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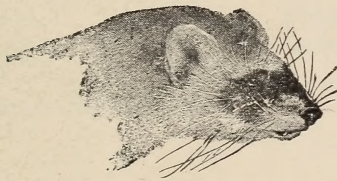
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# NORTH AMERICAN FAUNA

No. 4

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Descriptions of twenty-six new species of North American Mammals

BY DR. C. HART MERRIAM



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U. S. DEPARTMENT OF AGRICULTURE,  
*August 12, 1890.*

SIR: I have the honor to transmit herewith No. 4 of NORTH AMERICAN FAUNA. It contains descriptions of twenty-six new species of North American mammals, nearly all of which were discovered in the course of the biological explorations conducted by the Division.

Respectfully,

C. HART MERRIAM,  
*Chief of Division of  
Ornithology and Mammalogy.*

Hon. J. M. RUSK,  
*Secretary of Agriculture.*





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CONTRIBUTION TOWARD A REVISION OF THE LITTLE STRIPED SKUNKS  
OF THE GENUS *SPILOGALE*.

WITH DESCRIPTIONS OF SEVEN NEW SPECIES.

By Dr. C. HART MERRIAM.

The number of specimens of *Spilogale* at present available for study and comparison is wholly insufficient to warrant a final attempt to establish and define the North American species and subspecies; at the same time it is ample to demonstrate the absurdity of 'lumping,' under one specific name, as is now the practice, all the forms inhabiting the United States, from Florida to California.

The present paper is based on the study of 39 skins and 38 skulls, derived from the following sources: U. S. National Museum, 8 skins and 9 skulls; Department of Agriculture series, 12 skins and 11 skulls; Merriam collection, 19 skins and 18 skulls.

The examination of this material shows that the members of the genus may be readily separated into two divisions, according to the general shape of the skull; one having the cranium broad and flat, with the fronto-parietal region depressed, presenting the extreme of differentiation of the genus; the other with the cranium narrower and more highly arched and the fronto-parietal region somewhat elevated, approaching the normal *Mephitine* type. The members of the latter division inhabit the Gulf States and Mississippi Valley, extending as far westward (at least) as Trego County, Kans.; the members of the former inhabit the Sonoran region of the west, from central Texas westward through New Mexico and Arizona to California, extending south to Cape St. Lucas and north to British Columbia and the Great Basin.

The eastern group, so far as represented in the meager series at hand, comprises three species, one inhabiting Florida, one Alabama, and one Kansas. How far the limits of dispersion of each form extend, and whether or not any of them intergrade, are questions that can not be

settled until specimens from intermediate localities are examined. The Florida form is the smallest and whitest; the Kansas form is the largest and blackest.

The western group comprises at least three species and two or three subspecies, but, considering the great extent of the area it inhabits, is even less fully represented in available specimens than the eastern. One species inhabits south-central (and western?) Texas; one Arizona and southern California; and one the southern part of the peninsula of Lower California.

In the genus *Spilogale*, as in the allied genera *Mephitis* and *Conepatus*, the range of individual variation is considerable, though by no means so great as has been assumed. The principal variables are four, namely, (1) cranial characters; (2) dental characters; (3) length of tail; (4) color markings. As a rule the variation in each species is between definite limits which may be defined.

The males are much larger than the females and have considerably longer tails.

*Color and markings.*—The color markings are constant in pattern throughout the genus, the only variation being in the quantity of white, the widest extremes being the result of the extension or suppression of some of the markings. In the young the ground color is intensely black and the markings are pure white. As age advances, the markings become creamy yellow, and in worn states of the pelage and old museum specimens the black becomes dull brown.

*General remarks on cranial characters and variation.*—As already stated, there are two well-marked groups in the genus *Spilogale*—one having the cranium broad and flat, with the fronto-parietal region depressed to the general plane of the top of the skull; the other having the cranium relatively narrow and more highly arched, with the fronto-parietal region somewhat elevated. (See figs. 1 and 2.)

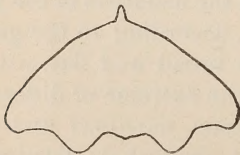


FIG. 1.—Transverse section of skull of *Spilogale gracilis*.

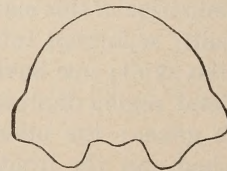


FIG. 2.—Transverse section of skull of *Spilogale ringens*.

The angle of divergence of the lateral series of teeth is greater in the narrow than in the broad skulls. As a rule, the postpalatal notch reaches the plane of the molars in the narrow-skulled forms, and falls short of this plane in the others. As a rule, also, in the narrow-skulled forms, the first and second upper premolars are not crowded, do not overlap, and are wholly in the tooth-row, while in the broad-skulled forms they are much crowded and partly overlap, or the first is turned obliquely or sideways to give the succeeding tooth more room.



The degree of inflation of the mastoids varies greatly in the species of both groups, and is not always proportional to the intermastoid breadth of the cranium. Thus, in the type of *S. lucasana*, in which the inflation is only moderate, the ratio of mastoid breadth to basilar length of Hensel is 69.3, while in *S. leucoparia*, which presents the maximum of inflation, the ratio is only 66.8. In some species the inflated mastoid is set off from the upper surface of the cranium by a distinct change of direction in the bone, or even by a well-marked groove or sulcus, while in others no such line of demarkation exists. The upper part of the inflated mastoid is covered by the squamosal, the outer edge of which, in the broad-skulled species, usually forms a sharp ridge along the outer side of the mastoid capsule. In *S. leucoparia*, however, this ridge is obsolete. The two species having the largest (most inflated) capsules are *S. leucoparia* of central Texas, and *S. putorius* of Florida. The degree of inflation varies somewhat with age, being greatest in young adults or middle-aged individuals and least in those of advanced age.

The postmolar production of the palate varies somewhat with age and sex. Thus, in two adult skulls from Provo, Utah, the postpalatal notch reaches the plane of the molars in the female, but not in the male. As a rule, it reaches the plane of the molars in the narrow-skulled forms, and falls short of this plane in the broad skulls.

The horizontal ramus of the jaw is nearly straight in all the flat-skulled forms except *lucasana*; it is strongly convex below in *lucasana* and in all the narrow-skulled forms.

The size, shape, and proportions of the sectorial teeth and of the upper molar afford excellent specific characters. The postorbital part of the frontal narrows with age. In the adults of some species there is a marked postorbital constriction, while in others no trace of it exists. The value of this excellent character is often destroyed by large asymmetrical postorbital swellings resulting from the presence, in the frontal sinuses, of a worm-like endoparasitic arachnid of the genus *Pentastoma*. Some species have distinct, peg-like postorbital processes, which in others are represented merely by slight protuberances.

Young skulls, compared with adults of the same species, are more highly arched, the brain case is more inflated, and the zygomatic arches are less spreading. The sectorial teeth and molars are sometimes actually larger than in old specimens, for the reason that the teeth complete their growth very early, and in old age become smaller by the wearing away of the crowns.

The bones of the skull unite very early, as usual in the *Mustelida*, all the sutures disappearing during the first few months.

*Cranial and dental measurements and ratios.*—The time has not yet arrived for fixing the limits of individual variation in any group of the *Mammalia*. When a series of a hundred or more skulls of a single species from a single locality, of the same sex and approximately the same age, shall have been carefully measured and the ratios of these measurements



calculated, a beginning will have been made. Until then, the relative values of the various measurements and ratios as factors in determining specific and subspecific differences must remain more or less problematical, as well as the percentage of variation in each. The tables prepared with so much care by the late Reinhold Hensel (in *Craniologische Studien*\*) are of little value because the localities from which the specimens came are not stated, and it is probable in many cases that several geographic races or subspecies are 'lumped' under one name.

The present paper, which is not put forward as more than a step toward the attainment of a knowledge of the Little Striped Skunks, contains a table of the cranial and dental measurements and ratios of most of the adult (and a few immature) skulls to which I have had access. Many of the measurements, and more of the ratios, are worthless; and the table is published as much to show these as those which are really important.

In comparing one species with another, adult skulls only should be selected and they should always be of the same sex.

The value of measurements and ratios of the postorbital constriction is frequently destroyed, as previously stated, by the large swellings produced by the worm-like parasite (*Pentastoma* or *Linguatula*) which infests the frontal sinuses of more than half of the skulls examined. Thus, the constriction in an old male, *S. gracilis* (No. 5852), from St. George, Utah, is entirely obliterated, notwithstanding the fact that *S. gracilis* has the deepest constriction of any of the known species. The same extreme of distortion occurs in an old female from Roseburg, Oregon (No. 24200).

Other skulls in which the postorbital breadth is more or less affected by these swellings are Nos. (U. S. National Museum) 4143, 4219, 30058, and perhaps also 24115, 24116, and 24117, and (Merriam collection) 1800, 2100, 2270, 2408, 2583, 3985, 4266, 5676, 6314, 6315, 6328.

In a few very old skulls the upper molars are worn down so far that their measurements and ratios are unreliable. This is the case in Nos. (U. S. National Museum) 1622, 4143, 24200, 24897 and (Merriam collection) 3985 and 5852; and Nos. 5676 and 6315 are somewhat worn.

*Generic characters of Spilogale contrasted with Mephitis.*—The small, many-striped skunks were separated from their larger single or double striped relatives by J. E. Gray, in 1865, under the generic name *Spilogale*. The separation was based wholly on external characters, of which the only tangible one is the number of tubercles (4) at the base of the hind toes. It may be added that the Little Striped Skunks are slender and weasel-like in form, active, agile, and somewhat arboreal in habit, often making their homes in hollows of trees or crevices in cliffs; while the true skunks are heavy, thickset animals, slow of movement, terrestrial in habit, and live in burrows which they dig in the earth.

\* Nova Acta d. Ksl. Leop.-Carol.-Deutsch. Acad. d. Naturf., Halle, XLII, 1881, pp. 125-195, pls. VI-XIII.

*Spilogale* is a perfectly valid genus, and may be known from *Mephitis* by the following cranial and dental characters.

The cranium as a whole is flat and broad, the frontal and parietal regions being so depressed that the top of the skull presents a nearly straight plane, instead of being highly arched as in *Mephitis*: the skull is broadly wedge-shaped in outline; the mastoids are greatly inflated, forming elliptical capsules which reach on either side from the meatus to the exoccipital, the outer border of which is pushed backward toward the condyle; the paroccipital process is obsolete or rudimentary; the tube of the auditory meatus is bent strongly forward: the supraorbital processes are more strongly developed: the step of the mandible is absent; the first lower premolar is relatively much larger; the upper sectorial tooth is longer; the upper molar is narrower antero-posteriorly; and the zygomatic arches are more spreading and are broadest and highest in the middle instead of posteriorly.

