountain, 5; Devil Gate (twelve miles west of Eureka), 1; Flowing Springs, 10; Golconda, 2; Halleck, 23; Monitor Valley, 2; Osobb Valley, 1; Pyramid Lake, 1; Reese River, 5; Stillwater, 2; Wadsworth, 2.

Oregon: Tumtum Lake, 3.

Utah: Kelton, 1.

PEROGNATHUS PACIFICUS Mearns. PACIFIC POCKET MOUSE.

Perognathus pacificus Mearns, Bull. Am. Mus. Nat. Hist., N. Y., X, 299, August 31, 1898.

Type locality.—Mexican boundary monument No. 258, shore of Pacific Ocean.

Distribution.—Known only from the type locality.

General characters.—Size exceedingly small; similar in color and general characters to *P. p. brevinasus*; tail about equal to or slightly shorter than head and body; proximal third of hind sole hairy; pelage very soft but not long and full as in *panamintinus*; skull much as in the other members of the *panamintinus* group.

Color.—Similar to *P. p. brevinasus* but somewhat darker; sides about like back, between pinkish and salmon buff, very finely and thickly mixed with black; lateral line and slight postauricular spot pinkish buff; ears dusky; subauricular spot present; lower parts white; tail nearly concolor, faintly darker above than below.

Skull.—Size very small; cranium strongly arched; mastoids moderate, not bulging as in *brevinasus*; interparietal much wider than long; zygomata very slender and threadlike; nasals rather short; interorbital space moderately wide; lower premolar plainly larger than last molar.

Measurements.—*Type*: Total length, 113; tail vertebræ, 53; hind foot, 15.5. One adult topotype: Total length, 110; tail vertebræ, 54; hind foot, 15.3. *Skull*: (See table, p. 62.)

Remarks.—This species is by far the most diminutive member of the *panamintinus* group and of the genus. *P. flavus*, which has long been distinguished as the smallest pocket mouse, must now allow its title to pass to this tiny species. There is some superficial resemblance to *flavus*, but the skull is entirely in accord with the characters of the *panamintinus* group. Details which *pacificus* shares with the other members of the group, and which distinguish it from *flavus* and its forms, are small mastoids, wide interparietal, wide interorbital space, and large lower premolar.

Specimens examined.—Total number, 3, all from the type locality.

PEROGNATHUS AMPLUS sp. nov. LORING POCKET MOUSE.

Type from Fort Verde, Ariz. ♂ ad., No. ~~4424~~⁴⁴²⁵, U. S. Nat. Mus., Biological Survey Coll. Collected June 26, 1892, by J. Alden Loring. Orig. No., 272.

Distribution.—Known only from the type locality.

General characters.—Size large; tail long, well haired, slightly penicillate; hind sole naked medially to posterior fifth, which is hairy; pelage soft, full, and long; antitragus not lobed; mastoids greatly developed.

Color.—Above, pinkish buff delicately lined with black; basal fifth of hairs plumbeous; underparts white; lateral line buff, rather wide, extending on forelegs nearly to wrist; orbital area pale; white spot present at base of ear above and below; tail buff, mixed with black above.

Skull.—Size large; mastoids excessively developed, bulging in all directions and reaching the maximum shown in the genus; audital bullæ relatively small, about as large as in *P. apache*, weakly apposed

anteriorly; interparietal relatively very small, pentagonal, about as long as broad; rostrum long and slender, nasals more slender than in *apache*, nasal branches of premaxillæ wider; zygomata narrowing anteriorly; interorbital width moderate; lower premolar about equal to or very slightly larger than last molar.

Measurements.—*Type*: Total length, 155; tail vertebræ, 80; hind foot, 20. *Skull*: (See table, p. 62.)

Remarks.—Both externally and cranially *P. amplus* is very peculiar and evidently has no close relation with any previously known species. In proportions (not in size) and character of pelage it is not very unlike *P. panamintinus*, and from some of the forms of this species it is but slightly dissimilar in color, but its remarkable skull and slightly haired hind foot are unique. The great development of mastoids which it shows is not at all correlated with an equal enlargement of the audital bullæ, as these are no larger than in *P. apache*. It has no important characters in common with *apache* and can not be closely related to it.

Specimens examined.—One, the type.

PEROGNATHUS LONGIMEMBRIS (Coues). SAN JOAQUIN POCKET MOUSE.

Otognosis longimembris Coues, Proc. Acad. Nat. Sci. Phila., 1875, 305, under *Cricetodipus parvus*. (Type from Fort Tejon.)

Cricetodipus parvus True, Proc. U. S. Nat. Mus., IV, 474, 1882.

Perognathus inornatus Merriam, N. Am. Fauna No. 1, 15, 1889. (Type from Fresno.)

Type locality.—Fort Tejon, Cañada de las Uvas, Kern County, Cal.

Distribution.—Sonoran zone of the San Joaquin Valley, California, and its immediate extensions.

General characters.—Size large, equaling *P. apache*; color uniform, all markings reduced; antitragus not lobed; pelage rather harsh; proximal third of hind sole hairy.

Color.—Above, buff mixed with more or less black; below, white; bases of hairs on rump slightly or not plumbeous; lateral line poorly defined, concolor with upper sides; tail buff, paler on lower surface, faintly dusky above; upper side of forelegs generally buff to wrist; ears buffy outside, dusky within, a slight stripe of white on inflexed portion and the usual white spot at base. Young adults darker than adults, and showing a slight tinge of olivaceous.

Skull.—Size large, mastoids and audital bullæ moderate, not bulging as in *brevinasus*; interparietal subquadrate, relatively smaller than in *brevinasus*; interorbital space very narrow, often dorsally concave in old individuals; nasals long; lower premolar larger than last molar.

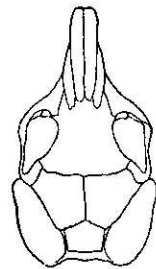


FIG. 7.—Skull of *Perognathus longimembris*.

Measurements.—Average of 4 adult males from Fresno, Cal.: Total length, 145.2; tail vertebræ, 74.5; hind foot, 18.7. Of 4 adult females: Total length, 136; tail vertebræ, 71.5; hind foot, 18.3. *Skull:* (See table, p. 62.)

Remarks.—The above description is based mainly on specimens from Fresno, the type locality of '*inornatus*.' The type of *longimembris* is immature, but its skull shows the narrow interorbital space peculiar to the San Joaquin Valley form. The only available topotype is fortunately a young adult which agrees perfectly with specimens from Fresno and other points in the San Joaquin Valley. Two young specimens from San Emigdio and Rose Station, both very near Fort Tejon, are also clearly the same as those from Fresno, having the harsher pelage and slight olivaceous effect so different from the soft hairs and delicate pearly color of the young of *panamintinus* and subspecies. Thus it seems that the name *longimembris* should be applied to the animal recently called *inornatus* rather than to the San Bernardino form.

The species is very distinct, though its range is limited. It seems to be exclusively confined to the San Joaquin Valley, where it is the only representative of the genus. Young adults may be distinguished from old by their smaller size and darker color. Females are constantly smaller than males. Among adults two phases of color are apparent, one in which the hairs are grayish from the roots and another in which they are buffy.

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

California: Alila, 2; Bakersfield, 5; Delano, 2; Fort Tejon, 2; Fresno, 54; Huron, 3; Livingston, 11; Lodi, 3; Oakdale, 2; Ripon, 2; Rose Station, Kern County, 1; San Emigdio, Kern County, 1; Three Rivers, 2; Tipton, 7; Walker Basin, Kern County, 14.

PEROGNATHUS PARVUS (Peale). OREGON POCKET MOUSE.

Cricetodipus parvus Peale, U. S. Expl. Exp'd., VIII, Mamm. and Ornith., 52-54, 1848.

Perognathus parvus Cassin, U. S. Expl. Exp'd., Mamm. and Ornith., 48-49, 1858; Merriam, N. Am. Fauna No. 1, 28, 1889—Peale's description copied.

Perognathus monticola Baird, Mamm. N. Am., 422, 1857; Merriam, N. Am. Fauna No. 1, 17, 1889.

Type locality.—Oregon. Assumed to be The Dalles, Oreg.

Distribution.—Valley of the Yakima River, Washington, and thence southward to central and southeastern Oregon. Upper Sonoran zone.

General characters.—Size large; tail slightly penicillate, its vertebræ longer than head and body; ears moderate, well haired, antitragus prominently lobed; proximal fourth of hind sole hairy; color variable, presenting two extremes, a gray and a buff.¹

¹This species is certainly to some degree dichromatic, for the color variation is evidently not due to age, sex, or season. In one phase the buff is reduced to grayish

Color.—*Gray phase:* Above, pale slaty buff mixed with black, darkest in center of back; below, white, except belly, the hairs of which are normally plumbeous, with pale tips; sides like back, but paler; black-tipped hairs of back running forward across sides and reaching or nearly reaching forearm; lateral line buff; tail tricolor, dusky above, becoming black terminally, buff on sides, generally white below, but sometimes suffused with buffy; ears dusky, lighter on margins; subauricular spot moderate; feet white; inner side of hind legs dusky to heel. *Buff phase:* Everywhere as in gray phase, but general color buff or ochraceous buff instead of slaty. *Young:* Above, clear, light plumbeous, tips of hairs very pale buff, gradually intensifying with increasing age; below, as in adult. In late fall the high pelage which succeeds the breeding pelage becomes much paler as the black tips of the hairs wear off and expose the undercolor.

Skull.—Size large; cranium slightly arched; rostrum somewhat attenuate; audital bullæ and mastoids moderately developed; audital bullæ meeting anteriorly in a well-defined symphysis; interparietal wide, pentagonal, anterior angle strong; lower premolar smaller than last molar.

Measurements.—Average of five adults from Mabton, Wash.:¹ Total length, 171.8; tail vertebrae, 91.8; hind foot, 22.4. *Skull:* (See table, p. 62.)

Remarks.—The group for which *parvus* stands contains seven closely related forms. All are of relatively large size and have the antitragus distinctly lobed, thus requiring but slight comparison with the other members of the subgenus. *P. p. olivaceus* is the most centralized form. It occupies the main part of the Great Basin proper and the others, which are found in the various Great Basin extensions, have evidently been derived from it.

The name *parvus*, though one of the earliest proposed for a pocket mouse, has been usually incorrectly applied. Peale assigns the species to Oregon, and his original description and measurements indicate one of the larger members of the genus.² Since but one species is found in the part of Oregon traversed by the Wilkes expedition, and since this agrees in general with Peale's description, there seems to be no reason why the name *parvus* should not now be applied to it. The

drab, and in another it is developed into cinnamon, or even bright ochraceous. Between these extremes occur various intermediate stages. As might be expected, one phase is often much more numerous at a given locality than the other, though both are found together. The two are perfectly distinct in both adults and young.

¹Although numerous specimens from The Dalles have been examined none are sufficiently adult to afford satisfactory measurements, so that it has been necessary to use the Mabton series for this purpose.

²The measurements alone are sufficient to prove that the name should never be used for a five-toed kangaroo rat. Cf. Rhoads, Proc. Acad. Nat. Sci. Phila., 1893, 407-410.

form found at The Dalles is here considered typical. The chances that the type was taken there are considerable since the species is very abundant there and members of the Wilkes expedition camped at or near that place on several different occasions.¹

It is also not improbable that the type of Baird's '*monticola*' was also taken at The Dalles. Baird's queried statement that it came from St. Mary's Mission, Mont., is rendered much more doubtful by the unsuccessful efforts of recent collectors to obtain additional specimens from that locality. Dr. Suckley, who collected this type, stopped for some time at The Dalles and may have obtained it there, as pocket mice are probably more abundant there than at any other point at which he stopped. Its skull agrees more nearly with that of *parvus* than with that of any other form.

Specimens examined.—Total number, 103, from localities as follows:

- Oregon:** Antelope, 1; Burns, 5; Crown Rock, John Day River, 3; Harney, 1; Heppner, 2; Lost River, Klamath Basin, 5; Narrows, Malheur Lake, 6; North Dalles, 11; Prineville, 1; Rock Creek Sink, 2; Shirk, 5; The Dalles, 13; Tule Lake, 5; Tumtum Lake, 7; Twelve-mile Creek, 1; Umatilla, 2; Willows Junction, 2.
- Washington:** Mabton, 25; North Yakima, 6.

PEROGNATHUS PARVUS MOLLIPILOSUS (Coues). COUES POCKET MOUSE.

Perognathus mollipilosus Coues, Proc. Acad. Nat. Sci. Phila., 1875, 296 (under *P. monticola*).

Perognathus monticola Townsend, Proc. U. S. Nat. Mus., X, 177, 1888.

Type locality.—Fort Crook, Shasta County, Cal.²

Distribution.—Great Basin extension of northeastern California, north to Klamath Basin, Oregon. Upper Sonoran zone, except on Mount Shasta, where it ascends to the Boreal.

General characters.—Size somewhat smaller than *parvus*; ears much larger, antitragal lobe prominent; coloration dark; markings intense.

Color.—Above, rich ochraceous buff, black-tipped hairs very abundant; lateral line prominent; white subauricular spot very faint or not evident; below, white, varying to tawny ochraceous on belly.

Skull.—Size relatively rather small; very similar to *P. olivaceus*, but with the ascending branches of the premaxillæ abruptly truncated, not exceeding the nasals.

Measurements.—Average of three adults from the type locality: Total length, 168.3; tail vertebrae, 88; hind foot, 22.3; ear from meatus (dry), 8.2. *Skull:* (See table, p. 62.)

Remarks.—The specimens from Fort Crook and Fall River Valley are the only ones that may be considered strictly typical. They are

¹ Wilkes, Narrative U. S. Expl. Exp'd, IV, 403-432, 1845.