*Geographic distribution.*—At the time when Baird wrote his great work on the mammals of North America, the Little Striped Skunks were known from California and Texas only. I have examined specimens from North Carolina, Georgia, Florida, Alabama, Mississippi, Kansas, Texas, Arizona, Lower California, California, Oregon, Washington, Utah, and Idaho, and species of the genus are known to inhabit Iowa and Wyoming.

*Faunal position.*—The genus *Spilogale* is a Sonoran genus, coming into the United States from Mexico, and ranging northward and eastward as far as the ramifications of the Sonoran fauna extend. To the south it reaches Yucatan and Guatemala (Alston, in *Biologia Centrali-Americana*).

The only part of the United States in which *Spilogale* oversteps the bounds of the Sonoran fauna is along the west coast, where, as previously explained (North American Fauna, No. 3, p. 26), the Sonoran and Boreal elements are curiously mixed.

*Synonymy and nomenclature.*—The synonymy and nomenclature of the Little Striped Skunks is somewhat involved. Without going fully into the history of the subject, it may be stated that four specific names have been applied to North American animals which are now recognized as belonging to the genus *Spilogale*, namely, *putorius* (Linnæus, 1758); *interrupta* (Rafinesque, 1820); *bicolor* (Gray, 1837); *quaterlinearis* (Winnans, 1859).

The name *Viverra putorius* was given by Linnæus in 1758 to the Little Striped Skunk of Florida or Carolina, and was based primarily on Catesby's description and figure. It becomes available therefore for the Florida animal, to which it is here restricted.

The name *Mephitis interrupta* was given by Rafinesque in 1820 to the species inhabiting 'Louisiana,' but Louisiana at that date was commonly spoken of as stretching far to the northwest, including most of the territory west of the Mississippi River and east of the Rocky Mountains.

The name was afterward (1836) restricted by Lichtenstein to the black-tailed form of the 'Upper Missouri River.'

The name *Mephitis bicolor* was given by Gray in 1837 to a North American animal; but since the locality was not mentioned, and the description contains nothing distinctive, it is impossible to ascertain which form he had in mind, and the name must be dropped. Indeed, Gray himself, in 1865, gave it as a synonym of *M. interrupta* of Rafinesque.

The name *Mephitis quaterlinearis* was given by one Winans, in 1859, to the Kansas animal,\* and like the foregoing becomes a synonym of *interrupta*.

The name *Viverra zorrilla* was given by Schreber, in 1778, to a South American species, and consequently may be dismissed from further consideration in the present connection.

Hence but two specific names are available for species inhabiting the United States, namely, *putorius* for the Florida animal, and *interrupta* for the animal inhabiting the Missouri region, of which Kansas specimens may be regarded as typical.

KEY TO SPECIES AND SUBSPECIES OF SPILOGALE.

- A.—CRANIUM BROAD AND FLAT; FRONTO-PARIETAL REGION DEPRESSED TO GENERAL LEVEL OF UPPER SURFACE OF SKULL.
- a*<sup>1</sup>. Under jaw strongly convex below ..... *lucasana*.  
*a*<sup>2</sup>. Under jaw straight or nearly straight below.
- b*<sup>1</sup>. Mastoids enormously inflated and evenly rounded below, with hardly a trace of lateral ridge..... *leucoparia*.  
*b*<sup>2</sup>. Mastoids moderately inflated, not evenly rounded below, with lateral ridge well developed.
- c*<sup>1</sup>. Postorbital processes but little developed; interorbital constriction marked ..... *gracilis*.  
*c*<sup>2</sup>. Postorbital processes strongly developed; interorbital constriction faint or absent.
- d*<sup>1</sup>. Combined length of crowns of upper sectorial tooth and molar equals length of pterygoid fossa from base of hamular ..... *phenax*.  
*d*<sup>2</sup>. Combined length of crowns of upper sectorial tooth and molar falls considerably short of length of pterygoid fossa ..... *saxatilis*.
- B.—CRANIUM NARROWER AND MORE HIGHLY ARCHED; FRONTO-PARIETAL REGION SOMEWHAT ELEVATED.
- a*<sup>1</sup>. Combined length of upper sectorial tooth and molar greater than length of mastoid capsule, and equal to distance from anterior lip of foramen magnum to foramen lacerum medium..... *indianola*.  
*a*<sup>2</sup>. Combined length of upper sectorial tooth and molar less than length of mastoid capsule, and much less than distance from anterior lip of foramen magnum to foramen lacerum medium.
- b*<sup>1</sup>. Inner lobe of upper molar broadly rounded on inner side, with greatest convexity near middle.
- c*<sup>1</sup>. Distance from nasal emargination to point midway between postorbital processes at least one-third the length of the top of skull..... *interrupta*.

\* See Coues, Fur-Bearing Animals, 1877, 239-240.



- c<sup>2</sup>. Distance from nasal emargination to point midway between postorbital processes considerable less than one-third the length of the top of the skull.....*ringens*.
- b<sup>2</sup>. Inner lobe of upper molar not broadly rounded on inner side, and with decided projection considerably behind middle of tooth.....*putorius*.

### SPILOGALE PUTORIUS Linnæus.

*Viverra putorius*.—Linnæus, Systema Naturæ, ed. x, i, 1758, 44 (based primarily on the *Putorius americanus striatus* of Catesby).

*General characters*.—The Little Striped Skunk of Florida is conspicuous for its small size, short tail, and the extent of the white markings. In addition to the usual markings, it usually has a white patch or stripe on the outside of the thigh and another on the upper side of the foot, the two rarely being confluent. The rump spots are large and sometimes continuous with the leg-stripe. The stripes at the base of the tail are very large and confluent posteriorly, forming a broad patch of white which covers the upper surface of the basal fourth of the tail. The external lateral stripe is broad, encroaches on the belly, and is continuous posteriorly with the anterior transverse stripe, which, in turn, is often continuous with the internal dorsal stripe. The tail with hairs is much shorter than head and body.

A single specimen from Kissimee Prairie, Florida (No. 4870 ♀ im.), is smaller than the others, and differs from them in the great extent and breadth of the external lateral stripe, which is confluent with both anterior and posterior transverse stripes. The rump spots also are unusually large, and are confluent posteriorly with the tail spots and laterally with the leg-stripe, and the latter is continuous on one side with the foot stripe. The middle pair of dorsal stripes begin posterior to the plane of the ears, leaving the black occipital patch larger than usual.

*Cranial characters*.—So far as cranial characters go, *S. putorius*, *S. indianola*, *S. ringens*, and *S. interrupta* constitute a closely related group, widely separated from the species inhabiting the arid lands from central Texas westward. They agree in having the cranium relatively high and narrow; the fronto-parietal region somewhat elevated; the upper lateral series of teeth strongly divergent posteriorly; all of the premolars in the tooth row, not overlapping, and rarely crowded; the post-palatal notch ending about on a line with the alveolus of the upper molar and without median projection; a distinct postorbital constriction; and the horizontal ramus of the lower jaw strongly convex below. They further agree with one another, and differ from the flat-skulled forms, except *S. leucoparia*, in lacking a distinct crest or ridge along the outside of the mastoid capsule (formed by the edge of the squamosal). *S. putorius* and *S. indianola* have the smallest and shortest skulls. *S. putorius* has the largest mastoid capsules, and differs from all the others in the shape of the inner lobe of the upper molar, the postero-internal

crescent of which projects strongly toward the median line posterior to the middle of the tooth. In *S. interrupta*, *indianola*, and *ringens* the inner lobe of the upper molar is broadly and evenly rounded, bringing the most prominent part of the convexity nearly opposite the middle of the tooth instead of considerably behind it. The nasal opening is constricted laterally in its upper half.

In *S. putorius*, *interrupta*, and *indianola*, the length of the upper surface of the rostrum, from the nasal emargination to the plane of the postorbital processes, is just half the length of the upper surface of the cranium behind the postorbital processes, while in *S. ringens* the latter measurement is considerably more than double the former.

*Measurements.*—A fully adult male, captured at Lake Worth, Fla., May 20, 1889, by Morris M. Green (U. S. National Museum, No.  $\frac{17185}{24117}$ ), afforded the following measurements in the flesh: Total length, 372; tail vertebræ, 129; hairs, 50; hind foot, 39. A female caught at the same place two days previously (U. S. National Museum, No.  $\frac{17183}{24115}$ ) measured: Total length, 340; tail vertebræ, 117; hairs, 48; hind foot, 37.

#### SPILOGALE INTERRUPTA Rafinesque.

*Mephitis interrupta.*—Rafinesque, Annals of Nature, I, 1820, 3. Lichtenstein, Abhand. Akad. Wiss., Berlin (for 1836), 1838; 281, tab. II, fig. 1.

*Mephitis quaterlinearis.*—Winans [Kansas?], newspaper, 1859 (see Coues, Fur-Bearing Animals, 1877, 239-240).

*General characters.*—This species may be known from all others by the large size of the tail and the limited extent of the white markings. The tail, with hairs, is longer than the head and body, and is large and full. As a rule it is black throughout; and the white when present, is limited to a slender tuft surrounded by the black hairs of the extreme tip. The head markings are very small, the frontal spot being less than half the usual size, and the crescent in front of the ear being reduced to an inconspicuous streak or dab wholly unconnected with the lateral stripe, there being no white at all under the ear. All of the white stripes are reduced in size, so that the animal has the blackest back of any known species, *S. ringens* approaching it most closely in this respect.

*Cranial characters.*—The skull of *S. interrupta* is longer and higher posteriorly than that of *S. putorius*, and the audital bullæ are much less inflated. The inner lobe of the upper molar is broadly rounded, with the most prominent part of the convexity opposite the middle of the tooth, instead of far behind the middle as in *S. putorius*. The post-orbital processes are feebly developed and there is scarcely a trace of postorbital constriction.

Specimens of *Spilogale interrupta* have been examined from various places in Kansas, from the eastern part of the state (Barber and Coffey Counties) west to Trego County, and from the Kiowa Indian Agency.

*General remarks.*—Whatever doubt may arise as to whether or not the species here described is really the *Mephitis interrupta* of Rafinesque, there can be none whatever that it is the *M. interrupta* of Lichtenstein; so that the question, if any, relates not to the name of the species but merely to the authority for the name. Lichtenstein distinctly states that his animal came from the 'Upper Missouri' and that it had a black tail.

*Measurements.*—The average measurements of four males from Trego County, Kans., are as follows: Head and body,\* 350; tail vertebræ, 216; hairs, 105; hind foot, 49.5. The average measurements of two females from the same locality are: Head and body, 320; tail vertebræ, 208; hairs, 80; hind foot, 43.5.

### SPILOGALE RINGENS sp. nov.

Type No.  $\frac{33148}{35614}\frac{1}{2}$  ♀. U. S. National Museum (Department of Agriculture collection). Greensborough, Hale County, Alabama, August 2, 1890. Collected by C. S. Brimley. (Original number, 50.)

*Measurements* (taken in flesh).—Total length, 460; tail vertebræ, 165; hind foot, 45; pencil, 88.