² Fort Crook, now abandoned, was located about 2 miles northeast of the present site of Burgettville, or Swasey.

well characterized by large ears, rich color, obsolescent subauricular spots, and truncated premaxillæ. Nearly all the others here referred to *mollipilosus* show greater or less tendency toward *olivaceus*. The form seems to be one like *magruderensis*, which is rather ill defined, but of a type too strongly characterized to be left unrecognized. Specimens from the Boreal zone on Mount Shasta do not seem to be separable, notwithstanding their very anomalous distribution.¹

Specimens examined.—Total number, 44, from localities as follows:

California: Alturas, 1; Cassel, 6; Edgewood, 3; Fall Lake, Fall River Valley, 1; Fort Crook, 5; Likely, 1; Madeline Plains, 2; Mount Shasta (head of Panther Creek, altitude 7,800 feet, 8; pine belt, south base 4), 12; Sisson, 2; Susanville, 2.

Oregon: Summer Lake, 2; Swan Lake Valley, 4; Williamson River, 3.

PEROGNATHUS PARVUS OLIVACEUS (Merriam). GREAT BASIN POCKET MOUSE.

Perognathus olivaceus Merriam, N. Am. Fauna No. 1, 15, 1889; *ibid.*, No. 5, 71, 1891; Elliott, Field Columbian Mus., Zool. Ser., I, No. 10, 211, 1898.

Perognathus olivaceus amemus Merriam, N. Am. Fauna No. 1, 16, 1889.

Type locality.—Kelton, Utah.

Distribution.—Upper Sonoran zone throughout the Great Basin, from northern Utah and southern Idaho southwest to Owens Valley, California, and west to southern Oregon and northeastern California.

General characters.—Similar to *P. parvus*; differing in softer pelage, lighter color, and slight cranial characters.

Color.—Similar to the buff phase of *P. parvus*, but with clearer, softer colors; above, bright cinnamon buff finely mixed with black; lateral line distinct; subauricular spot conspicuous; hairs of belly pure white or with plumbeous bases and buff tips; inner side of foreleg white or buff. Late fall pelage paler.

Skull.—Similar to that of *parvus* but slightly larger; mastoids more inflated; interparietal slightly smaller (ratio of interparietal width to basilar length of Hensel, 27.8); audital bullæ meeting anteriorly in a very weak symphysis or not meeting; ascending branches of premaxillæ generally exceeding nasals.

Measurements.—*Type:* Total length, 184; tail vertebræ, 101; hind foot, 23. Average of three males from Salt Lake City, Utah: Total length, 175.6; tail vertebræ, 95.6; hind foot, 22. Average of three females from Ogden, Utah: Total length, 167.7; tail vertebræ, 88; hind foot, 21.7. *Skull:* (See table, p. 62.)

Remarks.—In the wide range of this form are found numerous

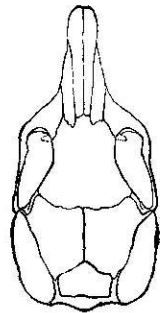


FIG. 8.—Skull of *Perognathus olivaceus*.

¹See N. Am. Fauna No. 16, 98, 1899.

more or less trivial deviations from the type. Most of these are of size only and probably represent nothing more than individual variation, which in this respect is often considerable. A difference in size between the sexes is also quite noticeable. The dark undercolor shown by the type of '*amoenus*' has been observed in many specimens from various localities, and in the series now available from Nephi are individuals with pure white belly hairs, as in the type of *olivaceus*.

Specimens examined.—Total number, 126, from localities as follows:

California: Benton, 1; Bishop Creek, 1; Long Valley, 4; Lower Alkali Lake, 1; Moran, 4.

Idaho: Bear Lake (east side), 10; Big Butte, 1; Birch Creek, 3; Blackfoot, 2; Lemhi, 1; Pahsimeroi Valley, 3.

Nevada: Anderson, 1; Bull Run Mountains, 3; Carson Valley, 1; Cottonwood Range, 5; Elko, 6; Golconda, 1; Granite Creek, 5; Halleck, 5; Monitor Valley, 5; Mountain City, 3; Pyramid Lake, 3; Reese River, 6; Ruby Valley, 9; Winnemucca, 1.

Utah: Blacksmith Fork, Cache County, 2; Kelton, 2; Laketown, 2; Nephi, 9; Ogden, 17; Otter Creek, 2; Salt Lake City, 4.

Wyoming: Fort Bridger, 1.

PEROGNATHUS PARVUS MAGRUDERENSIS subsp. nov. MOUNT MAGRUDER
POCKET MOUSE.

Type from Mount Magruder, Nev. (altitude 8,000 feet). ♂ ad., No. $\frac{28427}{40537}$, U. S. Nat. Mus., Biological Survey Coll. Collected June 6, 1891, by Vernon Bailey. Orig. No., 2899.

Distribution.—Upper Sonoran and Transition zones of the desert ranges of southern Nevada and adjoining portion of California.

General characters.—Similar to *P. p. olivaceus*, but very much larger, being the largest member of the *parvus* group.

Color.—As in *P. p. olivaceus*.

Skull.—Very much as in *olivaceus*, but considerably larger and heavier; interparietal relatively narrower (ratio of interparietal width to basilar length of Hensel, 25.1).

Measurements.—*Type*: Total length, 198; tail vertebræ, 107; hind foot, 26. Average of five adult topotypes: Total length, 191; tail vertebræ, 102.2; hind foot, 24.2. *Skull*: (See table, p. 62.)

Remarks.—*P. p. magruderensis* is a large incompletely differentiated mountain form closely related to *olivaceus* which is found near it at a lower altitude. The form found on the Panamint Mountains shows trifling differences from typical *magruderensis*, but is here considered the same.

Specimens examined.—Total number, 27, from localities¹ as follows:

California: Coso, 8; Inyo Mountains, 2; Panamint Mountains, 7; White Mountains, 2.

Nevada: Mount Magruder, 7; Grapevine Mountains, 1.

¹See N. Am. Fauna, No. 7, 361-384, 1893.

PEROGNATHUS ALTICOLA Rhoads. WHITE-EARED POCKET MOUSE.

Perognathus alticolus Rhoads, Proc. Acad. Nat. Sci., Phila., December, 1893, 412.

Type locality.—Squirrel Inn, San Bernardino Mountains, California.

Distribution.—Known only from the type locality.

General characters.—Similar to *P. p. olivaceus*, from which it differs in somewhat smaller size, in color of ears and tail, and in slight cranial characters.

Color.—Above, as in *P. p. olivaceus*; sides like back, lateral line not prominent; below, white; ears clothed within and without with clear white hairs; tail faint buff above, terminal fourth slightly dusky, white below.

Skull.—Essentially as in *P. p. olivaceus*; ascending branches of supraoccipital very broad and heavy; interparietal rather narrow.

Measurements.—Average of two adult topotypes: Total length, 165; tail vertebræ, 83.5; hind foot, 22.2. *Skull*: (See table, p. 62.)

Remarks.—This isolated species may be immediately distinguished from the other members of the *parvus* group by its light ears and tail. The type agrees perfectly with the topotypes upon which the description is based.

Specimens examined.—Total number, 4, all from the type locality.

PEROGNATHUS LORDI (Gray). NORTHWEST POCKET MOUSE.

Abromys lordi Gray, Proc. Zool. Soc. London, 1868, 202.

Perognathus lordi Rhoads, Proc. Acad. Nat. Sci. Phila., 1893, 405.

Type locality.—British Columbia.

Distribution.—Upper Sonoran and Transition zones of the plains of the Columbia River, Washington, and suitable adjacent territory in southern British Columbia.

General characters.—Similar to *P. parvus*; size large (nearly equaling *magruderensis*); tail long; feet and ears moderate; antitragus lobed; color dark; interparietal narrow.

Color.—Above, pale slaty buff, strongly mixed with black; general color as in the gray phase of *P. parvus*; hairs of belly generally with plumbeous bases and buffy tips, leaving a small inguinal and a large pectoral patch pure white; subauricular spot small but distinct; tail tricolor, as in *parvus*.

Skull.—Size large; audital bullæ and mastoids inflated; audital bullæ always connected anteriorly; interparietal squarish pentagonal, deeply notched by occipital.

Measurements.—Average of seven adults from Oroville, Wash.: Total length, 183, tail vertebræ, 97.7; hind foot, 23.2. *Skull*: (See table, p. 62.)

Remarks.—The numerous specimens examined from various parts of the country in which John Keast Lord collected leave little doubt

that this was the pocket mouse to which his name was given by Gray in 1868; but in order to remove all uncertainty, specimens were sent to Mr. Oldfield Thomas, curator of mammals in the British Museum, who kindly compared them with the type and found that they agreed in every essential particular. In color *lordi* is almost identical with the gray phase of *P. monticola*, but its large size and small interparietal show it to be a very different species. Apparently it does not occur on the west side of the Columbia at Wenatchee or south of that point. Specimens from Coulee City, Douglas, and vicinity are grading toward *columbianus*.

Specimens examined.—Total number, 131, from localities as follows:

British Columbia: Ashcroft, 14; Kamloops, 6; Okanagan, 12; Vernon, 2.

Idaho: Lewiston, 1.

Washington: Almota, 16; Asotin, 11; Chelan, 2; Cheney, 3; Conconully, 3; Coulee City, 6; Douglas, 11; Fort Spokane, 7; Marcus, 4; Orondo, 7; Oroville, 9; Spokane Bridge, 11; Wenatchee (east bank of Columbia), 9.

PEROGNATHUS LORDI COLUMBIANUS (Merriam). COLUMBIAN POCKET MOUSE.

Perognathus columbianus Merriam, Proc. Acad. Nat. Sci. Phila., September 27, 1894, 236.

Type locality.—Pasco, Wash.

Distribution.—Vicinity of type locality.

General characters.—Similar to *P. lordi*, from which it differs in slight cranial characters.

Color.—As in *P. lordi*.

Skull.—Audital bullæ and mastoids highly developed; interparietal width much reduced; otherwise as in *P. lordi*.

Measurements.—Average of five adults from Pasco, Wash.: Total length, 179.8; tail vertebræ, 92; hind foot, 22.8. *Skull*: (See table, p. 62.)

Remarks.—This form is found only on the hot plains about the Great Bend of the Columbia. The great development of audital bullæ and mastoids and consequent reduction of interparietal width exhibited by it is the extreme shown in the *parvus* group.

Specimens examined.—Total number, 26, from localities as follows:

Washington: Pasco, 12; Touchet, 14.

PEROGNATHUS FORMOSUS Merriam. LONG-TAILED POCKET MOUSE.

Perognathus formosus Merriam, N. Am. Fauna No. 1, 17, October 25, 1889.

Type locality.—St. George, Utah.

Distribution.—Southwestern Utah, southern Nevada, and the adjoining portion of California. Lower Sonoran zone.

General characters.—Size large (about equal to *P. p. magruderensis*); tail much longer than head and body, heavily crested penicillate; ears

large, somewhat attenuate, scantily haired; antitragus prominently lobed; soles naked.

Color.—Above, grizzled sepia; below, white; sides not noticeably lighter than back; dark hairs generally extending down front leg to forearm; ears dusky black, tuft of bristly hairs at base mixed black and whitish; subauricular spot small, noticeable only in very high pelage; feet white; tail buff to pencil below, buff mixed with dusky above, intensifying toward pencil, which is brownish black. Worn pelage, drab instead of sepia. *Young*: Smoky gray above, white below.

Skull.—Size medium; cranium slightly arched; mastoids well developed, bulging very slightly behind, rather smaller than in the *parvus* group; interorbital space wide; interparietal large and wide, pentagonal; nasals shorter than in *magruderensis*; audital bullæ slightly touching anteriorly; lower premolar larger than last molar.

Measurements.—Average of five adults from St. George, Utah: Total length, 189.6; tail vertebrae, 106.4; hind foot, 24. *Skull*: (See table, p. 62.)

Remarks.—This peculiar species is the only member of the subgenus *Perognathus* which has a heavily crested tail. In this respect it is like *Chaetodipus*, but its skull shows the characters of true *Perognathus*. It inhabits remote western deserts little frequented by collectors. With the exception of the type, all the specimens known were taken by the Death Valley Expedition in 1891.

Specimens examined.—Total number, 136, from localities¹ as follows:

California: Argus Mountains, 6; Bennett Wells, 2; Emigrant Spring, 12; Funeral Mountains, 7; Furnace Creek, 4; Grapevine Springs, 11; Little Owens Lake, 3; Lone Pine, 2; Lone Willow Spring, 2; Panamint Mountains, 15; Resting Springs, 1; Saline Valley, 6; Saratoga Springs, 6.

Nevada: Ash Meadows, 4; bend of Colorado River near Callville, 12; Bunkerville, 2; Charleston Mountains, 1; Grapevine Mountains, 6; Oasis Valley, 2; Pahranaagat Valley, 2; Pahroc Spring, 2; Pahrum Valley, 17; Thorp Mill, 2.

Utah: St. George, 9.

Subgenus CHÆTODIPUS Merriam, 1889 (see p. 14).

Chaetodipus Merriam, N. Am. Fauna No. 1, 5, 1889. Type, *Perognathus spinatus* Merriam, 1889, from Colorado River, California.

PEROGNATHUS BAILEYI Merriam. BAILEY POCKET MOUSE.

Perognathus baileyi Merriam, Proc. Acad. Nat. Sci. Phila., September 27, 1894, 262.

Type locality.—Magdalena, Sonora, Mexico.

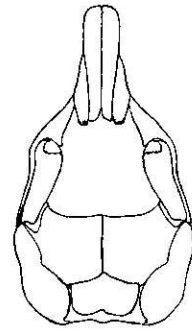


FIG. 9.—Skull of *Perognathus formosus*.

¹See N. Am. Fauna No. 7, 361–384, 1893.

Distribution.—South central Arizona and thence south into Sonora and northern Lower California, Mexico.

General characters.—Size, very large; tail very long and penicillate; color similar to that of *P. formosus*; skull large and heavy.

Color.—As in *formosus*, but paler, being grayish rather than buffy; under side of tail whitish instead of buffy.

Skull.—Large and massive; mastoids relatively smaller than in *formosus*; mastoid side of parietal scarcely longest, about equaling other long sides; audital bullæ very weakly apposed in front; interparietal large, pentagonal, relatively wider than in *formosus*, interparietal width about equal to interorbital width; lower premolar smaller than or about equal to last molar.