*General characters.*—Size considerably larger than *S. putorius*; about equaling *S. interrupta*, with which it is most closely related; tail with hairs longer than head and body, white markings restricted; no white on legs or feet; frontal spot very small; crescent in front of ear not continuous or barely continuous with lateral stripe; white of tail limited to terminal third above and terminal half below; while the white is less extensive than in *S. putorius*, it is more extensive than in *S. interrupta*.

*Cranial characters.*—Compared with *S. interrupta*, its nearest relative, the skull of *S. ringens* is broader across the postorbital processes and interorbitally, has better developed postorbital processes, and a decided postorbital constriction. The distance from the nasal emargination to the plane of the postorbital processes is considerably less than one-third the length of the top of the skull, while in *S. interrupta* it is just one-third. The ratio of the distance across upper molars to the upper lateral series of teeth is about 120 in *ringens* and 113 in *interrupta*.

Compared with *S. putorius* the skull is longer, the brain case is higher posteriorly, the inflated mastoids do not project so far laterally, the inner lobe of the upper sectorial tooth is larger and broader, and the inner lobe of the upper molar is evenly rounded off, the most prominent part of the convexity being near, instead of behind, the middle of the tooth.

While the type is from Hale County, Ala., other specimens have been examined from Cherokee, N. C., Corinth, Miss., and Mobile, Ala.

\* Unfortunately, the collector did not record the total length in the flesh; but by adding the length of the tail to the head and body, an approximate measurement may be obtained.



The latter has a little more white than the others, and the ante-auricular crescent is narrowly continuous with the lateral stripe. In the Corinth specimen the white tip of the tail reaches further down than on the others.

### SPILOGALE INDIANOLA sp. nov.

Type (skull) No. 1621, young adult. U. S. National Museum. From Indianola, Matagorda Bay, Texas. Collected by J. H. Clarke, in 1851.

This species is founded on two skulls collected at Indianola, Matagorda Bay, Texas, by J. H. Clarke, of the Mexican Boundary Survey. The skins were not preserved, and nothing whatever is known of the external characters of the animal. It probably is a Mexican tropical species extending north along the Gulf coast of Texas.

*Cranial characters.*—The skull is small, and the brain case is short and highly arched, as in *S. putorius* from Florida. It differs from *putorius*, however, in being narrower across the postorbital processes, in having smaller and less prominent mastoid capsules, smaller audital bullæ, longer pterygoid fossa, and larger teeth. The upper sectorial and molar particularly are much larger than in *putorius*, the combined length of the two teeth exceeding the length of the mastoid capsule and equaling the distance from the anterior lip of the foramen magnum to the foramen lacerum medium, in these respects differing from all known species of the genus. The inner lobe of the upper molar is very large and broad, and is broadly and evenly rounded off on the inner side, the greatest convexity being opposite the middle of the tooth instead of considerably behind it. The ratio of breadth to length of the upper molar is 126, while in *S. putorius* it is 136.

The lower sectorial tooth is very much larger, and the last lower molar about double the size of the same tooth in *S. putorius*.

*Average ratios of several specimens each of Spilogale indianola, S. interrupta, S. ringens and S. putorius.*

|  | S. indianola. | S. interrupta. | S. ringens. | S. putorius. |
|--|---------------|----------------|-------------|--------------|
| Ratios to basilar length of Hensel:              |               |                |             |              |
| Length of upper lateral series of teeth.....     | 37.5          | 36             | 35.5        | 35           |
| Length of upper sectorial and molar together.... | 23.6          | 22.1           | 20.8        | 21.3         |
| Length of upper sectorial.....                   | 14.3          | 13.2           | 12.5        | 13           |
| Length of pterygoid fossa.....                   | 25            | 24             | 23.8        | 24           |
| Ratio of mastoid breadth to palatal length.....  | 143           | 150.5          | 156         | 162          |
| Ratio of breadth to length of upper molar.....   | 126           | 132            | 134         | 136          |

## SPILOGALE LUCASANA sp. nov.

Type No. 4219 ad. U. S. National Museum. From Cape St. Lucas, Lower California. Collected by John Xantus. (Original number, 603.)

*General characters.*—Size large; tail long (with hairs apparently about as long as head and body); terminal pencil white; white markings large and broad. Median pair of dorsal stripes broadly confluent posteriorly with anterior transverse bands, and thence with external lateral stripes; lumbar spots on each side elongating posteriorly so as to form a distinct stripe, which becomes confluent with the posterior transverse stripe of the same side, forming an acute angle posteriorly at point of union; tail spots indistinctly confluent posteriorly. Two parallel longitudinal white stripes extend back from the chin to the throat, where they are connected by a transverse curved line. Two other white stripes, one on each side, reach backward from the angles of the mouth to a point a little below and posterior to the ears, where they indistinctly join the lateral stripes. This is the only species known to me in which there is any regularity in the throat and chin markings.

*Cranial characters.*—Two skulls from Cape St. Lucas, Lower California (the type, No. 4219, and No. 4143, U. S. National Museum), are much larger, broader posteriorly, flatter, and everywhere more massive than those of any other species examined. The postorbital processes are well developed; the postorbital constriction is not noticeable; there is a distinct sagittal crest; the post-palatal notches fall considerably short of the plane of the alveoli of the upper molars; the upper molars are rectangular, with a deep notch behind, and the postero-internal angle projects furthest toward the median line as in *S. putorius* from Florida; there is no line of demarkation on the upper surface of the skull between the inflated mastoids and cranial parietes.

The first upper premolar is small. In one skull (No. 4143) it is absent on one side and very small on the other, but is wholly in the tooth row. In the other skull (the type, No. 4219) it is present on both sides, larger, and slightly overlaps the canine. The second upper premolar is not crowded and does not overlap the third.

The under jaw is more convex below than in any other species known to me; the angular process is set up higher, and there is more evidence of the 'step' which is so characteristic of *Mephitis*.

## SPILOGALE LEUCOPARIA sp. nov.

(Plate I, figs. 4-6.)

Type No. 4276 ♂ ad. Merriam collection. From Mason, Mason County, Texas, December 2, 1885. Collected by Ira B. Henry. (Original number, 16.)

*General characters.*—Size medium (total length of ♂, about 400; hind foot, about 45), tail with hairs shorter than head and body. White markings larger than in any other known species, the white on back equaling

or even exceeding the black in area; all the stripes are broader than in the other species; the middle pair of dorsal stripes are continuous posteriorly with the anterior transverse stripe, which in turn are broadly confluent with the external lateral stripes. The lumbar spots are generally confluent with the posterior transverse stripes. The tail spots are sometimes confluent posteriorly, forming a narrow band across the base of the tail. There is no white on the thighs, and only rarely a few white hairs on the upper surface of the foot.

*Cranial characters.*—The skull of *Spilogale leucoparia* presents the maximum degree of inflation of the mastoid capsules yet observed in the genus, surpassing even *S. putorius* of Florida. The inflation is most conspicuous postero-laterally, and in transverse section the capsules are subcircular in outline. The crest or ridge usually formed by the outer edge of the squamosal is obsolete. The audital bullæ are larger than usual.

### SPILOGALE GRACILIS Merriam.\*

Type No.  $\frac{17986}{24897}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From Grand Cañon of the Colorado, Arizona (north of San Francisco Mountain), September 12, 1889. Collected by C. Hart Merriam, near bottom of cañon. (Original number, 451.)

*Measurements of type* (taken in the flesh).—Total length, 400; tail vertebræ, 142; † pencil, 100; hind foot, 46.

*General characters.*—Size medium: form slender like a ferret; tail with hairs, longer than head and body. External lateral stripe very large and broad, and broadly confluent with the anterior transverse stripe, which in turn is sometimes narrowly confluent with the inner dorsal stripe. Exposed white of tail occupies nearly the whole of the terminal half above and the terminal two-thirds below.

In old individuals the lumbar spots show a tendency to become confluent posteriorly with the posterior transverse stripes. The spots at base of tail are sometimes confluent posteriorly. The males have considerably longer tails than the females.

*Cranial characters.*—The skull of *S. gracilis* is broad and flat, with the fronto-parietal region depressed to the plane of the top of the skull, and there is a deep postorbital constriction—the deepest possessed by any of the species now known. There are well marked postorbital protuberances, but they are not peg-like processes as in *S. phenax* and *S. saxatilis*.

\* This species has been described in North American Fauna, No. 3, pp. 83–84.

† The tail of this specimen was injured in early life and the terminal portion is absent. In a young individual caught at the cañon two days later, the tail vertebra measure 160.



## SPILOGALE SAXATILIS sp. nov.

Type No. 4888 ♂ ad. Merriam collection. From Provo, Utah. November 13, 1888.  
Collected by Vernon Bailey. (Original number, 384.)

*Measurements of type* (taken in the flesh).—Total length, 450; tail vertebrae, 176; pencil, 100; hind foot, 49. *Measurements of ♀ ad.* (same locality and date): total length, 400; tail vertebrae, 163; hairs, 80; hind foot, 41.

*General characters.*—Size, rather large; tail, with hairs, longer than head and body. External lateral stripe nearly obsolete and barely or not continuous with anterior transverse stripe. In the type specimen, an adult male, none of the markings are confluent. In an old female taken at the same locality and date, the internal or middle dorsal stripes are narrowly confluent posteriorly with the anterior transverse stripes, and the caudal spots meet indistinctly across the base of the tail. All of the other spots and markings are distinct. Externally *S. saxatilis* may be distinguished at a glance from its nearest geographical neighbor, *S. gracilis*, by the inconspicuous and nearly obsolete lateral stripe. In *S. gracilis* this stripe is large and broad and broadly confluent with the anterior transverse stripe.

*Cranial characters.*—The skull of *S. saxatilis* resembles that of *S. gracilis* in size and proportions, but differs from it in having well-developed postorbital processes, in having the anterior nares deeply and broadly emarginate above, in having the zygomatic arches more broadly and highly arched, and in lacking a deep postorbital constriction (though it has a slight constriction). It differs from *S. phenax* in the shape of the nasal aperture (which is less broadly emarginate above), in the presence of a slight interorbital constriction (altogether absent in *phenax*), in having the last lower molar smaller, and in a number of cranial and dental proportions, which are given in tabular form under *S. phenax*.

## SPILOGALE PHENAX sp. nov.

(Plate I, figs. 1-3.)

Type No. 4188 ♂ ad. Merriam collection. From Nicasio, Marin County, California, October 31, 1885. Collected by C. A. Allen.

*General characters.*—Size large; hind foot 46 (in dry skin); tail, with hairs, shorter than head and body. External lateral stripes narrow, but considerably broader than in *S. saxatilis*; lumbar spots inclined to become confluent with posterior transverse stripes. Markings otherwise normal. Exposed white portion of tail occupying terminal third above and terminal half below. There is considerable white in irregular patches about the chin and angles of the mouth.

*Cranial and dental characters.*—The postorbital processes of *S. phenax* reach the maximum development observed in the genus; the postorbital

constriction is absent; the zygomatic arches are broad and highly arched, and the sectorial and molar teeth are large. The last lower molar is conspicuously larger than in *S. gracilis* and *S. saxatilis*.

*S. phenax* differs from *S. saxatilis* in the following particulars: The breadth across the postorbital processes is greater (ratio to basilar length 37, against 35.2 in *saxatilis*); there is no attempt at a postorbital constriction; the emargination above the nasal aperture is neither so broad nor so deep; the vault of the cranium is higher; the molariform teeth in both jaws are much larger, particularly the last lower molar, the ratio of which to the interorbital constriction is 20.3, while in *saxatilis* it is 17.4 (the ratio of the interorbital breadth to the basilar length being the same in both skulls); the combined length of the crowns of the upper sectorial tooth and molar equals the length of the pterygoid fossa, while it falls short of it in *saxatilis*; the palate is broader, the ratio of the distance across the upper molars to palatal length being 100.4, while in *saxatilis* it is 94.1; and the inner lobe of the upper molar is narrower (the ratio of the antero-posterior diameter of the inner lobe to the same diameter of the outer lobe being 87.5, while in *saxatilis* it is 95.2).

Several specimens from the region about San Bernardino and Alhambra, in southern California, have longer tails and broader side stripes than the Nicasio specimens, and the markings under the chin tend to arrange themselves in two small parallel stripes, with a small spot at each angle of the mouth. The postorbital processes are smaller than in true *phenax*. This form may merit subspecific separation.

The following table shows the ratios of a number of cranial and dental measurements in *S. saxatilis* and *S. phenax*, and also in *S. gracilis*, their nearest geographical neighbor:

Ratios of type specimens of *Spilogale phenax*, *S. saxatilis*, and *S. gracilis* (all adult males).

|  | <i>S. phenax</i> ,<br>Nicasio,<br>Cal. ♂ ad.<br>No. 2100. | <i>S. saxatilis</i> ,<br>Provo,<br>Utah. ♂ ad.<br>No. 5675. | <i>S. gracilis</i> ,<br>Grand<br>Cañon, Ari-<br>zona. ♂ ad.<br>No. 24897. |
|--|---|---|---|
| Ratios to basilar length of Hensel:  |   |   |   |
| Height of cranium from posterior margin of palate.....   | 28.6  | 27.2  | 26.5  |
| Length of upper sectorial tooth.....   | 13  | 12.2  | 12.5  |
| Length of lower sectorial tooth.....   | 16  | 14.9  | 15.9  |
| Length of upper sectorial and molar together.....  | 21.4  | 19.7  | 21.7  |
| Breadth across postorbital processes.....  | 37  | 35.2  | 35.7  |
| Postorbital constriction.....  | 30.4  | 27  | 25.9  |
| Ratios to palatal length:  |   |   |   |
| Distance from foramen magnum to post-palatal notch.....  | 141   | 135   | 144   |
| Length of upper lateral series of teeth.....   | 85.9  | 82.9  | 89.5  |
| Breadth across upper molars.....   | 100.4   | 94.1  | 95.8  |
| Length of upper sectorial tooth.....   | 31.4  | 29.2  | 31.2  |
| Length of upper molar (antero-posterior diameter of outer<br>cusp).....                        | 23.1  | 20.4  | 24.4  |
| Ratio of length of last lower molar to interorbital constriction.....                          | 20.3  | 17.4  | 17.7  |
| Ratio of breadth to length of upper sectorial tooth.....                                       | 67.8  | 66.6  | 61.4  |
| Ratio of breadth to length of upper molar.....   | 145.8   | 147.6   | 129.7   |
| Ratio of inner cusp to outer cusp of upper molar (antero-poste-<br>rior diameter of each)..... | 87.5  | 95.2  | 80.8  |

## SPILOGALE PHENAX LATIFRONS subsp. nov.

Type No.  $\frac{17271}{24200}$  ♀ old. U. S. National Museum (Department of Agriculture collection). From Roseburg, Douglas County, Oregon, July 13, 1889. Collected by Theodore S. Palmer. (Original number, 216.)

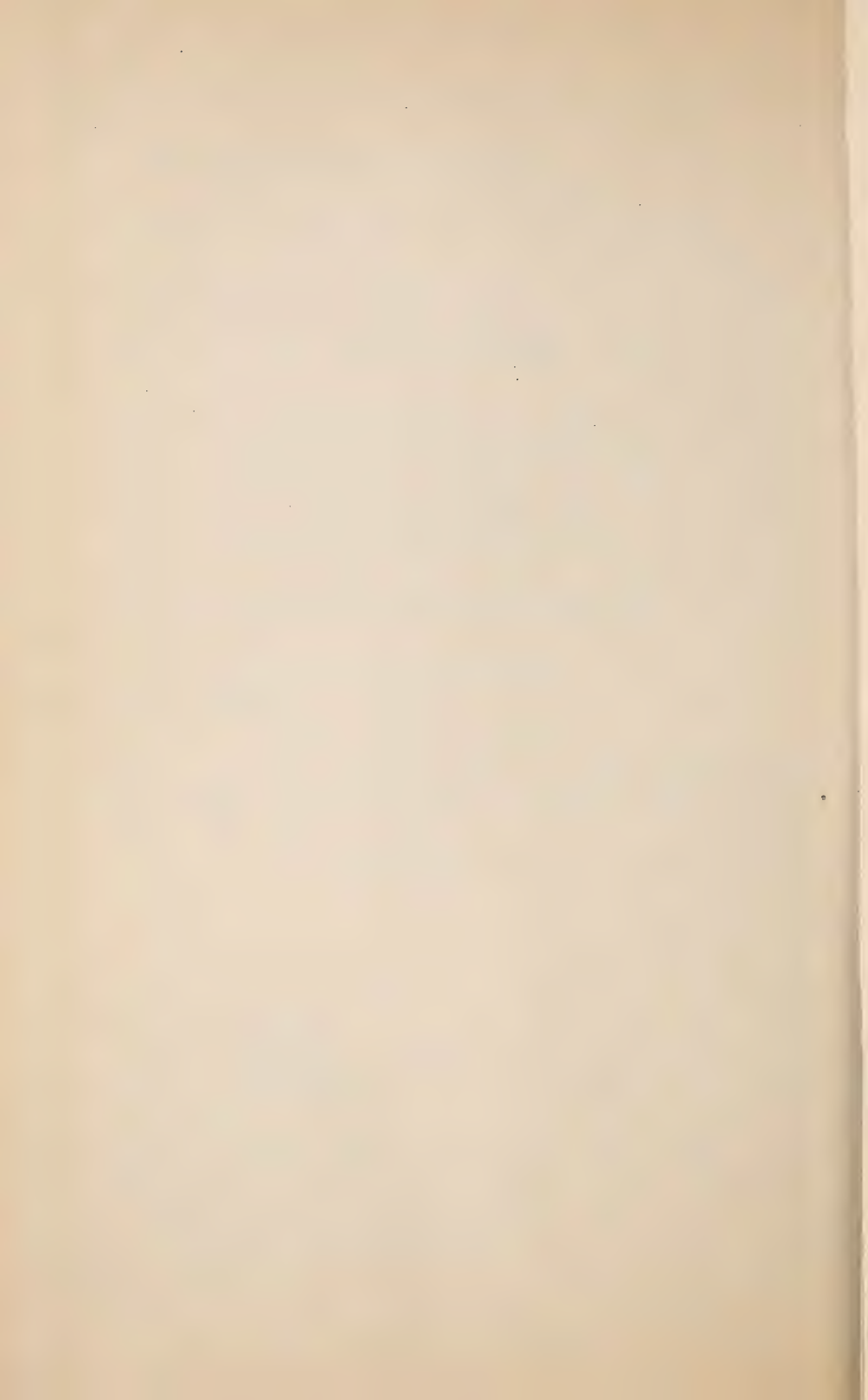
*Measurements* (taken in the flesh).—Total length, 335; tail vertebrae, 130; pencil, 90; hind foot, 40.

*General characters*.—Similar to *S. phenax*, but much smaller. No peculiarities in the markings appear in the single specimen examined—a very old, nursing female in worn pelage—except the white under the chin, which is much less extensive than in *S. phenax*; other specimens may have more.

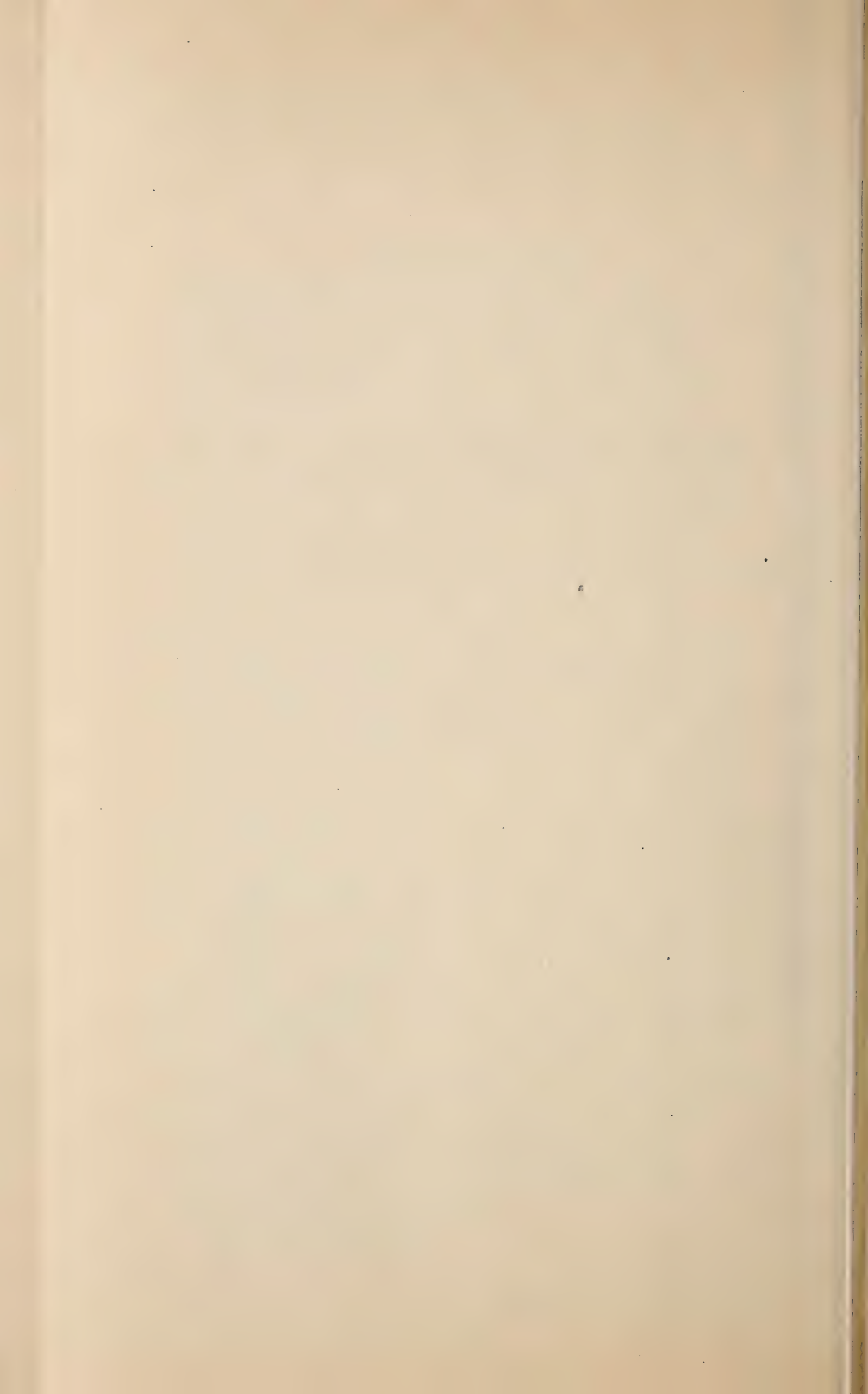
*Cranial characters*.—The skull of *S. phenax latifrons*, as its name indicates, is broader interorbitally and across the postorbital processes than *S. phenax*. It is broader also across the brain-case, the mastoids, and the palate. The last lower molar is much smaller than in *S. phenax*. The skull of the type specimen is so injured that the basilar length can not be taken, but another skull, from Chehalis Co., on the coast of Washington, affords the following ratios, which for convenience of comparison are accompanied by corresponding ratios of the type of *S. phenax*:

|  | <i>S. latifrons</i> ,<br>No. 2583.<br>! ♀ yg. ad. | <i>S. phenax</i> ,<br>No. 2100.<br>♂ ad. |
|--|---|--|
| Ratios to basilar length of Hensel:        |   |  |
| Interorbital breadth .....                 | 32.4  | 29.4                                     |
| Breadth across postorbital processes ..... | 38.9  | 37                                       |
| Breadth across molars .....                | 43.2  | 41.6                                     |
| Breadth across mastoids .....              | 65.5  | 64                                       |
| Breadth of brain-case .....                | 55.1  | 49                                       |











## DESCRIPTIONS OF FIVE NEW GROUND SQUIRRELS OF THE GENUS TAMIAS.

By Dr. C. HART MERRIAM.

### A. DESCRIPTIONS OF THREE NEW SPECIES OF THE TAMIAS LATERALIS GROUP.

The type specimen of *Tamias lateralis* of Say was collected by Long's Expedition on the Arkansas River in Colorado, a few miles below the present site of Cañon City. Specimens agreeing with the typical form have been examined from other parts of Colorado, from the Uinta Mountains in Utah, and from San Francisco Mountain, Arizona. Comparison of specimens from various parts of the West shows that there are at least three well-marked species which have not yet been described.

The most conspicuous differences by which the several forms may be distinguished are: (1) the extent of the inner black dorsal stripe; (2) the color of the head and neck; and (3) the color of the under side of the tail. In true *lateralis* the under side of the tail (within the sub-marginal black band) is grizzled *grayish-yellow*. In specimens from the Wahsatch (near Park City, Utah), it is deep, intense *chestnut*; in those from the Sierra Nevada (from Klamath, Oregon, to Lake Tahoe, Nevada, and Donner, California) it is deep *fulvous*. The head and sides of the neck in typical *lateralis* are suffused with ferruginous or *pale* rusty chestnut; in the Wahsatch animal the same parts are *deep* rusty chestnut; while in specimens from the Sierra Nevada they are bright golden-red or ochraceous, strikingly different from any of the others. The inner black stripe is small and more or less obscured in *lateralis*; it is large and distinct in the Wahsatch and Sierra animals, and of medium size in Montana specimens. Specimens from the Medicine Bow Mountains, Wyoming, differ from all the others examined, in having the ground color above very much darker. In some of these specimens the upper surface of the tail is almost black. The form may deserve sub-specific recognition.

Seasonal variation in color is more marked in some members of the present group than in any other North American mammal with which I am familiar (excepting, of course, the winter change to pure white in

some northern species). This variation relates mainly to the extent and intensity of the red or golden mantle which covers the head and neck. The maximum development of color occurs soon after the close of the breeding season, in August and September; but, as shown by Dr. J. A. Allen\* in his recent excellent and highly critical revision of the chipmunks of the *Tamias quadrivittatus* group, the change may be delayed by nursing and other causes, so that specimens showing both extremes may be killed the same day at the same place. As a rule the males are more highly colored than the females. This is particularly marked in *T. cinerascens*, in which the extremes of sexual coloration are so different that it is hard to believe them the same species. Adult males and females of this species, the former in the height of the red, the latter in the purest gray phase, were collected by myself at Helena, Montana, about the middle of August, 1888, together with a few specimens in intermediate pelage.

*Common characters.*—*Tamias lateralis* and its allies here described are the largest of the American ground squirrels of the genus *Tamias*. They are intermediate between *Tamias* and *Spermophilus*, and it is open to question whether they do not belong to the latter rather than to the former genus. They certainly depart from *Tamias* proper and agree with *Spermophilus* (section or subgenus *Colobotis*) in the form of the skull, in the general form of the body (in being heavy and thick-set instead of light and slender), in habits, in becoming excessively fat in the fall, and in hibernating early. They differ from all members of both groups in the peculiar pattern of the coloration, namely, the absence of dorsal stripe or stripes, coupled with the possession of three lateral stripes on each side (two of which are black, separated by one which is whitish or yellowish), and a conspicuous mantle of ferruginous-chestnut or ochraceous, which covers the head and neck to the shoulders at least a part of the year. Heretofore but one species (*T. lateralis*) has been recognized. Three additional species are here described. The four may be arranged in couplets according to affinities, thus:

KEY TO SPECIES OF THE TAMIAS LATERALIS GROUP.

- a*<sup>1</sup>. Inner black stripe much smaller than outer; lateral hairs of tail with *two* black bands; under side of tail grizzled yellowish gray.
- b*<sup>1</sup>. Ground color of back grizzled brown.....*lateralis*.
- b*<sup>2</sup>. Ground color of back grizzled ash-gray.....*cinerascens*.
- a*<sup>2</sup>. Inner stripe as large as outer; lateral hairs of tail with *one* black band; under side of tail fulvous or chestnut.
- c*<sup>1</sup>. Under side of tail deep *chestnut*; mantle ferruginous chestnut.....*castanurus*.
- c*<sup>2</sup>. Under side of tail *fulvous*; mantle ochraceous.....*chrysodeirus*.

*Faunal position.*—*Tamias lateralis* and its relatives here described belong to the lower or southern zones of the Boreal province. They inhabit the Douglas Fir zone and the higher levels of the *Pinus ponderosa* zone, and are particularly fond of rocky hill-sides.

\* Bull. Am. Mus. Nat. Hist., New York, III, May, 1890, pp. 49-50.

## TAMIAS CASTANURUS sp. nov.

Type No.  $\frac{32733}{30133}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From Park City, Wahsatch Mountains, Utah (altitude 7,000 feet), July 3, 1890. Collected by Vernon Bailey. (Original number, 1383.)

*Measurements* (taken in the flesh).—Total length, 284; tail vertebræ, 92; pencil, 32; hind foot, 43. Ear from crown, 13 (in dry skin).

*Color*.—Head and neck to shoulders ferruginous chestnut, lightest on the sides of the neck. Inner black stripe nearly as broad, long, and sharply defined as the outer, in this respect resembling *T. chrysodeirus* of the Wahsatch. Belly hairs dusky at base as in *T. chrysodeirus*, but tipped with whitish or very pale yellowish, the dusky base showing through. Tail above mixed yellow, black, and reddish brown, with yellow or fulvous border; tail below *deep chestnut*, with a submarginal black band. Upper surfaces of feet whitish. The ground color of the rump and outer side of the leg is darker and more strongly suffused with reddish-brown than in *T. chrysodeirus*.

*General remarks*.—This species is remarkably constant in coloration, as shown by a series of 44 excellent specimens (consisting of adults and young of both sexes) collected in the Wahsatch Mountains in June and July by Mr. Bailey. Almost the only variation from the type is in the amount of red in the mantle (some of the females having less than the type), and this is more constant than in the other species.

Mr. Bailey writes that these Ground Squirrels are "particularly abundant around the edge of town [Park City] and around the boarding-houses at the mines, where they pick up crumbs about the doors. A good many live along the roads, picking up the grain that falls from wagons. Of thirty-five stomachs examined, all but ten contained remains of insects (grasshoppers, beetles, flies, and larvæ). Most of them contained also seeds of plants, flowers, and foliage, and some were nearly full of roses. Many contained corn, beans, oats, bread, cake, potatoes, and fat pork picked up about camp."

## TAMIAS CHRYSODEIRUS sp. nov.

Type No.  $\frac{4766}{3726}$  ♂ ad. Merriam collection. From Fort Klamath, Oregon, July 31, 1888. Collected by Samuel Parker. (Original number, 143.)

*Measurements*.—Total length, 286; tail vertebræ, —; pencil, 25; hind foot, 39; ear from crown, 13.

*General characters*.—Top of head, rusty chestnut; sides of neck, bright ochraceous, this color reaching forward on the sides of the face. backward to the shoulders, upward across the nuchal region, where it is grizzled with the black-tipped hairs of the back, and downward (though of a paler shade) completely across the throat, and brightest on the sides of the neck between the ears and shoulders. The three side stripes



of equal breadth throughout; inner black stripe equaling the outer in length, breadth, and sharpness of definition; white stripe extending both anteriorly and posteriorly beyond the others, and being traceable in some specimens from the ears to the root of the tail. Under side of body everywhere strongly washed with pale ochraceous, which is deepest on the throat, where the hairs are of the same color throughout. Belly hairs dusky at base, with yellowish tips, the dusky showing through. Tail above, mixed black and yellow, with yellowish border; tail below, fulvous with a submarginal band of black. Upper surfaces of feet strongly suffused with ochraceous.

*General remarks.*—This species is represented in the Department of Agriculture collection by a series collected near Glenbrook, Nev., on the eastern side of Lake Tahoe, by Charles A. Keeler; and in the Merriam collection by series from Klamath, Oregon, collected by Samuel Parker; and Donner, Cal., collected by Charles A. Allen. The range of variation is slight and relates mainly to the intensity of color of the mantle, which varies from deep ochraceous or orange red to pale yellowish.

### TAMIAS CINERASCENS sp. nov.

Type No.  $\frac{44}{177}$  ♀ ad. Merriam collection. From Helena, Montana (altitude 4,500 feet), August 13, 1888. Collected by C. Hart Merriam. (Original number, 4.)

*Measurements.*—Total length, 322; tail vertebræ, 108; pencil, 35; hind foot, 44; ear from crown, 9.