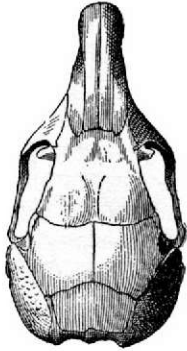


FIG. 10.—Skull of *Perognathus baileyi*.

Measurements.—Average of five adults from the type locality: Total length, 214.6; tail vertebrae, 120.6; hind foot, 27. *Skull:* (See table, p. 62.)

Remarks.—*P. baileyi* stands somewhat alone. It seems most nearly related to *formosus*, although the sum of its characters places it in a different subgenus. The size and massiveness of its skull suggest relationship to some of the larger species of *Chatodipus*, like *paradoxus* or *femoralis*, but detailed characters indicate little affinity in this direction.

Specimens examined.—Total number, 17, from localities as follows:

Arizona: Mammoth, 1; New River, 5; Tucson (75 miles southwest), 1; Santa Catalina Mountains, near Tucson, 1.

Sonora: Magdalena, 8.

Lower California: Comondu, 1.

PEROGNATHUS HISPIDUS Baird. HISPID POCKET MOUSE.

Perognathus fasciatus Baird, Mamm. N. Am., 420, 1857; Thomas, Proc. Zool. Soc. Lond., 1888, 449.

Perognathus hispidus Baird, Mamm. N. Am., 421, 1857; Merriam, N. Am. Fauna No. 1, 23, 1889.

Perognathus paradoxus spilotus Merriam, N. Am. Fauna No. 1, 25, 1889; Allen, Bull. Am. Mus. Nat. Hist., N. Y., VI, 172, 1894; *ibid.*, VIII, 58, 1896.

Perognathus paradoxus Allen, Bull. Am. Mus. Nat. Hist., N. Y., VI, 172, 1894.

Type locality.—Charco Escondido, Tamaulipas, Mexico.

Distribution.—Southern and western Texas, north to Oklahoma and south into border States of Mexico. Lower Sonoran zone.

General characters.—Size large; tail equal to or slightly shorter than head and body, not crested or penicillate; pelage harsh, no spines or bristles anywhere; ear small, antitragus lobed, tragus quite evident; soles of hind feet naked in median line; skull heavy and somewhat ridged.

Color.—Above, ochraceous much mixed with black; sides scarcely paler than back; lateral line clear ochraceous, extending on fore and hind legs for half their length; face and orbital region light, lower cheeks continuous with lateral line; underparts white; ears dusky inside, buffy white on margins and on outer side, except an elliptical black spot on inflexed portion; feet white; tail whitish below, buffy on sides, sharply black above. *Spring pelage*: Much paler.

Skull.—Size large; rostrum heavy, somewhat arched; interorbital space wide; supraorbital bead very evident; mastoids relatively small, not bulging behind; mastoid side of parietal short; interparietal large, imperfectly pentagonal, all angles much rounded, anterior one sometimes entirely annihilated; ascending branches of supraoccipital short and heavy; audital bullæ normally separated anteriorly by breadth of basisphenoid, occasionally approaching each other; lower premolar about equal to last molar.

Measurements.—Average of six adults from Brownsville, Tex.: Total length, 204.5; tail vertebræ, 100.5; hind foot, 25. *Skull*: (See table, p. 62.)

Remarks.—This species typifies one of the most peculiar groups of the genus. It is characterized by its large size, short uncrested tail, and heavy ridged skull. Its skull, though peculiar, is plainly that of a *Chaetodipus*, but external characters, excepting size, do not prohibit its being classed with restricted *Perognathus*, thus reversing the conditions presented by *formosus*. Baird's type agrees in essential characters with specimens from Brownsville, Tex., and other points near the type locality. In examining this type it was discovered that the broken skull supposed to belong to it is composite. The posterior section is the only part which may be safely assumed to have been originally within the skin. The anterior part and the mandible seem to have belonged with some other skin. Besides many differences of proportion which show this to be the case, there is a distinct difference in the texture and surface appearance of the bone in the two parts, indicating that they were cleaned and used differently. The skull of Baird's second specimen (No. 1695), which he figured, is nearly perfect and agrees in detail with many recently collected ones. The posterior section of the skull of the type agrees with this one, and also with the same parts of numerous others from the same vicinity. The skin of the type is also easily recognizable, so that when everything is considered there is no good excuse for allowing the name *Perognathus hispidus* to remain doubtful.

The form described as *P. p. spilotus* is here considered synonymous with *hispidus*, though there is some difference between the two. In a general way the southern animals are smaller, and with harsher pelage and higher color than the northern. The difference, which is chiefly of size, is fairly marked, and the increase quite gradual from

typical *hispidus* to typical *paradoxus*, leaving 'conditi' and 'spilotus' exactly intermediate, in character as well as geographic situation. Individual variation in size is often considerable, as is well shown by the Brownsville series, in which the length of the hind foot varies from 22 mm to 25 mm.

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

Texas: Bee County, 5; Beeville, 2; Blocker Ranch, 1; Brazos, 1; Brownsville, 40; Chileipin Creek, San Patricio County, 1; Colorado, 1; Corpus Christi, 2; Cuero, 1; Gainesville, 6; Llano, 2; Lomita Ranch (near Rio Grande City), 3; Long Point, 1; Los Indios Ranch, Nueces County, 1; Nueces Bay, 5; Oconnorport, 1; Padre Island, 1; Rio Grande City, 3; Rockport, 30; Roma, 1; Saginaw, 1; San Antonio, 46; Santa Rosa, 1; San Thomas, 2; Sauz Ranch, Cameron County, 1; Sycamore Creek (mouth), 2.

Nuevo Leon: Linares, 2.

Tamaulipas: Matamoras, 1; Mier, 3; Victoria, 1.

PEROGNATHUS HISPIDUS PARADOXUS (Merriam). KANSAS POCKET MOUSE.

Perognathus paradoxus Merriam, N. Am. Fauna No. 1, 24, October 25, 1889.

Perognathus latirostris Rhoads, Am. Nat., XXVIII, 185, February, 1894.

Perognathus conditi Allen, Bull. Am. Mus. Nat. Hist., N. Y., VI, 318, November, 1894.

Type locality.—Trego County, Kans.

Distribution.—Upper Sonoran zone of the Great Plains from the Dakotas to Texas, westward to base of Rocky Mountains.

General characters.—Very similar to *P. hispidus*, but larger and with softer pelage; skull much heavier and more ridged.

Color.—Much as in *hispidus*, but duller and paler.

Skull.—As in *hispidus*, but much larger, heavier, more angular and more ridged; otherwise not tangibly different.

Measurements.—Average of six adults from Kansas and Nebraska: Total length, 222.3; tail vertebræ, 108; hind foot, 26.5. *Skull:* (See table, p. 62.)

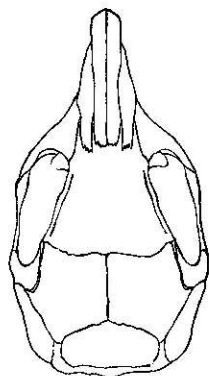


FIG. 11.—Skull of *Perognathus paradoxus*.

Remarks.—The average difference in size between *paradoxus* and typical *hispidus* is considerable, but apart from this there are no very important distinctive characters. The skull varies indi-

vidually more than is usual in the genus and affords scarcely any reliable differences. *P. paradoxus* has few characters in common with *P. femoralis*, which it rivals in size. It is heavier and more robust than *femoralis* and different in many other ways. The type of '*P. latirostris*' Rhoads is slightly larger than any other specimen examined, but, in view of the variation shown in the group, the chances of its being even subspecifically distinct seem very slight. Specimens from Arizona and

western Texas are here referred to *paradoxus*, as they seem slightly nearer to that form than to *hispidus*.

Specimens examined.—Total number, 61, from localities as follows:

Arizona: Fort Huachuca, 1; San Bernardino Ranch, 2.

Colorado: Boulder County, 2; Sterling, 2.

Kansas: Colby, 1; Ellis, 2; Garden Plain, 1; Pendennis, 1; Trego County, 3.

Nebraska: Callaway, 1; Cherry County, 1; Myrtle, 2; Red Cloud, 1.

New Mexico: Las Vegas, 1; Roswell, 1.

Oklahoma: Alva, 11; Orlando, 3; Ponca, 1.

South Dakota: Corral Draw, Pine Ridge Indian Reservation, 8; Quinn Draw, Cheyenne River, 3; Smithville, 1.

Rocky Mountains: 1 (type of '*latirostris*').

Texas: Amarillo, 1; Marfa, 3; Presidio County, 1.

Chihuahua: Chihuahua, 1; Santa Rosalia, 2; Casas Grandes, 12.

PEROGNATHUS HISPIDUS ZACATECÆ subsp. nov. ZACATECAS POCKET MOUSE.

Type from Valparaiso, Zacatecas, Mexico. ♀ yg. ad., No. 91877, U. S. Nat. Mus., Biological Survey Coll. Collected December 16, 1897, by E. A. Goldman. Orig. No., 11968.

Distribution.—Upper Sonoran zone from Valparaiso, Zacatecas, to Celaya, Guanajuato, Mexico.

General characters.—Somewhat larger and darker-colored than *hispidus*; otherwise similar.

Color.—Much darker and more olivaceous than in *hispidus*; general color of upperparts between the hair-brown and olive of Ridgway; bases of hairs very dark plumbeous; lateral line pure ochraceous, well defined, slightly paler than in *hispidus*; spots at base of whiskers intensely black and very conspicuous; tail sharply black above; underparts white.

Skull.—As in *hispidus*, but somewhat larger.

Measurements.—*Type*: Total length, 211; tail vertebrae, 105; hind foot, 27.5. *Skull*: (See table, p. 62.)

Remarks.—This form seems to be related most nearly to *paradoxus* and, like it, inhabits the Upper Sonoran zone. Its dark olivaceous color makes it easily recognizable.

Specimens examined.—Total number, 10, from localities in Mexico, as follows:

Guanajuato: Celaya, 1.

Zacatecas: Valparaiso, 9.

PEROGNATHUS PENICILLATUS Woodhouse. DESERT POCKET MOUSE.

Perognathus penicillatus Woodhouse, Proc. Acad. Nat. Sci. Phila., 1852, 200.

Perognathus penicillatus Woodhouse, Sitgreaves Exp'd. Zuffi and Colorado River, 49, pl. 3, 1854; Merriam, N. Am. Fauna No. 1, 22, 1889.

Type locality.—San Francisco Mountain, Arizona.¹

¹Woodhouse does not specify exactly where the type was taken. It seems to have been between his camps 15 and 18, which were on the northeast side of the mountain. It is not unlikely that the type came from the Little Colorado Desert, a few miles farther to the northeast.

Distribution.—Vicinity of Colorado River, from Bunkerville, Nev., to Yuma, Ariz., where it meets the range of its subspecies *angustirostris*. The type is the only specimen known from the type locality. Lower Sonoran zone.

General characters.—Size rather large, about equal to *formosus*; tail long, heavily crested, penicillate; sole of hind foot naked to heel; ears scantily haired, shorter and rounder than in *formosus*, antitragus lobed; pelage rather soft; no spines on rump; color very uniform, markings almost obsolete.

Color.—Above, vinaceous buff very finely sprinkled with black; sides exactly like back; lateral line obsolete; subauricular spot present; face and cheeks like back except for a slight darkening under ears; no black spots at base of whiskers; ears outside like back, inside slightly dusky; tail white below to pencil, upper surface and pencil dusky brownish. In the 'left-over' winter pelage the general color is écreu drab instead of vinaceous buff.

Skull.—Size medium or rather large; rostrum heavy and high; parietals somewhat flattened; mastoid side of parietal about equaling squamosal side, much exceeded by others; interparietal moderate, all angles rounded, especially posterior ones, anterior angle rounded but distinctly evident; ascending branches of supraoccipital quite heavy; audital bullæ widely separated anteriorly; lower premolar larger than last molar.

Measurements.—Average of four adults from bend of Colorado River, Nevada: Total length, 205; tail vertebræ, 109; hind foot, 25.5. *Skull:* (See table, p. 62.)

Remarks.—The members of the *penicillatus* group are true *Chaetodipus*, but none of them have rump spines. Characters marking the typical form are large size, uniform color, subdued markings, and heavy skull. The skull of the type which is now available for examination does not agree perfectly with any of the series from the bend of the Colorado River. It is larger and heavier than these, the anterior part is much elevated, and the rostrum broad. These characters, however, are quite pronounced in the Colorado River specimens, and it seems safe to consider them *penicillatus*, even though no exact duplicates of the type are among them. Even the most northern of the Colorado River specimens is somewhat intermediate between true *penicillatus* and *angustirostris*.

Specimens examined.—Total number, 55, from localities as follows:

Arizona: Ehrenberg, 5; Harper Ferry, 3; Fort Mohave, 9; Norton, 4; San Francisco Mountain, 1 (type).

California: Mohave Mountains, 1.

Nevada: Bunkerville, 3; Colorado River, Lincoln County, 8; Colorado River, near Callville, 8; Vegas Valley, 13.

PEROGNATHUS PENICILLATUS ANGUSTIROSTRIS subsp. nov. CALIFORNIA
DESERT POCKET MOUSE.

Type from Carriso Creek, Colorado Desert, Cal. ♂ ad., No. 73881, U. S. Nat. Mus., Biological Survey Coll. Collected March 31, 1895, by A. W. Anthony. Orig. No., 22.

Distribution.—Colorado Desert; south to northern Lower California and east to the Colorado River and southwestern Arizona, where it meets the range of *penicillatus* and *pricei*. Lower Sonoran zone.

General characters.—Similar to *P. penicillatus*, but smaller; color about the same; skull lighter and with longer and more slender rostrum.

Color.—As in *P. penicillatus*.

Skull.—Similar in general to *P. penicillatus*; nasals and ascending premaxillæ long and narrow, much more slender than in *penicillatus*; interparietal averaging larger and more angular.

Measurements.—*Type*: Total length, 191; tail vertebræ, 105; hind foot (measured dry), 24.4. Average of five topotypes: Total length, 181; tail vertebræ, 103; hind foot, 24. *Skull*: (See table, p. 62.)

Remarks.—The numerous specimens of this subspecies which have been examined include many which are not strictly typical. This is true of the large series from the Colorado River at monument No. 204 and the several localities in the vicinity of Yuma, all of which tend in differing degrees toward true *penicillatus*. From Yuma eastward the tendency is toward *pricei*. The characters of small size and slender rostrum are very constant in the many specimens from the Colorado Desert, California.

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

Arizona: Bradshaw City, 1; Gila City, 3; Yuma, 9.

California:¹ Agua Caliente, 3; Baregas Springs, 4; Carriso Creek, 15; Colorado Desert, 7; Coyote Wells, 3; Indian Wells, 1; Laguna, 5; Mexican Boundary monument No. 204, near Colorado River, 78; Palm Springs, 55; Salt Creek, 1; San Felipe Canyon, 6; Unlucky Lagoon, 9; Vallecitas, 10; Walters, 7; Whitewater, 2; Fort Yuma, 15.

Lower California: Gardner Lagoon, 5; Hardee River (head, near mouth of Colorado River), 2; Poso Vicente, 2; Seven Wells, 10.

PEROGNATHUS PENICILLATUS PRICEI (Allen). PRICE POCKET MOUSE.

Perognathus pricei Allen, Bull. Am. Mus. Nat. Hist., N. Y., VI, 318, November, 1894.

Perognathus obscurus Allen, Bull. Am. Mus. Nat. Hist., N. Y., VII, 216, June, 1895.

Type locality.—Oposura, Sonora, Mexico.

Distribution.—South central Arizona and Northwestern Mexico, west of the Sierra Madre.

General characters.—Similar to *penicillatus*, but smaller; pelage

¹Nearly all these localities are in the Colorado Desert.

harsher, no spines on rump; upperparts more strongly mixed with black; skull short and heavy.

Color.—Above, general effect drab or broccoli brown, produced by vinaceous buff strongly lined with black; sides like back, lateral line faintly evident; ears very scantily haired, same color as back; underparts white; tail bicolor, white below, dusky above.

Skull.—Size medium, much smaller than in *penicillatus*; rostrum short and heavy; nasal branches of premaxillæ barely exceeding nasals; interparietal moderately wide, anterior angle often obliterated; lower premolar larger than last molar. Contrasted with *penicillatus* the skull of *pricei* is much smaller, smoother, or less angular, and has very much shorter nasals. In comparison with *intermedius* it is heavier and less arched, the rostrum is broader, and the nasals are shorter, the mastoids are smaller, and the interparietal is narrower.

Measurements.—Average of seventeen adults from Hermosillo, Sonora, Mexico: Total length, 172.5; tail vertebræ, 92.8; hind foot, 22.3. *Skull*: (See table, p. 62.)

Remarks.—The type of *P. pricei* is very immature, but its skull shows characters amply sufficient to prove that it belongs to the *penicillatus* rather than the *intermedius* group. Although these groups inhabit the same general region and resemble each other so closely in superficial characters, the skulls are so markedly different as to indicate that they bear no close relation to one another. The only external difference is found in the rump spines. This is not to be relied upon absolutely, however, for though never present in *penicillatus* and its forms, they are sometimes, though very rarely, absent or undeveloped in *intermedius*. In local habitat the two also differ in an interesting way, *pricei* being found in sandy places, while *intermedius* prefers the rocks.

The extreme form of *pricei* is found in southern Sonora, where it is so different from typical *penicillatus* as to suggest full specific rank.

Specimens examined.—Total number, 187, from localities as follows:

Arizona: Calabasas, 6; Dos Cabezos, 1; Fairbank, 28; Fort Bowie, 2; Fort Huachuca, 1; Fort Lowell, 39; La Osa, 2; Mammoth, 12; New River, 5; Phoenix, 5; Santa Cruz River (west of Patayone Mountain), 3; Sentinel, 2; Tubac, 3; Tucson (twenty miles south), 3; Willcox, 6.

Sonora: Batomotal, 13; Hermosillo, 17; Magdalena, 6; Oposura, 8; Ortiz, 10; Quitobaquita, 10; Sonora, 1; Sonoyta, 4.

PEROGNATHUS PENICILLATUS EREMICUS (Mearns). EASTERN DESERT
POCKET MOUSE.

Perognathus (Chatodipus) eremicus Mearns, Bull. Am. Mus. Nat. Hist., N. Y., X, 300, August 31, 1898.

Type locality.—Fort Hancock, El Paso County, Tex.

Distribution.—Extreme western Texas, thence south into north

central Mexico east of the Sierra Madre at least to La Ventura, Coahuila.

General characters.—Size about equal to *pricei*; color slightly paler; pelage softer; nasals longer and more slender; skull otherwise peculiar.

Color.—Essentially as in *pricei*, but paler; general effect fawn lightly mixed with black; dark area below ears quite prominent; spot at base of whiskers faint.

Skull.—Similar to *pricei*; cranium somewhat arched; nasals long and slender; nasal branches of premaxillæ widened at extremities, extending much beyond nasals; supraoccipital slightly bulging behind.

Measurements.—*Type*: Total length, 163; tail vertebræ, 83; hind foot, 22.1. *Skull*: (See table, p. 62.)

Remarks.—The average difference between this eastern form of the *penicillatus* group and its western relative *pricei* is considerable. The long slender nasals and high arched skull of this form are never found in specimens from west of the Sierra Madre. Specimens from Chihuahua and Coahuila appear to be quite typical. *P. eremicus* differs from *pricei* much as *angustirostris* does from true *penicillatus*. In fact, its skull is not very unlike that of *angustirostris*, but the two are not likely to be confused, on account of the difference in size and color. Specimens from San Bernardino ranch, Arizona, are not typical, being dark-colored and otherwise intermediate.

Specimens examined.—Total number, 93, from localities as follows:

Arizona: San Bernardino Ranch, Cochise County, on Mexican boundary, 27.

Texas: El Paso, 5; Fort Hancock, 3.

Chihuahua: Ciudad Juarez, 2; Escalon, 1; Samalayuca, 3; Santa Rosalia, 24.

Coahuila: Jimulco, 1; La Ventura, 12; Torreon, 14.

Durango: Mapimi, 1.

PEROGNATHUS STEPHENSI Merriam. STEPHENS POCKET MOUSE.

Perognathus stephensi Merriam, Proc. Acad. Nat. Sci. Phila., September 27, 1894, 267.

Type locality.—Mesquite Valley, northwest arm of Death Valley, Inyo County, Cal.

Distribution.—Known only from the type locality.

General characters.—Similar to *penicillatus*; size very much smaller; tail long, well crested; hind feet naked below; very little or no black in color.

Color.—‘Left-over’ winter pelage: Above, between pinkish buff and vinaceous buff; effect perfectly uniform, no traces of black anywhere; ears sparsely haired, same color as back; lateral line entirely obliterated; face slightly lighter than back and sides; below, white; tail below white, above like back. The post-breeding pelage is doubtless darker and may have more or less black in it.

Skull.—Size small; general form much like that of *penicillatus*;

cranium slightly arched; mastoids rather small; interparietal correspondingly large; ascending branches of supraoccipital relatively heavy; lower premolar very large, nearly twice as large as last molar.

Measurements.—*Type*: Total length, 177; tail vertebrae, 96; hind foot, 21. *Skull*: (See table, p. 62.)

Remarks.—*P. stephensi* is a miniature of *penicillatus* and but slightly larger than *arenarius*. It is at once separated from the former by its small size and from the latter by its cranial characters. Further collections from the desert region of California will doubtless yield more of this interesting species, but at present it is known only from the two specimens which Mr. Stephens caught in the extension of Death Valley known as Mesquite Valley.

Specimens examined.—Total number, 2, the type and one topotype.

PEROGNATHUS ARENARIUS Merriam. LITTLE DESERT POCKET MOUSE.

Perognathus arenarius Merriam, Proc. Cal. Acad. Sci., 2d ser., IV, 461, September 25, 1894.

Type locality.—San Jorge, near Comondu, Lower California.

Distribution.—Known only from the type locality.

General characters.—Size very small; tail short, slightly exceeding head and body; pelage rather soft, no bristles anywhere; color plain and uniform, lateral line obsolete; skull short and broad.

Color.—Very similar to *penicillatus*; dorsum buffy drab, finely mixed with black; sides somewhat paler, lateral line not evident; ears dusky, a minute white spot on lower margins; underparts white; tail bicolor.

Skull.—Size very small; cranium slightly arched; interorbital and mastoid width relatively great; mastoids moderate, relatively larger than in *penicillatus*; interparietal broadly pentagonal; nasals rather slender, slightly emarginate at frontal endings; zygomata extremely frail and light; lower premolar larger than last molar.

Measurements.—*Type* (from dry skin): Total length, 136; tail vertebrae, 70; hind foot, 20. *Skull*: (See table, p. 62.)

Remarks.—*P. arenarius* is a very aberrant member of the *penicillatus* series. It is about the same color as *stephensi*, but differs from it in size and cranial details, such as more slender nasals, wider interorbital space, larger mastoids, and shorter premaxillae. As far as known it is the smallest member of the subgenus *Chaetodipus*.

Specimen examined.—The type.

PEROGNATHUS PERNIX Allen. SINALOA POCKET MOUSE.

Perognathus pernix Allen, Bull. Am. Mus. Nat. Hist., N. Y., X, 149, April, 1898.

Type locality.—Rosario, Sinaloa, Mexico.

Distribution.—Coast of western Mexico in the States of Sinaloa and Jalisco.

General characters.—Size small; tail rather long, thinly haired, slightly crested; colors dark; pelage slightly hispid, no spines or bristles anywhere; ears medium; feet naked below.

Color.—General color above, hair-brown, uniform over all parts above the lateral line; lateral line distinct, between pinkish buff and ochraceous buff; underparts soiled white; ears dusky, a minute white spot on inferior margins; tail brownish black above, whitish below.

Skull.—Size rather small; form narrow and elongate; mastoids quite small; interorbital space much constricted; nasals rather broad and flattened, of medium length; naso-frontal suture not emarginate; interparietal wide, somewhat produced anteriorly; posterior angles much rounded; molar teeth small and weak; lower premolar larger than last molar.

Measurements.—Average of four adult topotypes: Total length, 175; tail vertebrae, 97; hind foot, 22.3. *Skull:* (See table, p. 63.)

Remarks.—*Perognathus pernix* differs from other Mexican species in much smaller size. Its dark color, narrow interorbital space and long nasals distinguish it from all other *Chaetodipus* not having rump spines.

Specimens examined.—Total number, 48, from localities in Mexico, as follows:

Sinaloa: Altata, 2; Culiacan, 17; Mazatlan, 11 (not typical); Rosario, 10.

Tepec: Acaponeta, 8.

PEROGNATHUS PERNIX ROSTRATUS subsp. nov. BROAD-NOSED POCKET MOUSE.

Type from Camoa, Rio Mayo, Sonora, Mexico. ♂ yg. ad., No. 95818, U. S. Nat. Mus., Biological Survey Coll. Collected October 28, 1898, by E. A. Goldman. Orig. No., 13167.

Distribution.—Coast plains of southern Sonora and northern Sinaloa, Mexico.

General characters.—Size, proportions, and general color about as in *P. pernix*; skull quite different.

Color.—Above, slightly lighter and grayer than *pernix*; general color oftener broccoli brown than hair-brown; facial area distinctly paler than back and sides; lateral line pinkish buff; lower parts soiled white.

Skull.—Similar to *pernix*, but shorter and broader; rostrum very heavy; nasals, premaxillae, and premaxillary branches of zygomata all heavier than in *pernix*; nasals shorter; interorbital space wider; interparietal, mastoids, and audital bullae not tangibly different.

Measurements.—*Type:* Total length, 162; tail vertebrae, 94; hind foot, 23.5. Average of four topotypes: Total length, 161; tail vertebrae, 88; hind foot, 22.5. *Skull:* (See table, p. 63.)

Remarks.—This form is quite a departure from *pernix*, but intergradation with that species is evidenced by a single specimen from

Sinaloa. The series of topotypes from Camoa are constant in their cranial differences from *pernix*, and though no external characters are evident the form seems well worth recognition.

Specimens examined.—Total number, 10, from localities in Mexico, as follows:

Sinaloa: Sinaloa, 1.

Sonora: Camoa, 9.

PEROGNATHUS INTERMEDIUS Merriam. INTERMEDIATE POCKET MOUSE.

Perognathus intermedius Merriam, N. Am. Fauna No. 1, 18-19, 1889; *ibid.*, No. 3, 74, 1890.

Perognathus obscurus Merriam, *ibid.*, No. 1, 20-21, 1889.

Type locality.—Mud Spring, Mohave County, Ariz.

Distribution.—Known from several scattered localities in the Sonoran zone of Arizona, New Mexico, and northern Mexico.

General characters.—Size medium, smaller than *penicillatus*; color much darker, with well-defined markings; rump spines rather weak; skull rather small and light.

Color.—*Winter pelage:* Above, general effect drab, with a strong mixture of black on back and rump; sides paler than back; lateral line pale fawn, quite narrow; ears dusky; tail dusky above, becoming black toward pencil, whitish below, faintly buffy on sides; underparts white, with suggestions of buff.

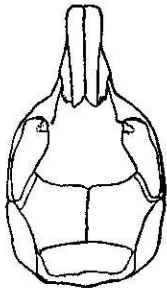


FIG. 12.—Skull of *Perognathus intermedius*.

Skull.—Size medium; cranium well arched; rostrum slender, somewhat depressed; interparietal very wide and strap-shaped, anterior angle normally obliterated, others but slightly rounded; lower premolar larger than last molar. Compared with *penicillatus* it is smaller and less angular; rostrum and nasals much more slender; zygomata more sloping; mastoids relatively larger and fuller; ascending branches of supraoccipital much lighter; interorbital space wider.

Measurements.—Average of four adults from the Grand Canyon of the Colorado, Arizona: Total length, 179.5; tail vertebræ, 102.7; hind foot, 22.7; ear from anterior base, 7. *Skull:* (See table, p. 62.)