*Color of type specimen, and of females generally in gray phase.*—Upper parts, from nose to root of tail, clear ash-gray, grizzled with black-tipped hairs; no red anywhere, or at most a slight ochraceous tinge on shoulders or a few red hairs about head; white stripe broad, reaching from ears to hips, somewhat obscured over shoulders; black stripe broad, short, and obscured at both ends, the inner shorter than the outer; a reddish-brown wash on outer side of thighs; tail above grizzled black and gray, with yellowish border; tail below grizzled grayish-yellow with a broad submarginal black band and a narrower and less distinct (concealed) band on the basal half of the lateral hairs; under parts whitish, slightly tinged with yellowish, the dusky basal portion of the belly hairs showing through; feet whitish from ankles.

*Males in red phase.*—Similar to gray phase, but with top of head and neck and sides of neck from white of lower eyelid to shoulders, deep rusty chestnut; eyelids white; a whitish line from eye to ear, dividing the red; face in front of eye whitish.

*General remarks.*—The females when in the red phase are not nearly so red as the males; and no males in the gray phase were procured. The species is represented by specimens, all collected by myself at Helena, Mont., in August, 1888.

The relationships of *Tamias cinerascens* are with *T. lateralis*, not with *T. castanurus* or *T. chrysoideirus*.

## B. DESCRIPTION OF A NEW SPECIES OF THE *TAMIAS HARRISI* GROUP.

The members of the *Tamias harrisi* group differ from all other American ground squirrels in possessing a single lateral stripe, white in color. Three forms have been thus far described, namely, the original *T. harrisi* of Bachman, which has the under side of the tail iron-gray and the lateral hairs black at base and marked with two free black bands; *T. leucurus* (described by the writer in Fauna No. 2, 1889, pp. 19-21), which has the under side of the tail white, with a single partly concealed submarginal black band; and *T. leucurus cinnamomeus* (described by the writer in Fauna, No. 3, 1890, pp. 51-53), which has the tail colored like the foregoing, but the upper parts suffused with cinnamon. The new species here described (*T. interpres*), while resembling *T. harrisi* and *T. leucurus* in the color of the upper parts, has the lateral hairs of the tail black at the base and marked with two free black bands as in *T. harrisi* from western Arizona, and the hairs of the under surface of the tail white as in *leucurus*. It resembles *leucurus* more than *harrisi*, and yet is more closely related to the latter. It is clearly intermediate between the two and still it does not connect them, there being room for an intervening form or 'intergrade' in each direction. Intergrades with *harrisi* will probably be discovered, so that it will rank eventually as a subspecies.

It may be known from the following description :

### TAMIAS INTERPRES sp. nov.

Type No.  $\frac{15100}{15100}$  ♀ ad. U. S. National Museum (Department of Agriculture collection. From El Paso, Texas, December 10, 1889. Collected by Vernon Bailey. (Original number, 762.)

*Measurements* (taken in flesh).—Total length, 226; tail vertebræ, 80; pencil, 22; hind foot, 37; ear from crown, 4 (in dry skin).

*General characters*.—Similar to *Tamias leucurus*, but tail longer and its lateral hairs marked with two free black bands instead of one.

*Color* (of type in winter pelage).—Upper parts finely grizzled gray, faintly tinged posteriorly with vinaceous, and suffused with pale fulvous over the nose; shoulders, hips, and outer surfaces of fore and hind legs ochraceous buff; a broad stripe of clear white on each eyelid and on each side of back from shoulders to side of rump; under parts silky whitish. Tail above with proximal third concolor with back and suffused with pale fulvous; distal two-thirds grayish black with a partly concealed submarginal black band and whitish border; tail below white, with two complete free black bands (the innermost concealed) and a whitish border. The lateral hairs of the tail are black at the very base, so that each hair has three black zones, alternating with three white zones, precisely as in *T. harrisi*. But it differs from *harrisi* in having the hairs of the under side of the tail whitish instead of marbled black and white, giving the tail a very different appearance.

The four forms may be easily identified by the following

KEY TO SPECIES AND SUBSPECIES OF THE TAMIAS HARRISI GROUP.

- A.—Lateral hairs of tail with *one* free black band, under side of tail white:
- b*<sup>1</sup>. Upper parts grayish.....*leucurus*.  
*b*<sup>2</sup>. Upper parts cinnamon.....*leucurus cinnamomeus*.  
 B.—Lateral hairs of tail with *two* free black bands:
- c*<sup>1</sup>. Under side of tail iron-gray (mixed black and white) .....*harrisi*.  
*c*<sup>2</sup>. Under side of tail white.....*interpres*.

C. DESCRIPTION OF A NEW SUBSPECIES OF THE TAMIAS MINIMUS GROUP.

TAMIAS MINIMUS MELANURUS subsp. nov.

Type No. 33043 ♂ ad. U. S. National Museum (Department of Agriculture collection). From west side of Snake River near Blackfoot, Idaho, July 17, 1890. Collected by Vernon Bailey and Basil Hicks Dutcher. (Original number, 1451).

*Measurements*.—Total length, —; tail vertebræ, 84; pencil, 21; hind foot, 29; ear from crown, 7.5 (in dry skin).

*General characters*.—Similar to *Tamias minimus consobrinus* Allen, but with under side of tail black along the median line, bordered on each side with pale yellowish—thus exactly reversing the condition which prevails in all the other known species of the genus, the normal arrangement consisting of a light (usually yellowish or fulvous) median stripe, bordered by a submarginal band of black.

*General remarks*.—Specimens of this new form of the small, pallid chipmunk of the Great Basin have just been received from Vernon Bailey, chief field agent of the Division, and his assistants, Basil Hicks Dutcher and Clark P. Streator. They were collected on the Snake River Desert in Idaho, between Blackfoot and Big Lost River. Mr. Bailey writes me that they are replaced by the ordinary form (*T. minimus consobrinus*) in the immediate vicinity of Blackfoot, on the east side of Snake River. The Snake River Desert consists of sand and sage plains alternating with lava beds. Without knowing the exact haunts of the animal it is difficult to say whether its peculiar freak of tail coloration is *protective* (in harmony with the dark tints of the lava) or *directive* (in sharp contrast with the light colors of the sandy desert). I incline to the latter view.

The new form is here treated as a subspecies instead of a species, because specimens from Big Lost River are somewhat intermediate, having the usual submarginal black band on the basal third of the tail, while the central part is black beyond. (No. 23046 ♀, collected by Clark P. Streator, July 21, 1890, is of this character).



## DESCRIPTION OF A NEW EVOTOMYS FROM COLORADO.

By Dr. C. HART MERRIAM.

Up to the present time no member of the circumpolar genus *Evotomys* has been recorded from the Rocky Mountain region of the United States, so far as I am aware. It is with great pleasure, therefore, that I am able to add to our fauna a new species of this genus from the mountains of Colorado.

The specimen on which the new species is based was collected near Gold Hill, Boulder County, Col., at an altitude of 9,500 feet, by Mr. Denis Gale, who very generously presented it to me along with an interesting collection of other mammals from the same region.

It may be known by the following description:

### EVOTOMYS GALEI sp. nov.

GALE'S RED-BACKED MOUSE.

(Plate II, fig. 3.)

Type  $\frac{56885}{6332}$  ♀ ad. Merriam collection. From Boulder County Colorado (altitude 9,500 feet), July 13, 1889. Collected by Denis Gale.

Size about equal to that of *E. gapperi*, or a little larger, but not so large as *E. carolinensis*. Unfortunately no measurements were taken in the flesh. The hind foot, after soaking to straighten the toes, measures 19. The tail in the dry skin measures about 42; pencil, 6.5. The ears are considerably larger than those of *E. gapperi* and the antitragus is relatively as well as actually much larger.

*Color*.—Above, considerably lighter than true *gapperi*; dorsal band well defined, pale hazel (not obscured by black-tipped hairs), extending from midway between the eyes and ears nearly to the tail; rest of upper parts 'Isabella-color,' suffused with ochraceous-buff. Below, white throughout, without trace of fulvous; basal half of fur of belly plumbeous. Tail sharply bicolor: above, 'Isabella-brown,' with a blackish tip; below, soiled white. There is no apparent post-auricular spot.

*Cranial characters*.—Compared with *E. gapperi*, the brain-case is broader, flatter, and more squarish in outline; immediately behind the

orbits it spreads out more abruptly, and the postorbital process of the squamosal is more prominent, so that the orbital and temporal fossæ are more sharply separated. A broad depression occupies the posterior part of the frontals. The auditory bullæ are large and high, but are less inflated laterally than in *gapperi*. The zygomatic arches are somewhat expanded upward at the point of junction of the jugal with the zygomatic process of the maxillary, showing a tendency toward the formation of the vertical lamella seen in *Phenacomys* and the lemmings.

*Dental characters.*—The molar series are considerably larger than in skulls of *gapperi* of the same size, but are not so large as in *Phenacomys*. The last lower molar is slightly broader posteriorly than anteriorly (contrary to the rule in *Evotomys*) and is broadest in the middle. It consists of three transverse loops, all of which are closed. The re-entrant angles of the inner side are very deep; those on the outer side are correspondingly shallow. The front lower molar has the usual number of loops and triangles. The anterior loop is directed straight forward and communicates broadly with the adjoining triangles on each side, leaving one external and two internal closed (or nearly closed) triangles and a posterior loop. The upper molars present no noteworthy peculiarities. All of the molars in both jaws are rooted, each having two long and well-formed roots, resembling those of *Phenacomys*, except that they are not closed at the bottom. (See fig. 3.) They may be considered as intermediate between those of *Evotomys rutilus* and *Phenacomys*.

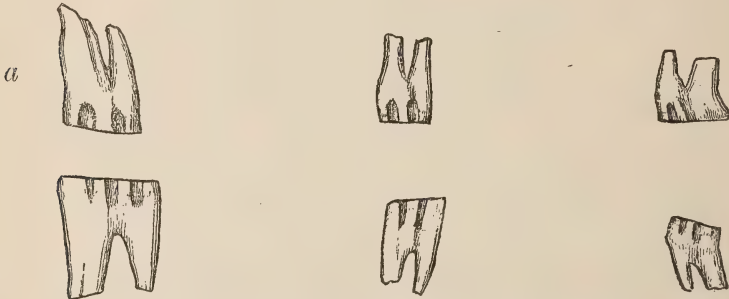


FIG. 3.—Molar teeth of *Evotomys galei* (a, left upper series; b, left lower series).

DESCRIPTIONS OF TWO NEW SPECIES OF EVOTOMYS FROM THE PACIFIC  
COAST REGION OF THE UNITED STATES.

By Dr. C. HART MERRIAM.