Remarks.—Specimens of typical *intermedius* are not numerous at present, and the few that are available are in the winter pelage. This makes the determination of '*P. obscurus*' a little difficult. The latter is identical with *intermedius* in cranial characters, but slightly more ruddy in color.

P. intermedius is much rarer than *penicillatus*, some form of which is often found near it. In the vicinity of El Paso, Tex., Mr. Vernon Bailey collected both *intermedius* and *eremicus*, the one being found

in the rocks and the other in the sandy places. At other localities where both occur the same conditions seem to obtain.

Specimens examined.—Total number, 46, from localities as follows:

Arizona: Grand Canyon, 4; Harper Ferry, 1; Fort Bowie, 1; Fort Huachuca, 1; Little Colorado River, Painted Desert, 2; Mud Spring, 2; Willow Spring, 1.

New Mexico: Camp Apache, Grant County, 14.

Texas: Alpine, 1; El Paso, 2.

Chihuahua: Casas Grandes, 4; Chihuahua, 13.

PEROGNATHUS NELSONI Merriam. NELSON POCKET MOUSE.

Perognathus nelsoni Merriam, Proc. Acad. Nat. Sci. Phila., September 27, 1894, 266.

Type locality.—Hacienda La Parada, San Luis Potosi, Mexico.

Distribution.—Upper and Lower Sonoran zone of central Mexico, covering the table-land from Inde, Durango, south to Lagos, Jalisco, and east to Jaumave, Tamaulipas.

General characters.—Similar to *intermedius*, but larger, darker, and harsher pelaged; tail heavily crested; rump bristled.

Color.—Above, general effect hair-brown; hairs dark plumbeous, basally followed by a narrow grayish fawn zone and a heavy black tip; sides like back, orbital region scarcely lighter; lateral line fawn, well defined; underparts dirty whitish; ears dusky, slightly hoary on margins; tail bicolor, black above, whitish below. Worn pelage much paler, becoming drab or ecru drab.

Skull.—Similar to *intermedius*, but larger and heavier, rostrum and nasals particularly so; interparietal smaller; nasal branches of premaxillæ exceeding nasals; ascending branches of supraoccipital heavy.

Measurements.—Average of ten adults from the type locality: Total length, 182; tail vertebræ, 104; hind foot, 23; ear from anterior base, 8. *Skull:* (See table, p. 62.)

Remarks.—This is the commonest pocket mouse of Mexico. It is found in suitable localities over the entire table-land. It is closely related to *intermedius* and possibly intergrades with it. There are some slight variations in the species, but none are marked enough to warrant separation.

Specimens examined.—Total number, 65, from localities in Mexico, as follows:

Aguas Calientes: Chicalote, 5.

Cosahuila: Jimulco, 1; La Ventura, 1; Sierra Encarnacion, 1.

Durango: Durango City, 10; Inde, 3; Mapimi, 1.

Jalisco: Lagos, 9.

San Luis Potosi: Hacienda La Parada, 19; Jesus Maria, 3.

Zacatecas: Berriozabal, 9; Cañitas, 1; Hacienda San Juan Capistrano, 1; Valparaiso Mountains, 1.

PEROGNATHUS NELSONI CANESCENS (Merriam). GRAY POCKET MOUSE.

Perognathus intermedius canescens Merriam, Proc. Acad. Nat. Sci. Phila., September 27, 1894, 267.

Type locality.—Jaral, Coahuila, Mexico.

Distribution.—Known only from the type locality.

General characters.—Size larger than *intermedius*; color much paler and more grayish; skull similar to that of *P. nelsoni*.

Color.—General color of upperparts drab gray; lateral line pinkish buff, rather narrow; underparts pure white; tail bicolor, mouse gray above, white below.

Skull.—Similar to that of *nelsoni*; differs in more slender nasals, constricted interorbital space, and slightly smaller mastoids.

Measurements.—*Type*: Total length, 193; tail vertebræ, 117; hind foot, 22. One topotype: Total length, 184; tail vertebræ, 105; hind foot, 22. *Skull*: (See table, p. 63.)

Remarks.—This form seems to be quite localized. Its habitat is similar to that of the other members of the group. The type and cotypes were caught in the cliffs of a rocky canyon.

Specimens examined.—Total number, 3, from the type locality.

PEROGNATHUS GOLDMANI sp. nov. GOLDMAN POCKET MOUSE.

Type from Sinaloa, Sinaloa, Mexico. ♀ ad., No. 96673, U. S. Nat. Mus., Biological Survey Coll. Collected February 15, 1899, by E. A. Goldman. Orig. No., 13428.

Distribution.—Coast plains of northern Sinaloa and southern Sonora, Mexico.

General characters.—Size large; tail moderately long and heavily crested; pelage somewhat hispid, rump with a few short bristles; ears relatively large, much larger than those of *nelsoni*; antitragal lobe prominent, wider at base than at apex; in color and markings similar to *nelsoni*; skull relatively large and heavy.

Color.—Similar in general to *nelsoni*; general color across shoulders and anterior portion of upperparts, broccoli brown; posterior half of dorsum much darkened by admixture of black; lateral line pinkish buff; ears blackish with hoary margins, externally whitish for distal half; subauricular spot present; tail sharply bicolor, blackish above, white below.

Skull.—Size large, much heavier than in *nelsoni*; mastoids somewhat smaller and more ridged; nasals much larger and heavier; skull noticeably higher and not so wide posteriorly, thus making the zygomatica more nearly parallel.

Measurements.—*Type*: Total length, 202; tail vertebræ, 108; hind foot, 28. Average of five topotypes: Total length, 202; tail vertebræ, 112; hind foot, 28; ear from anterior base, 11. *Skull*: (See table, p. 63.)

Remarks.—The large orbicular ears of this species easily distinguish

it from *nelsoni*, its nearest relative. It is one of the several forms peculiar to western Mexico, and, like the others, its known range is quite limited. Specimens from Camoa and Alamos are slightly smaller than those from Sinaloa.

Specimens examined.—Total number, 36, from localities in Mexico, as follows:

Sinaloa: Sinaloa, 7.

Sonora: Alamos, 18; Camoa, 11.

PEROGNATHUS ARTUS sp. nov. BATOPILAS POCKET MOUSE.

Type from Batopilas, Chihuahua, Mexico. ♀ ad., No. 96298, U. S. Nat. Mus., Biological Survey Coll. Collected October 6, 1898, by E. A. Goldman. Orig. No., 13090.

Distribution.—Known only from a few scattered localities in western Mexico.

General characters.—Externally similar to *goldmani*; rump bristles weak or undeveloped; skull distinctive.

Color.—As in *goldmani*.

Skull.—Similar to that of *goldmani*, but smaller and narrower; mastoids much smaller with more strongly marked transverse ridges; audital bullæ smaller; nasals moderate, exceeded by ascending premaxillæ; interparietal nearly elliptical, slightly produced anteriorly; zygomata nearly parallel.

Measurements.—Average of five adult topotypes: Total length, 191; tail vertebræ, 106; hind foot, 24.6. *Skull:* (See table, p. 63.)

Remarks.—The large size of this species at once distinguishes it from *pernix* and *rostratus*, and its very small mastoids separate it from other Mexican species. Externally it is very similar to *goldmani*, but it has less prominent rump bristles; in fact, they are not at all evident in the majority of specimens. *P. pernix* was generally found by Mr. Goldman at the same localities as *P. goldmani*, but at Culiacan he found it in company with *P. artus*.

Specimens examined.—Total number, 15, from localities in Mexico, as follows:

Chihuahua: Batopilas, 8.

Durango: Chacala, 3.

Sinaloa: Culiacan, 4.

PEROGNATHUS FALLAX Merriam. SHORT-EARED CALIFORNIA POCKET MOUSE.

Perognathus fallax Merriam, N. Am. Fauna No. 1, 19, 1889; Allen, Bull. Am. Mus. Nat. Hist., N. Y., V, 184, 1893.

Type locality.—Reche Canyon, 3 miles southeast of Colton, San Bernardino County, Cal.

Distribution.—Extreme southwestern California, occupying the region west of the San Bernardino and San Jacinto ranges and extending south into northern Lower California.

General characters.—Size medium, somewhat larger than *intermedius*; general color similar but darker; wider and brighter lateral line; rump bristles heavier; tail long and crested; ears moderate.

Color.—Above, general effect bister, middle of back and rump with a strong element of black; lateral line and subterminal zone of hairs of upperparts pinkish buff; underparts creamy white; ears dusky on inflexed portions, hoary on inner sides; tail bicolor.

Skull.—Similar to *intermedius*; cranium arched; nasals slender; mastoids rather large and full; interparietal wide, anterior angle slightly developed; naso-frontal suture slightly or not emarginate.

Measurements.—Average of six adults from the type locality: Total length, 192; tail vertebrae, 11; hind foot, 23; ear from anterior base, 9. *Skull:* (See table, p. 63.)

Remarks.—This species falls readily into the small group typified by *intermedius*. It differs from the other members in size, color, and shape of interparietal. It has been much confused with *femorialis* on account of its similar color, but its much smaller ear is a convenient external character for distinguishing it. Two specimens from Turtle Bay, Lower California, are similar in color to *anthonyi*, but cranially the same as *fallax*, to which they are here referred.

Specimens examined.—Total number, 120, from localities as follows:

California:¹ Ballenas, 1; Bergmann, Riverside County, 1; Carlsbad, 1; Chihuahuahua Mountains, 1; Dulzura, 24; El Nido, 3; Encinitas, 1; Herron, San Bernardino County, 5; Jacumba, 8; Lajolla, 1; Mountain Spring, 11; Radec, 5; Reche Canyon, Riverside County, 10; Riverside, Riverside County, 1; Rose Canyon, 10; San Felipe Valley, 4; San Pasqual Valley, 4; Santa Ysabel, 10; San Ygnacio Valley, 1; Summit (Coast Range), San Bernardino County, 4; Temescal, Riverside County, 1.

Lower California: Cape Colnett, 2; Ensenada, 1; Gato Creek, 1; Jamul Creek, 1; San Isidro Ranch, 2; Sanos Cedros, 1; San Quintin Bay, 1; Tia Juana, 2; Turtle or San Bartolome Bay, 2.

PEROGNATHUS ANTHONYI sp. nov. CERROS ISLAND POCKET MOUSE.

Type from South Bay, Cerros Island, Lower California. ♀ ad., No. 81058, U. S. Nat. Mus., Biological Survey Coll. Collected July 29, 1896, by A. W. Anthony. Orig. No., 71.

Distribution.—Known only from the type locality.

General characters.—Similar in general to *P. fallax*; differing in slightly smaller size, more ruddy color, and cranial characters.

Color.—Above, grayish fawn mixed with black; lateral line brownish fawn, poorly defined; ears dusky; white subauricular spot present; tail dusky above, whitish below.

Skull.—Similar to *P. fallax*; cranium less arched; rostrum heavier; mastoids smaller; interparietal smaller and shorter; zygomatic breadth greater anteriorly.

¹Most of these localities, unless otherwise stated, are in San Diego County.

Measurements.—*Type*: Total length, 168; tail vertebræ, 92; hind foot, 23.5. *Skull*: (See table, p. 63.)

Specimens examined.—One, the type.

PEROGNATHUS FEMORALIS Allen. GREAT CALIFORNIA POCKET MOUSE.

Perognathus femoralis Allen, Bull. Am. Mus. Nat. Hist., N. Y., III, 281, June 30, 1891; Rhoads, Proc. Acad. Nat. Sci. Phila., 1893, 407.

Type locality.—Dulzura, San Diego County, Cal.

Distribution.—Known from a few localities in San Diego County, in extreme southern California, and the adjoining part of Lower California.

General characters.—Size very large; tail long, heavily crested penicillate; color dark; ears large and elongate; pelage harsh; rump and flanks furnished with strong bristles or spines; skull large and heavy.

Color.—Similar to *fallax*, but quite intensified; above, general color bister, hairs heavily tipped with intense black; lateral line rich pinkish buff; underparts dirty whitish, sometimes washed or flecked with buffy; tail bicolor.

Skull.—Large and heavy; less arched than in *fallax*; rostrum and nasals much heavier; mastoids relatively smaller; molar teeth relatively weaker; interparietal subquadrate, rarely developing a fifth angle; naso-frontal suture slightly emarginate.

Measurements.—Average of six adults from the type locality: Total length, 223; tail vertebræ, 126; hind foot, 27.5; ear from anterior base, 12. *Skull*: (See table, p. 63.)

Remarks.—This species has the longest tail and largest hind foot found in the genus, but its body is light in comparison with that of *paradourus*. In color it has a remarkable resemblance to *fallax*, which is found within its range, but its large size, long ears, and heavy skull are amply sufficient to distinguish it.

Specimens examined.—Total number, 60, from localities as follows:

California (San Diego County): Dulzura, 32; Santa Ysabel, 9; Twin Oaks, 16.

Lower California: Nachoguero Valley, 3.

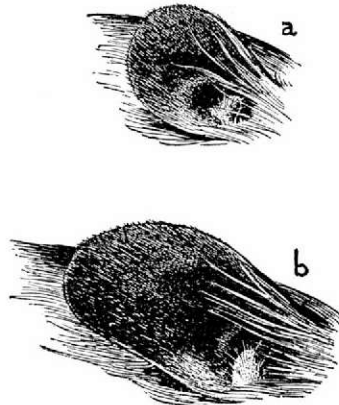


FIG. 13.—Ear of (a) *Perognathus fallax*; (b) *Perognathus femoralis*.

PEROGNATHUS CALIFORNICUS Merriam. CALIFORNIA POCKET MOUSE.

Perognathus californicus Merriam, N. Am. Fauna No. 1, 26, 1889; Allen, Bull. Am. Mus. Nat. Hist., N. Y., 263, 1896; Elliott, Field Columbian Mus., Zool. Ser., I, No. 10, 211, 1898.

Perognathus armatus Merriam, l. c., 27.

Type locality.—Berkeley, Cal.

Distribution.—Vicinity of San Francisco Bay and south to Bear Valley, San Benito County, where it meets the range of its subspecies *dispar*.

General characters.—Similar to *P. femoralis*, but smaller; about equal in size to *fallax*; ears quite elongate; rump and flanks well supplied with bristles; skull very peculiar.

Color.—Nearly the same as *femoralis*, much darker than *fallax*; general effect of upperparts bister; hairs pale plumbeous basally, darkening distally; subterminal zone pinkish buff followed by heavy black tips; tail bicolor; underparts and feet yellowish white.

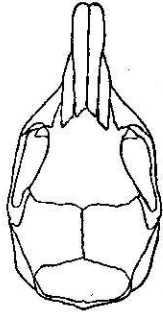


FIG. 14.—Skull of *Perognathus californicus*.

Skull.—Size medium; cranium considerably arched; mastoids exceedingly small; mastoid width greatly reduced; occiput bulging greatly; interparietal about twice as broad as long, anterior angle very slightly developed; naso-frontal suture deeply emarginate or V-shaped; lower premaxilla slightly larger than last molar.

Measurements.—Average of five adults from the type locality: Total length, 192; tail vertebrae, 103; hind foot, 24; ear from anterior base, 10.5. *Skull*: (See table, p. 63.)

Remarks.—*P. californicus* is remarkable for its very small mastoids. It has no close relation to *fallax*, with which it has sometimes been confused. Its long ears and its cranial characters indicate that its closest affinities are with *femoralis*. Even within its very limited range it is quite a rare animal, and but few specimens are in collections.

Specimens examined.—Total number, 18, from localities as follows:

California: Berkeley, 7; Bear Valley, San Benito County, 2; Gilroy, 3; Portola, San Mateo County, 2; Stanford University, 2.

PEROGNATHUS CALIFORNICUS DISPAR subsp. nov. ALLEN POCKET MOUSE.

Type from Carpinteria, Santa Barbara County, Cal. ♂ ad., No. ³²¹¹⁶/₄₃₉₂₈, U. S. Nat. Mus., Biological Survey Coll. Collected December 19, 1891, by E. W. Nelson. Orig. No., 1655.

Distribution.—Coast valleys of California from San Bernardino to San Benito County and north along the foothills of the west slope of the Sierras to Placer County.

General characters.—Larger and paler colored than *californicus*; pelage somewhat softer; skull quite different.

Color.—Similar to *fallax*, paler than *californicus* or *femoralis*; above, general color bister; facial area slightly lightened; lateral line pinkish buff, sometimes approaching ochraceous buff; underparts buffy white; tail bicolor.

Skull.—Similar to that of *californicus*, but larger and heavier; in general form resembling that of *femoralis*; mastoids quite small; nasals heavy, somewhat elongate; interorbital space narrow.

Measurements.—*Type*: Total length, 218; tail vertebræ, 120; hind foot, 27. Average of six typical adults: Total length, 210; tail vertebræ, 117; hind foot, 26; ear from anterior base, 12. *Skull*: (See table, p. 63.)

Remarks.—Although this subspecies is somewhat intermediate in character between *californicus* and *femoralis* there seems to be no good evidence of any connection with the latter. It intergrades with *californicus* in the vicinity of Bear Valley, San Benito County. In typical form, its skull presents the characters of small mastoids and narrow interorbital space found in *californicus* at the same time almost attaining the large size of the skull of *femoralis*.

Specimens examined.—Total number, 56, from localities as follows:

California: Auburn, 1; Bitter Water, 3; Carpenteria, 4; Fort Tejon, 2; Hueneme (10 miles west), 1; Kern River (25 miles above Kernville), 1; Las Virgines Creek, Los Angeles County, 1; Milo, 1; Nordhoff, 4; Raymond, 1; San Bernardino Peak, 3; San Emigdio, 4; San Fernando, 3; San Luis Obispo, 8; San Simeon, 1; Santa Monica, 1; Santa Paula, 1; Three Rivers, 9; Ventura River, 7.

PEROGNATHUS SPINATUS Merriam. SPINY POCKET MOUSE.

Perognathus spinatus Merriam, N. Am. Fauna No. 1, 21, October 25, 1889.

Type locality.—Twenty-five miles below the Needles, Colorado River, California.

Distribution.—Desert region of southern California and northern Lower California.

General characters.—Size medium, tail moderately long and crested; ears small and orbicular; pelage hispid, spines large and prominent on rump, scattered on flanks and sides and often extending to shoulders; lateral line very faint or wanting.

Color.—Above, general effect drab brown; hairs plumbeous basally, ecru drab subterminally and black-tipped; sides and orbital region slightly paler than back; underparts buffy white; lateral line generally faint, in very bright pelage showing as a slender line of ecru drab; ears dusky, subauricular spot small; tail hair-brown above, whitish below; spines white with dusky tips, except on sides where the tips are also white. Many of the hairs of the back often end with a

broad zone of ecru drab without the usual black tip. These, when combined with those having black tips, cause a peculiar mottled appearance. The 'left-over' winter pelage is much paler and grayer, the general effect being pale drab.

Skull.—Size medium; cranium rather slender and much flattened; parietals on nearly same plane as interparietal; mastoids small, not so full as in *fallax* and *intermedius*; interparietal broad but normally with slight evidence of an anterior or fifth angle; supraorbital ridge slightly trenchant; lower premolar about equal to last molar.

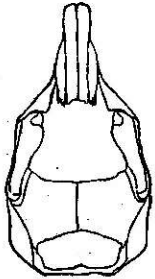


Fig. 15.—Skull of *Perognathus spinatus*.

Measurements.—Average of five adults from Palm Springs, Cal.: Total length, 181; tail vertebræ, 101; hind foot (measured dry), 21.5. *Skull:* (See table, p. 63.)

Remarks.—*Perognathus spinatus* has a limited range, and aside from the excellent series from Palm Springs in the Bangs collection but few specimens have found their way into collections. It is the type of the subgenus *Chaetodipus* and the representative of a small group quite distinct from all others. Young adults of this group differ from old in being of a grayish color and in having weaker and less numerous spines. In juveniles the first pelage is soft and without spines, which do not appear until an entire new pelage is acquired. In this species, as in most others, the males average slightly larger than the females.

Specimens examined.—Total number, 46, from localities as follows:

California: Colorado River (twenty-five miles below Needles), 1 (type); Coast Range, San Diego County, 3; La Puerta, San Diego County, 6; Palm Springs, 21; San Felipe Canyon, 12; Vallecitas, San Diego County, 2.

Lower California: Cocopah Mountains, 1.

PEROGNATHUS SPINATUS PENINSULÆ Merriam. CAPE ST. LUCAS POCKET MOUSE.

Perognathus spinatus peninsulæ Merriam, Proc. Cal. Acad. Sci., 2d ser., IV, 460, September 25, 1894.

Type locality.—San Jose del Cabo, Lower California.

Distribution.—Cape region of Lower California.

General characters.—Similar to *P. spinatus*, but much larger; pelage a trifle more hispid; tail more scantily haired and relatively shorter; ears large and rounded.

Color.—As in *P. spinatus*.

Skull.—Similar to that of *P. spinatus*, but averaging much larger; supraorbital ridges flattened and shelf-like, with very trenchant edges, forming a nearly straight line from mastoids to lachrymals.

Measurements.—Average of five adults from San Jose del Cabo and Cape St. Lucas: Total length, 188; tail vertebræ, 101; hind foot, 24. *Skull:* (See table, p. 63.)

Specimens examined. Total number, 23, from localities as follows:

Lower California: Cape St. Lucas, 7; Comondu, 2 (intermediate); San Jose del Cabo, 5; Santa Anita, 9.

PEROGNATHUS BRYANTI Merriam. BRYANT POCKET MOUSE.

Perognathus bryanti Merriam, Proc. Cal. Acad. Sci., 2d ser., IV, 458, September 25, 1894.

Type locality.—San Jose Island, Lower California.

Distribution.—Known only from the type locality.

General characters.—Larger and longer-tailed than *peninsula*; skull slightly characterized; otherwise similar.

Color.—Apparently as in *peninsula*.

Skull.—Slightly larger and heavier than in *peninsula*; somewhat more elongate; nasals longer and more slender; interparietal wide and subquadrate; lower premolar equal to or slightly larger than last molar.

Measurements.—*Type*: Total length, 216; tail vertebræ, 127; hind foot, 25. One adult topotype: Total length, 225; tail vertebræ, 128; hind foot, 25. *Skull*: (See table, p. 63.)

Remarks.—This insular form is well characterized by its large size and long tail. In color it is probably the same as *peninsula*, though the material examined is not sufficient to determine with certainty.

Specimens examined.—Total number, 8, all from the type locality.

PEROGNATHUS MARGARITÆ Merriam. MARGARITA POCKET MOUSE.

Perognathus margaritæ Merriam, Proc. Cal. Acad. Sci., 2d ser., IV, 459, September 25, 1894.

Type locality.—Santa Margarita Island, Lower California.

Distribution.—Known only from the type locality.

General characters.—Size medium; tail longer than head and body; ears moderate; pelage rather harsh, rump and flanks with a few bristles; skull peculiar.

Color.—Above, much as in *spinatus*, pale fawn mottled and lined with hair-brown and black; lateral line scarcely evident; subauricular spot present, but very small; underparts and feet dirty white.

Skull.—Size rather small; cranium somewhat arched; mastoids exceedingly small, fully as small as in *californicus*; nasals moderate, naso-frontal suture emarginate; occiput not projecting posteriorly; interparietal wide, anterior angle evident, others very much rounded; interorbital space moderate, about as in *californicus*; lower premolar larger than last molar.

Measurements.—*Type* (from dry skin): Total length, 180; tail vertebræ, 102; hind foot, 22.5. *Skull*: (See table, p. 63.)

Remarks.—So far as known, this species has no near relative on the mainland adjacent to its habitat. In cranial characters it seems to be

somewhat similar to *californicus*, while externally it is a combination of *fallax* and *spinatus*.

Specimen examined.—The type.

Cranial measurements of *Perognathus*.

[All measurements are in millimeters.]

Species.	Locality.	Basilar length Hensel. ¹	Occipito-nasal length.	Greatest mastoid breadth.	Length of interparietal.	Greatest width of interparietal.	Interorbital width at narrowest point.	Length of nasals.	Number of specimens averaged.
<i>Perognathus fasciatus</i>	Tilyou ranch, Mont	16.5	23	11.8	—	4.3	—	—	3
<i>P. f. infraluteus</i>	Loveland, Colo	15.4	21.8	11.7	—	4.8	—	—	3
<i>P. flavescens</i>	Kennedy, Nebr.	15.1	22.1	11.6	—	4.8	—	—	3
<i>P. merriami</i>	Brownsville, Tex.	14.8	20.4	11.2	2.3	3.6	—	—	4
<i>P. m. gilvus</i>	Eddy, N. Mex.	15	20.7	11.7	2.2	3.3	4.7	7.5	2
<i>P. flavus</i>	El Paso, Tex.	14.6	21	12	2.6	2.9	—	—	1
<i>P. flavus</i>	Fort Huachuca, Ariz	14.5	20.3	11.7	2.4	2.8	—	—	4
<i>P. f. bimaculatus</i>	Fort Whipple, Ariz	15.9	21.6	13	2.5	3.1	4.5	7.6	3
<i>P. apache</i>	Keams Canyon, Ariz	16.3	23	13	2.9	4	5	8.6	4
<i>P. apache melanotis</i> ²	Casas Grandes, Chihuahua, Mexico.	15.3	21.5	11.8	2.8	4.3	5	8	1
<i>P. callistus</i>	Kinney ranch, Wyo	16	22.9	13	2.8	4.6	4.8	8.2	1
<i>P. panamintinus</i>	Panamint Mountains, California.	14.9	21.4	11.9	2.5	3.5	5.2	8.3	3
<i>P. p. brevinasus</i>	San Bernardino, Cal	14.2	20.1	11.8	3	3.8	5	7.1	3
<i>P. nevadensis</i>	Halleck, Nev	14.8	20.6	12	2.2	3.7	5.2	8.2	2
<i>P. pacificus</i> ²	Edge of Pacific Ocean, Mexican boundary.	13	19	11	2.2	3.4	4.9	7	1
<i>P. longimembris</i>	Fresno, Cal	17.5	23.6	13	3	3.8	4.8	9.2	3
<i>P. amplus</i> ²	Fort Verde, Ariz.	16.8	23.6	13.9	3	3.3	5	9.2	1
<i>P. parvus</i>	Mahton, Wash	17.6	25.1	13	3.1	5.4	—	—	5
<i>P. p. olivaceus</i>	Salt Lake City, Utah	17.6	—	12.6	3.7	4.9	—	—	4
<i>P. p. magruderensis</i>	Mount Magruder, Nev.	19.1	27	13.6	3.1	4.8	—	—	4
<i>P. p. mollipilosus</i>	Fort Crook, Cal	17.8	25.3	12.8	3.1	5.1	—	—	3
<i>P. albicola</i>	San Bernardino Mts., Cal	18	25.4	12.6	3.2	4.6	—	—	2
<i>P. lordi</i>	Oroville, Wash	18.7	26.7	13.6	3.3	4.7	—	—	5
<i>P. l. columbianus</i>	Pasco, Wash	18.6	25.9	14.1	3.1	4.1	—	—	4
<i>P. formosus</i>	St. George, Utah	18.6	26.7	14	3.7	5.8	6.6	10.4	3
<i>P. baileyi</i>	Magdalena, Mexico	21.5	30	15.6	4.2	6.8	6.8	12.2	3
<i>P. hispidus</i>	Mier, Mexico.	20.2	28	13.8	4.1	7.2	7	10.6	3
<i>P. h. paradoxus</i>	Kansas and Nebraska	24	32	15	4.7	8	7.5	13.2	3
<i>P. h. zacateca</i> ²	Valparaiso Mountains, Mexico.	22.5	30.2	15	4	8	7	12	1
<i>P. penicillatus</i> ²	Little Colorado Desert, Arizona.	20	28.3	14.5	3.5	6.9	6.8	10	1
<i>P. penicillatus</i>	Colorado River, near Callville, Nev.	19.5	27.8	13.4	3.2	7.6	6.6	10.8	3
<i>P. p. angustirostris</i>	Carriso Creek, California.	18	26	13	3.1	7	6.4	10.3	3
<i>P. p. pricei</i>	Oposura, Sonora, Mexico.	18.4	26	13	3.4	6.7	6.2	9.4	3
<i>P. p. eremicus</i> ²	Fort Hancock, Tex.	17.5	—	12.6	3	7	6.4	9.8	1
<i>P. stephensi</i> ²	Mesquite Valley, California	16	22.7	12	3	6.7	6	9	1
<i>P. arenarius</i> ²	San Jorge, Lower California	15.3	23	12	3.5	6.4	6.2	8.8	1
<i>P. intermedius</i> ²	Mud Spring, Ariz.	17	24.5	13.5	3	8	6.3	9.4	1
<i>P. nelsoni</i>	La Parada, Mexico.	18	26	13.8	3.5	7.6	6.7	10	3

¹ See note, p. 14.