During the summer of 1889, Mr. Theodore S. Palmer made a biological reconnaissance of the Pacific coast region from northern California to Puget Sound, under the direction of the Division of Ornithology and Mammalogy of the Department of Agriculture. Among the interesting results of his explorations was the capture of two species of the circumpolar Arvicoline genus *Evotomys*, one as far south as Humboldt Bay, California. The only previous record of the genus from the Pacific region is Coues' mention of a specimen collected by Kennerly at Chilowk Lake, Washington, and referred to *E. gapperi*.\* Species of the genus have been described by the writer from the Great Smoky Mountains in North Carolina and Tennessee, and from the Rocky Mountains in Colorado. It remains only to discover a form in the Sierra Nevada in order to complete the illustration of the typical distribution of a Boreal genus, extending its range southward along all the great mountain systems of the continent and throughout the humid Pacific coast region to the southernmost limits of the Boreal zones.

The new species collected by Mr. Palmer may be known from the following descriptions:

EVOTOMYS OCCIDENTALIS sp. nov.

WESTERN RED-BACKED MOUSE.

(Plate II, fig. 1.)

Type No.  $\frac{17447}{337}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From Aberdeen, Chehalis County, Washington, August 16, 1889. Collected by Theodore S. Palmer. (Original number, 308.)

*Measurements* (taken in flesh).—Total length, 145; tail vertebrae, 45; pencil, 3; hind foot, 18; ear from crown, 7.5 (in dry skin).

*General characters*.—Size medium, about equaling *E. gapperi*; tail rather long; coloration very much darker than in any other known form.

\* Mon. N. Am. Rodentia, 1877, 144.



*Color.*—Upper parts dark sepia-brown, with a broad dorsal area of burnt umber not sharply defined. Under parts salmon color, the dusky basal part of the fur sometimes showing through. Tail blackish above, slightly paler below, but not bicolor. Hind feet dusky.

*Cranial and dental characters.*—The skull of *Evotomys occidentalis* is small and narrow, with the brain case highly arched. The enamel folds of the molars are deep, those from opposite sides pressing strongly against one another as shown in the figure (plate II, fig. 1). The front lower molar has five projecting angles on the inner side and four on the outer. The last upper molar has four projecting angles on the inner side and three on the outer, with sometimes the suggestion of a fourth.

### EVOTOMYS CALIFORNICUS sp. nov.

CALIFORNIAN RED-BACKED MOUSE.

(Plate II, fig. 2.)

Type No.  $\frac{17011}{23920}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From Eureka, Humboldt County, California, June 3, 1889. Collected by Theodore S. Palmer. (Original number, 110.)

*Measurements* (taken in flesh).—Total length, 161; tail vertebræ, 50; pencil, 5; hind foot, 21; ear from crown, 6 (apparently defective at tip; measured from dry skin).

*General characters.*—Compared with *E. occidentalis*, the present form is larger, with longer tail and hind feet and shorter ears (the margins of the ears appear to be imperfect, and may have been slightly longer). The tail is distinctly bicolor, which is not the case in *occidentalis*; it is dusky above and whitish below. There is less red in the dorsal area, and the black hairs are more conspicuous. The ground color above is lighter and has a grayish tint, especially on the sides, instead of being dark sepia-brown. The belly is white instead of salmon. The hind feet are much lighter.

*Cranial and dental characters.*—The skull is larger, broader, and flatter than that of *E. occidentalis*, its nearest relative; the frontals are depressed and concave between the eyes, and also broader interorbitally; the zygomatic arches stand out more strongly in front, and the parietals are very much broader and flatter. The dental characters are essentially the same as in *E. occidentalis*.

DESCRIPTION OF A NEW MARTEN (*MUSTELA CAURINA*) FROM THE  
NORTHWEST COAST REGION OF THE UNITED STATES.

By Dr. C. HART MERRIAM.

The marten inhabiting the dense spruce forests of the heavy rain-fall belt along the north west coast from northern California to Puget Sound, and doubtless ranging much farther north, differs specifically from the eastern *M. americana* in both cranial and dental characters, and many of the departures from the latter animal are in the direction of the old world *M. zibellina*. It may be known from the following description:

*MUSTELA CAURINA* sp. nov.

Type No.  $\frac{2954}{2373}$  ♂ yg. ad. Merriam collection. From Chehalis County, Washington (coast near Gray's Harbor), February 4, 1886. Collected by L. C. Toney.

*General characters.*—In external appearance *Mustela caurina* differs little from *M. americana*, the chief difference being that the irregular markings of the throat and under surface generally are orange-red instead of whitish or yellowish. A female taken at the same place and on the same day as the type has the flanks and even the upper parts suffused with the same color, giving the animal a peculiarly rich and beautiful appearance.

A young female, less than half grown, was collected by Mr. T. S. Palmer, at Crescent City, in the extreme northwestern corner of California, June 19, 1889 (No.  $\frac{17077}{23998}$  U. S. National Museum). It is very woolly and the color is a uniform light seal brown, somewhat paler below, and interrupted on the throat by a yellowish patch.

*Cranial characters.*—The skull of *Mustela caurina* differs from that of *M. americana* in the following particulars: The rostral portion is broader and shorter; the audital bullæ are shorter and less inflated; the frontals are broader both interorbitally and postorbitally; the shelf of the palate is less produced behind the plane of the last molar; the first upper pre-molar is smaller and more crowded; the upper molars are larger; the upper sectorial, in addition to its larger size, has the inner lobe very much larger and longer, projecting anteriorly beyond the plane of the anterior lobe, the reverse being the case in *M. americana*; the last upper

molar is not only larger, but has a much broader saddle; the transverse diameter of the tooth is about one-third greater than in *M. americana*, and the antero-posterior diameter of the inner lobe is both relatively and absolutely much greater; the distance between the outer alveoli of the upper canines equals the greatest length of auditory bullæ instead of being much less; the transverse diameter of last upper molar is greater instead of less than the length of the upper sectorial; the length of the first lower molar is less instead of greater than the antero-posterior diameter of the last upper molar, and equals instead of exceeding the greatest breadth of the upper sectorial. The under jaw is in every way larger and heavier; the lower canine is not so strongly bent; the first lower premolar is smaller; the last lower molar is approximately of the same size; the lower sectorial is larger in both diameters; the three remaining lower teeth (second and third premolars and first molar) are uniformly shorter, thicker, and higher. The inner cusp of the lower sectorial is wanting in the male and nearly obsolete in the female.

The above cranial and dental comparisons have been made with specimens from the Adirondack Mountains in northern New York, and in both cases with skulls of corresponding sex and almost exactly the same size. The resulting absolute measurements, therefore, as well as the ratios, are available for direct comparison. Both of the skulls of *M. caurina* are young adults, while those of *M. americana* are a little older though by no means *old*. Hence the breadth of the frontals postorbitally in *M. caurina* is somewhat greater than if the skulls were fully adult.

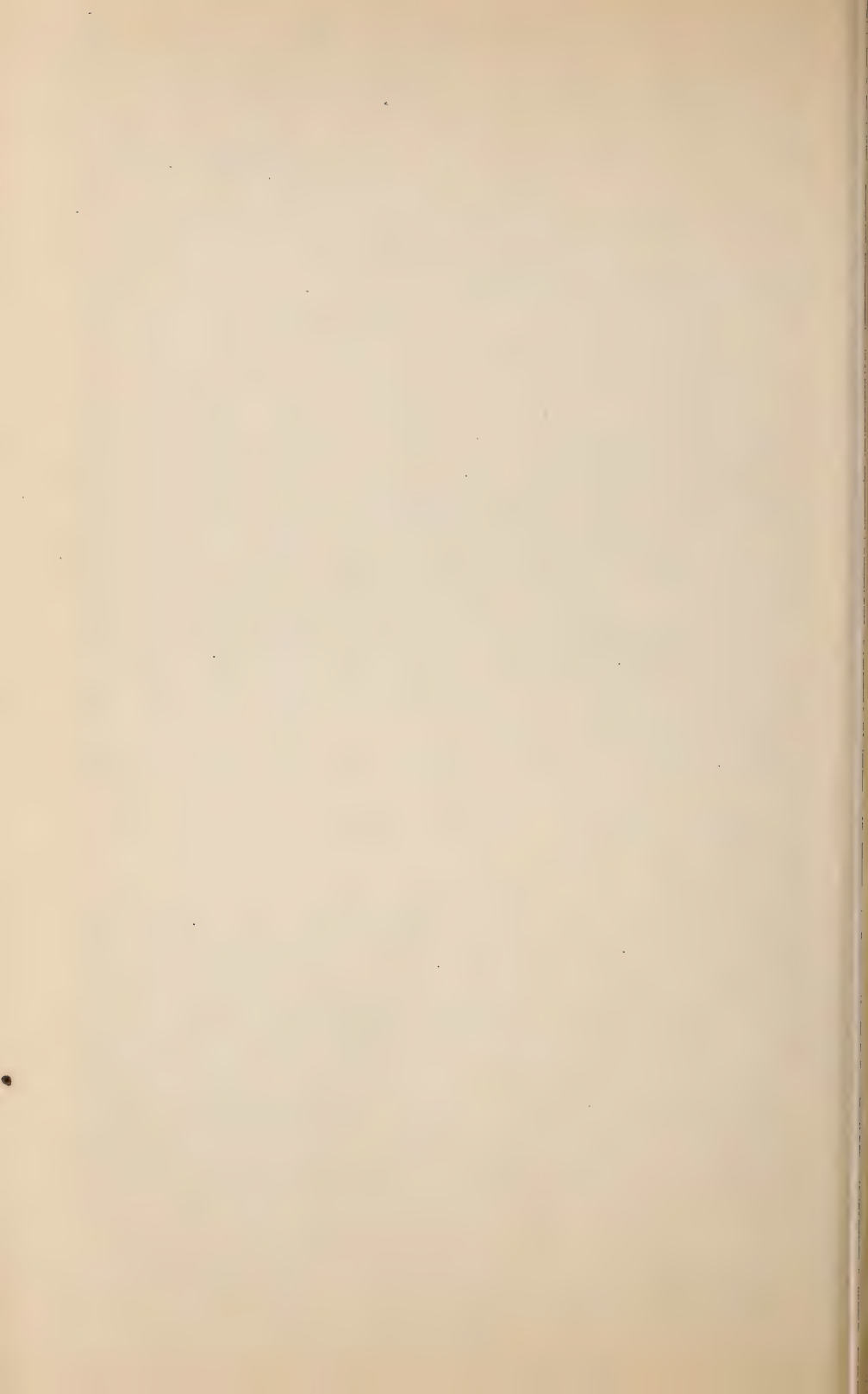
*Measurements of skulls of Mustela caurina and M. americana.*