² Type.

Cranial measurements of *Perognathus*—Continued.

[All measurements are in millimeters.]

Species.	Locality.	Basilar length of Hensel.	Occipito-nasal length.	Greatest mastoid breadth.	Length of interparietal.	Greatest width of interparietal.	Interorbital width at narrowest point.	Length of nasals.	Number of specimens averaged.
<i>P. n. canescens</i> ¹	Jaral, Coahuila, Mexico....	17.5	25	13.5	3.7	7.2	6.1	9.3	1
<i>P. goldmani</i>	Sinaloa, Sinaloa, Mexico....	20.6	27.7	14.3	3.8	7.4	6.5	11.1	3
<i>P. artus</i>	Batopilas, Chihuahua, Mexico.	18.8	25.4	12.4	3.3	7.1	6.1	9.7	3
<i>P. fallax</i>	Reche Canyon, California..	18	26	14	3.8	7.8	6.6	10	3
<i>P. anthonyi</i> ¹	Cerros Island, Lower California.	17.4	25.4	12.9	2.6	5.8	6	10.2	1
<i>P. femoralis</i>	Dulzura, Cal.....	20.3	29.6	14.3	4	8.1	7.1	11.4	3
<i>P. californicus</i>	Berkeley, Cal.....	18.9	27.4	13	4.4	8.1	6.4	10.2	3
<i>P. c. dispar</i>	Carpenteria, Cal.....	19.8	28	13.1	4	8.3	6.5	11.2	3
<i>P. spinatus</i>	Palm Springs, Cal.....	17	24.3	12.3	3.4	7.7	6.2	9.4	4
<i>P. s. peninsula</i>	San Jose del Cabo, Lower California.	18	26.5	13	3.7	7.6	6.6	9.8	4
<i>P. bryanti</i>	San Jose Island, Lower California.	18.9	27.3	13.1	3.5	8.1	6.8	10.3	3
<i>P. margaritæ</i> ¹	Margarita Island, Lower California.	18	25.9	12	3.7	8	6.5	10.3	1
<i>P. pernix</i>	Rosario, Sinaloa, Mexico....	17.4	24.4	12.2	3.3	7.2	5.4	9.2	3
<i>P. p. rostratus</i>	Camoa, Sonora, Mexico....	16.5	22.7	11.7	3.4	7	5.5	8.6	3

¹Type.

INDEX.

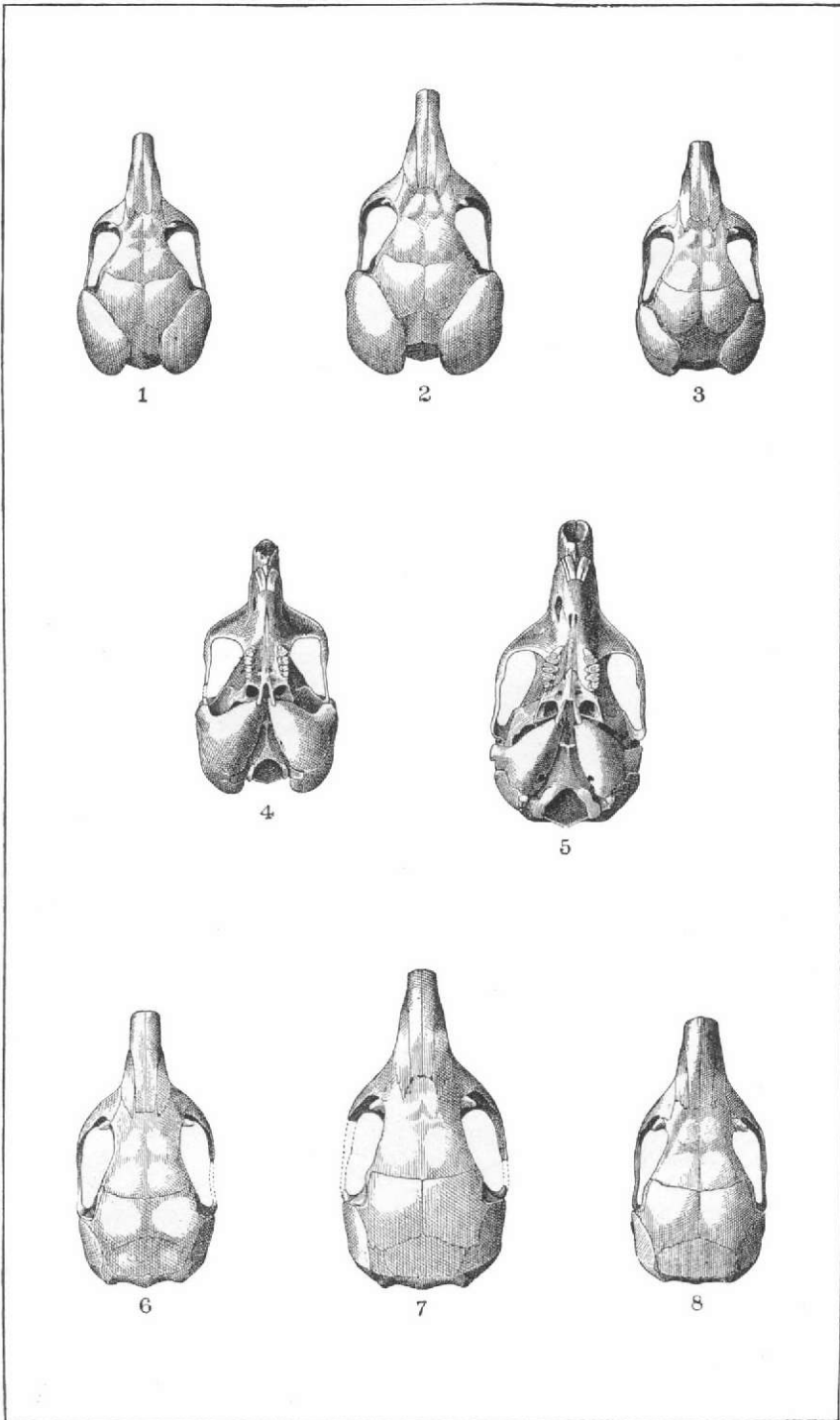
[Names of new species in **black-face** type, synonyms in *italics*.]

- Abromys*, 13.
Abromys lordi, 39.
Chatodipus, subgenus, 14, 41-62.
Cricetodipus, 13.
Cricetodipus flavus, 21.
 parvus, 33, 34.
Otognosis, 13.
Otognosis longimembris, 33.
Perognathus, characters of subgenera, 14.
 classification, 12-13.
 color and pelages, 11-12.
 cranial measurements, 62-63.
 distribution, 11.
 genus, 13.
 habits, 12.
 history and material, 9-11.
 key to species, 14-16.
 Chatodipus, 15-16.
 Perognathus, 14-15.
 list of species, 17-18.
 Chatodipus, 17-18.
 Perognathus, 17.
 new species, 13.
 subgenus, 14, 18-41.
Perognathus alticola, 14, 39.
 amoenus, 37.
 amplus, 15, 32-33.
 angustirostris, 16, 47.
 anthonyi, 16, 56-57.
 apache, 15, 26-27.
 apache, 24.
 arenarius, 16, 50.
 arenicola, 29.
 armatus, 58.
 artus, 16, 55.
 baileyi, 16, 41-42.
 bangsi, 15, 29-30.
 bimaculatus, 15, 24-25.
 brevinasus, 15, 30-31.
 bryanti, 16, 61.
 californicus, 15, 58.
 callistus, 15, 28.
 cancscens, 16, 54.
 columbianus, 14, 40.
 conditi, 44.
 copei, 20.
 dispar, 15, 58-59.
Perognathus—Continued.
 eremicus, 16, 48-49.
 fallax, 16, 55-56.
 fasciatus, 15, 18-19.
 fasciatus, 42.
 femoralis, 15, 57.
 flavescens, 15, 20-21.
 flavus, 15, 23-24.
 flavus, 21, 26.
 formosus, 14, 40-41.
 fuliginosus, 15, 25.
 gllvus, 15, 22-23.
 goldmani, 16, 54-55.
 hispidus, 16, 42-44.
 infraluteus, 15, 19-20.
 inornatus, 33.
 intermedius, 16, 52-53.
 latirostris, 44.
 longimembris, 15, 33-34.
 lordi, 14, 39-40.
 magruderensis, 14, 38.
 margarita, 16, 61-62.
 mearnsi, 21.
 melanotis, 15, 27.
 merriami, 15, 21-22.
 mexicanus, 15, 25-26.
 mollipilosus, 14, 36-37.
 monticola, 34, 36.
 nelsoni, 16, 53.
 nevadensis, 15, 31.
 obscurus, 47, 52.
 olivaceus, 14, 37-38.
 pacificus, 15, 31-32.
 panamintinus, 15, 28-29.
 paradoxus, 16, 44-45.
 paradoxus, 42, 44.
 parvus, 14, 34-36.
 penecillatus, 45.
 penicillatus, 16, 45-46.
 peninsulae, 16, 60-61.
 pernix, 16, 50-51.
 pricei, 16, 47-48.
 rostratus, 16, 51-52.
 spilotus, 42.
 spinatus, 16, 59-60.
 stephensi, 16, 49-50.
 zacatecae, 16, 45.

PLATE I.

[One and one-half times natural size.]

- FIG. 1. *Perognathus flarus* Baird. Topotype. El Paso, Tex. (No. 25029, U. S. Nat. Mus.)
2. *Perognathus amplus* Osgood. Type. Fort Verde, Ariz. (Type No. 46711, U. S. Nat. Mus.)
3. *Perognathus merriami* Allen. Topotype. Brownsville, Tex. (No. 41764, U. S. Nat. Mus.)
4. *Perognathus flarus bimaculatus* (Merriam). Topotype. Fort Whipple, Ariz. (No. 46478, U. S. Nat. Mus.)
5. *Perognathus (Chætodipus) californicus* Merriam. Topotype. Berkeley, Cal. (No. 55560, U. S. Nat. Mus.)
6. *Perognathus (Chætodipus) pernix* Allen. Topotype. Rosario, Sinaloa, Mexico. (No. 91324, U. S. Nat. Mus.)
7. *Perognathus (Chætodipus) penicillatus* Woodhouse. Type. Near San Francisco Mountain, Ariz. (Type No. 2676, U. S. Nat. Mus.)
8. *Perognathus (Chætodipus) pernix rostratus* Osgood. Type. Camoa, Sonora, Mexico. (Type No. 95818, U. S. Nat. Mus.)



SKULLS OF PEROGNATHUS.

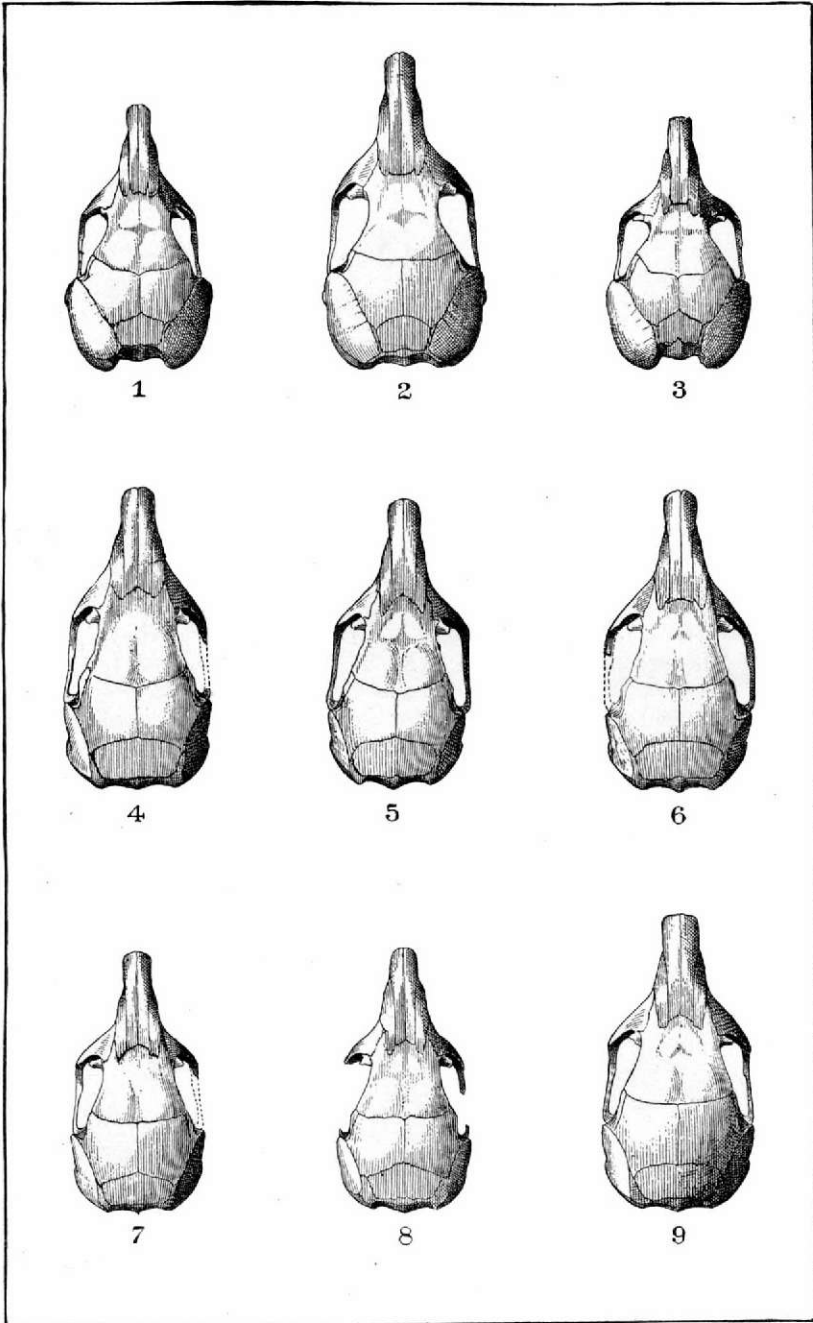
1. *Perognathus flavus*.
2. *P. amplus*.
3. *P. merriami*.
4. *P. flavus bimaculatus*.

5. *P. (Chetodipus) californicus*.
6. *P. (Chetodipus) pernix*.
7. *P. (Chetodipus) penicillatus*.
8. *P. (Chetodipus) pernix rostratus*.

PLATE II.

[One and one-half times natural size.]

- FIG. 1. *Perognathus panamintinus* (Merriam). Type. Panamint Mountains, Cal. (Type No. 39866, U. S. Nat. Mus.)
2. *Perognathus lordi columbianus* (Merriam). Type. Pasco, Wash. (Type No. 39450, U. S. Nat. Mus.)
3. *Perognathus nevadensis* Merriam. Topotype. Halleck, Nev. (No. 54565, U. S. Nat. Mus.)
4. *Perognathus (Chatodipus) bryanti* Merriam. Type. San Jose Island, Lower California, Mexico. (No. 550, Coll. Calif. Acad. Sci.)
5. *Perognathus (Chatodipus) margaritæ* Merriam. Type. Santa Margarita Island, Lower California, Mexico. (No. 90, Coll. Calif. Acad. Sci.)
6. *Perognathus (Chatodipus) spinatus peninsulae* Merriam. Type. San Jose del Cabo, Lower California, Mexico. (No. 274, Coll. Calif. Acad. Sci.)
7. *Perognathus (Chatodipus) arenarius* Merriam. Type. San Jorge, near Comondu, Lower California, Mexico. (No. 99, Coll. Calif. Acad. Sci.)
8. *Perognathus (Chatodipus) stephensi* Merriam. Topotype. Mesquite Valley, Cal. (No. 39874, U. S. Nat. Mus.)
9. *Perognathus (Chatodipus) nelsoni* Merriam. Type. Hacienda La Parada, San Luis Potosi, Mexico. (Type No. 50214, U. S. Nat. Mus.)



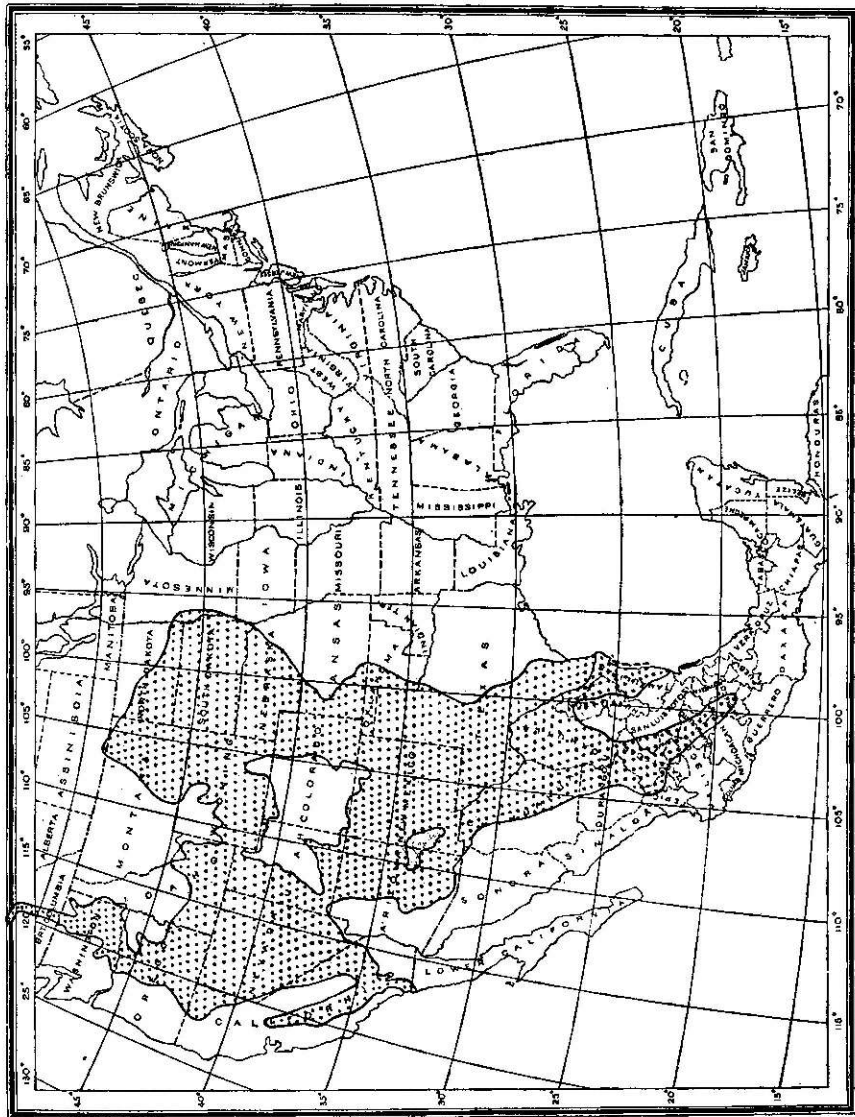
SKULLS OF PEROGNATHUS.

1. *Perognathus panamintinus*.
2. *P. lordi columbianus*.
3. *P. nevadensis*.
4. *P. (Chastodipus) bryanti*.
5. *P. (Chastodipus) margaritæ*.

6. *P. (Chastodipus) spinatus peninsulæ*.
7. *P. (Chastodipus) arenarius*.
8. *P. (Chastodipus) stephensi*.
9. *P. (Chastodipus) nelsoni*.

PLATE III.

Map showing distribution of the subgenus *Perognathus*.



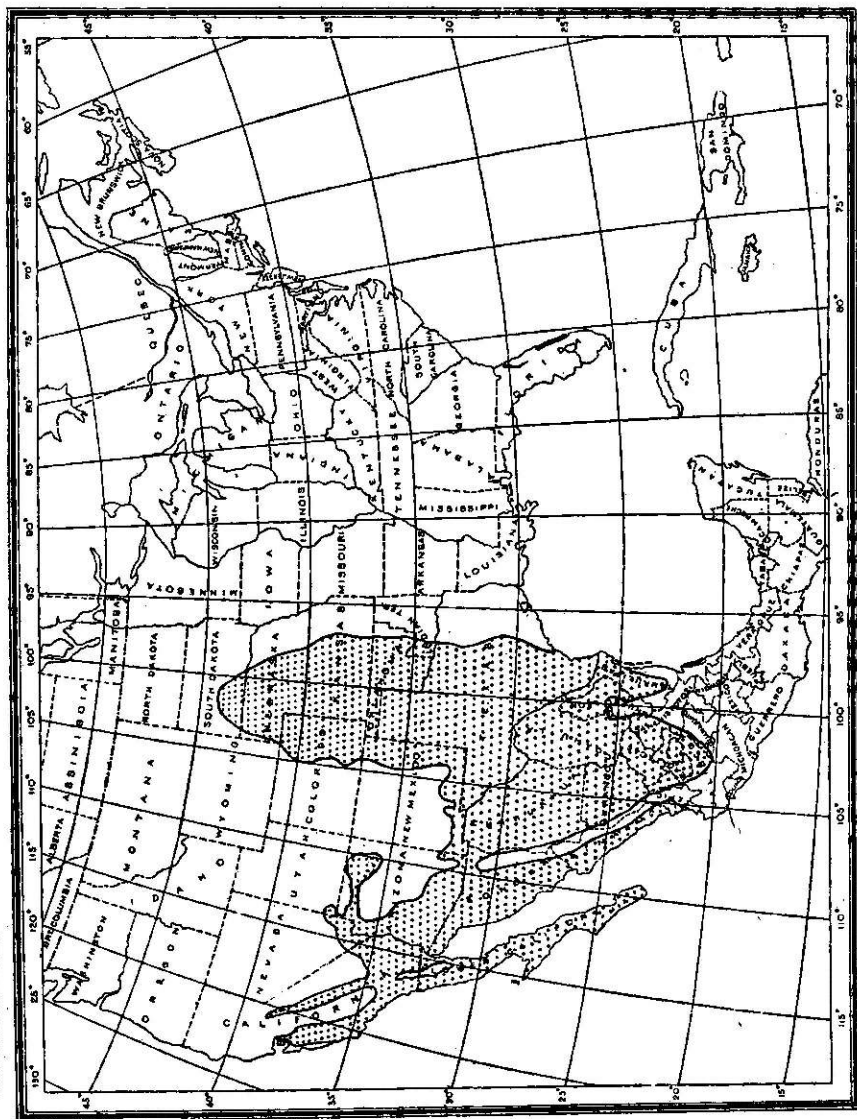
MAP SHOWING DISTRIBUTION OF THE SUBGENUS PEROGNATHUS.

PLATE IV.

Map showing distribution of the subgenus *Chatodipus*.

72





MAP SHOWING DISTRIBUTION OF THE SUBGENUS CHÆTOPIDIPUS.

CONTENTS OF NORTH AMERICAN FAUNA.

- No. 1.** Revision of the North American Pocket Mice. By Dr. C. Hart Merriam. Pp. 36, pls. 4. October 25, 1889..... Price, 10 cents.
- No. 2.** Descriptions of fourteen new species (genera *Onychomys*, *Arctomys*, *Lagomys*, *Spermophilus*, *Tamias*, *Nyctinomus*, and *Arvicola*) and one new genus (*Phenacomys*) of North American Mammals. By Dr. C. Hart Merriam. Pp. 52, pls. 8, figs. 7. October 30, 1889..... Price, 10 cents.
- No. 3.** Results of a Biological Survey of the San Francisco Mountain Region and Desert of the Little Colorado, Arizona. By Dr. C. Hart Merriam. [List of Reptiles and Batrachians, by Dr. Leonhard Stejneger.] Pp. 136, pls. 14 (2 colored), maps 5 (colored), figs. 2. September 11, 1890. Price, 25 cents.
- No. 4.** Descriptions of twenty-six new species of North American Mammals. [Revision of *Spilogale* and descriptions of new species in nine other genera.] By Dr. C. Hart Merriam. Pp. 60, pls. 3, figs. 3. October 8, 1890..... Price, 10 cents.
- No. 5.** Results of a Biological Reconnoissance of south-central Idaho. By Dr. C. Hart Merriam. [List of Reptiles and Batrachians, by Dr. Leonhard Stejneger.] Pp. 132, pls. 4 (1 colored), figs. 4. July 30, 1891.. Price, 15 cents.
- No. 6.** (*Not published.*)
- No. 7.** The Death Valley Expedition: A Biological Survey of Parts of California, Nevada, Arizona, and Utah. Part II. [Reports on Birds, by Dr. A. K. Fisher; Reptiles and Batrachians, by Dr. Leonhard Stejneger; Fishes, by Chas. H. Gilbert, Ph. D.; Insects, by C. V. Riley, Ph. D.; Mollusks, by R. E. C. Stearns, Ph. D.; Desert Trees and Shrubs, by Dr. C. Hart Merriam; Desert Cactuses and Yuccas, by Dr. C. Hart Merriam; List of Localities, by T. S. Palmer.] Pp. 402, pls. 14, maps 5 (colored), figs. 2. May 31, 1893..... (*Out of print.*)
- No. 8.** Monographic Revision of the Pocket Gophers, Family *Geomysidæ* (exclusive of the species of *Thomomys*). By Dr. C. Hart Merriam. Pp. 258, pls. 20, maps 4 (colored), figs. 71. January 31, 1895..... Price, 35 cents.
- No. 9.** (*Not published.*)
- No. 10.** Revision of the American Shrews of the Genera *Sorex*, *Notiosorex*, and *Blarina*. By Dr. C. Hart Merriam and Gerrit S. Miller, Jr. Pp. 124, pls. 12, figs. 3. December 31, 1895..... Price, 15 cents.
- No. 11.** Synopsis of the Weasels of North America. By Dr. C. Hart Merriam. Pp. 44, pls. 6, figs. 16. June 30, 1896..... Price, 10 cents.
- No. 12.** Genera and Subgenera of Voles and Lemmings. By Gerrit S. Miller, Jr. Pp. 84, pls. 3, figs. 40. July 23, 1896..... Price, 10 cents.
- No. 13.** Revision of the North American Bats of the Family *Vespertilionidæ*. By Gerrit S. Miller, Jr. Pp. 135, pls. 3, figs. 40. October 16, 1897. Price, 10 cents.
- No. 14.** Natural History of the Tres Marias Islands, Mexico. By E. W. Nelson and others. Pp. 97, map 1, figs. 2. April 29, 1899..... Price, 10 cents.
- No. 15.** Revision of the Jumping Mice of the genus *Zapus*. By Edward A. Preble. Pp. 41, pl. 1, figs. 4. August 8, 1899..... Price, 5 cents.
- No. 16.** Results of a Biological Survey of Mount Shasta, California. By Dr. C. Hart Merriam. Pp. 179, pls. 5, figs. 46. October 28, 1899..... Price, 20 cents.
- No. 17.** Revision of American Voles of the genus *Microtus*. By Vernon Bailey. Pp. 88, pls. 5, figs. 17. June 6, 1900..... Price, 10 cents.

All applications for Nos. 1-5, 8, and 10-17 should be addressed to the Superintendent of Documents, Union Building, Washington, D. C.

Remittances should be made by postal money order or express money order, *not* by postage stamps or private check.