| Measurements of skull.  | <i>M. caurina</i> ,<br>Chehalis<br>County, Wash. |        | <i>M. americana</i> ,<br>Adirondacks,<br>New York. |        |
|---|--|--------|--|--------|
|   | 2578 ♂   | 2577 ♀ | 4927 ♂   | 4930 ♀ |
| Basilar length from condyle to front of premaxillary .....  | 78   | 70.5   | 77.5   | 70.5   |
| Basilar length of Hensel (from inferior lip of foramen magnum to posterior rim of alveolus of middle incisor) ..... | 70.7   | 63.5   | 70.5   | 64.2   |
| Greatest zygomatic breadth .....  | 44.5   | 40.8   | 44.7   | 39.2   |
| Breadth across postorbital processes .....  | 22.5   | 20     | 21   | 18.3   |
| Least interorbital breadth .....  | 17.7   | 16.9   | 17.3   | 15.5   |
| Least postorbital breadth .....   | 16.4   | 16.2   | 15.5   | 14.5   |
| Distance from inferior lip of foramen magnum to postpalatal notch .....   | 33.2   | 30.5   | 33.3   | 31.2   |
| Palatal length (from postpalatal notch to posterior rim of alveolus of middle incisor) .....                        | 37.6   | 33     | 36.5   | 33     |
| Length of lateral series of teeth on alveoli (from front of canine to back of last molar) .....                     | 28   | 24.5   | 27.5   | 24.5   |
| Greatest breadth across molars (on alveoli) .....   | 26   | 23     | 24   | 21     |
| Greatest breadth across canines (on alveoli) .....  | 15   | 13.2   | 13.8   | 12.7   |
| Greatest length of under jaw (single half) .....  | 52.6   | 42.5   | 50.5   | 45     |
| Height of coronoid process from angle .....   | 23.5   | 21     | 23   | 18.5   |
| Length of pterygoid fossa (from base of hamular to deepest part of postpalatal notch) .....                         | 9.8  | 10.4   | 10.5   | 10     |
| Length of shelf of palate behind plane of alveolus of last molars .....   | 6.2  | 6.3    | 7.7  | 6.1    |
| Greatest length of auditory bulla .....   | 15   | 13.3   | 16.5   | 16.2   |
| Least breadth of muzzle behind canine .....   | 17.5   | 14     | 15   | 13.3   |
| <i>Measurements of teeth.</i>   |  |        |  |        |
| Upper sectorial, length of crown .....  | 8.2  | 7.3    | 7.7  | 7      |
| Upper sectorial, breadth of crown .....   | 5  | 4.5    | 4.7  | 3.7    |
| Last upper molar, antero-posterior diameter of outer lobe .....   | 4  | 3.7    | 4  | 3.3    |
| Last upper molar, antero-posterior diameter of inner lobe .....   | 5.5  | 4.5    | 4.7  | 4      |



Measurements of skulls of *Mustela caurina* and *M. americana*—Continued.

| Measurements of skull.   | <i>M. caurina</i> ,<br>Chehalis<br>County, Wash. |        | <i>M. americana</i> ,<br>Adirondacks,<br>New York. |        |
|--|--|--------|--|--------|
|  | 2578 ♂   | 2577 ♀ | 4927 ♂   | 4930 ♀ |
| <i>Measurements of teeth</i> —Continued.   |  |        |  |        |
| Last upper molar, antero-posterior diameter of saddle .....                                      | 3.6  | 3      | 3.7  | 3      |
| Last upper molar, greatest transverse diameter .....   | 8.5  | 7.5    | 7.3  | 6.4    |
| Lower sectorial tooth, greatest length of crown .....  | 10   | 8.5    | 8.7  | 8      |
| Length of first lower molar .....  | 5.1  | 4.5    | 5.8  | 5.4    |
| <i>Ratios of cranial and dental measurements:</i>  |  |        |  |        |
| Ratios to basilar length of Hensel:  |  |        |  |        |
| Zygomatic breadth .....  | 62.9   | 64.2   | 63.4   | 61     |
| Palatal length .....   | 53.1   | 51.9   | 51.9   | 51.4   |
| Length of lateral series of teeth .....  | 39.6   | 38.5   | 39   | 38.1   |
| Breadth across molars .....  | 36.7   | 36.2   | 34   | 32.7   |
| Length of upper sectorial tooth .....  | 11.5   | 11.4   | 10.9   | 10.9   |
| Length of lower sectorial tooth .....  | 14.1   | 13.3   | 12.3   | 12.4   |
| Breadth of postorbital constriction .....  | 23.1   | 25.5   | 21.9   | 22.5   |
| Length of under jaw .....  | 74.3   | 66.9   | 71.6   | 70     |
| Ratio of length of inner cusp to outer cusp of upper molar .....                                 | 13.7   | 12.1   | 11.7   | 12.1   |
| Ratio of length of inner cusp to transverse diameter of upper molar .....                        | 64.7   | 60     | 64.3   | 59.7   |
| Ratio of breadth to length of upper sectorial .....  | 60.9   | 61.6   | 61   | 52.8   |
| Ratio of antero-posterior diameter of saddle of upper molar to same diameter of inner lobe ..... | 65.4   | 66.6   | 78.7   | 75     |
| Ratios to half basilar length (from condyle to front of premaxillary):                           |  |        |  |        |
| Zygomatic breadth .....  | 114.1  | 115.6  | 115.2  | 111.2  |
| Palatal length .....   | 96.4   | 93.4   | 94   | 93.6   |
| Breadth of anteorbital constriction .....  | 45.3   | 47.8   | 44.6   | 43.8   |
| Breadth of postorbital constriction .....  | 42   | 45.8   | 40   | 40     |
| Length of lateral series of teeth .....  | 71.7   | 69.5   | 70.9   | 69.5   |
| Breadth across molars .....  | 61.6   | 65.2   | 61.9   | 55.6   |
| Breadth of last upper molar .....  | 21.7   | 21.2   | 18.8   | 19     |
| Length of upper sectorial .....  | 21   | 20.7   | 19.8   | 19.8   |
| Length of lower sectorial .....  | 25.6   | 24     | 22.4   | 22.6   |
| Length of first lower molar .....  | 13.5   | 12.7   | 14.9   | 15.3   |
| Post-molar production of shelf of palate .....   | 15.8   | 17.8   | 19.8   | 17.3   |
| Length of auditory bulle .....   | 38.4   | 37.7   | 42.4   | 45.8   |
| Breadth of muzzle .....  | 44.8   | 39.6   | 38.4   | 37.6   |



DESCRIPTION OF A NEW SPECIES OF MOLOSSUS FROM CALIFORNIA  
(MOLOSSUS CALIFORNICUS).

By Dr. C. HART MERRIAM.

*Molossus* is a tropical American genus of bats, no species of which has been heretofore recorded from the United States, so far as I am aware. The subject of the present description is a huge animal, with immense ears, and of sooty-brown color. It was captured at Albambra, in southern California, by Mr. E. C. Thurber, who writes me that it was found on the ledge over a door. Two others were caught during the same month (December, 1889), and both in similar situations. Mr. Thurber says of one of them: "It was hanging from the ledge of a window, swinging back and forth and knocking against the window as if to attract attention. All were caught about 8 or 9 o'clock in the evening."

Mr. Henry W. Henshaw tells me that when encamped in southern California several years ago, he saw and tried in vain to shoot, an enormous bat, much larger than any he had previously seen, which passed swiftly by in the light of the camp fire.

The present species is closely related to *Molossus perotis* of Brazil. It may be known from the following description:

MOLOSSUS CALIFORNICUS sp. nov.

Type No. 5736 ♀ ad. Merriam collection. From Alhambra, Los Angeles County, California, December 14, 1889. Collected by E. C. Thurber.

*Dental formula.*—Inc.,  $\frac{1-1}{2-2}$ ; c.,  $\frac{1-1}{1-1}$ ; pm.,  $\frac{2-2}{2-2}$ ; m.,  $\frac{3-3}{3-3}$ =30. First upper molar minute, and wedged in angle between canine and second premolar, on the *outer* side. Second premolar large; higher than first molar. First lower premolar nearly as large as second. Lower incisors bifid and crowded. Lower canines with cingulum forming a distinct cusp on inner side.

Muzzle very obliquely truncated, as in *M. perotis*, projecting 11<sup>mm</sup> in front of upper incisors and deeply notched between nostrils. Lips smooth, without vertical wrinkles; a prominent glandular swelling in front of each eye; side of head immediately above and behind eye concave.

Ears very large, their bases united in front, projecting slightly beyond muzzle. Ear conch broadly convex anteriorly and posteriorly, slightly convex on top, keel large and heavy, flattened externally. Tragus quadrate, higher than broad. Antitragus twice as long as high, nearly rectangular, highest a little behind middle, and separated posteriorly



from conch by a deep notch. Inside of ear conch (facing outward) haired in the form of a horseshoe, the hairs beginning on the superior margin of the keel about opposite angle of mouth and extending anteriorly the full length of the keel, thence curving upward (leaving a naked crescentic triangle in front) and reaching the upper border of the conch at the highest point anteriorly (on plane of nostrils) and thence, curving backward, forming a narrow fringe along the margin of the highest part of the conch and extending backward to a point opposite the angle of the mouth. The folds of the ear over the nose are densely haired on both surfaces, the hairs projecting forward over the nostrils. The anterior margin of the conch is reflexed and bare in front from the plane of the keel to the antero-superior rounded angle.

Upper surface of wing membrane with a line of hair along the posterior margin of distal three-fourths of fore-arm, expanding in the apex of angles between the fore-arm and fifth metacarpal, and fifth and fourth metacarpals, but not invading the narrow space between the fourth and third metacarpals. There is a small, scant-haired strip immediately behind the metacarpo-phalangeal articulation of the third digit. Ante-brachial membrane naked in front of humerus, but haired in front of fore-arm, except at bottom of angle. No gular sac (may be present in male). Wings from junction of middle and distal third of tibia. Color sooty-brown, palest below, bases of hairs everywhere pale drab-gray.

*Measurements of type specimen.*

|   |      |
|---|------|
| Head and body .....                                     | 102  |
| Tail .....  | 60   |
| Free part of tail .....                                 | 13   |
| Head .....  | 42   |
| Height of ear (from line of attachment above eye) ..... | 24   |
| Length of ear (antero-posterior) .....                  | 39   |
| Tragus, height from anterior base .....                 | 4    |
| Tragus, breadth at top .....                            | 2.5  |
| Length of antitragal lobe .....                         | 11   |
| Humerus .....   | 41   |
| Fore-arm .....  | 73   |
| Longest finger .....                                    | 136  |
| Thumb .....   | 9    |
| Third finger { metacarpal .....                         | 72   |
| { 1st ph .....  | 31   |
| { 2d ph .....   | 28.5 |
| { cartilaginous claw .....                              | 8    |
| Fourth finger { metacarpal .....                        | 70   |
| { 1st ph .....  | 26   |
| { 2d ph .....   | 5    |
| { cartilaginous claw .....                              | 6    |
| Fifth finger { metacarpal .....                         | 38   |
| { 1st ph .....  | 22   |
| { 2d ph .....   | 6    |
| { cartilaginous claw .....                              | 5    |
| Tibia .....   | 22.5 |
| Hind foot .....   | 17   |

## DESCRIPTION OF A NEW PRAIRIE DOG FROM WYOMING.

By Dr. C. HART MERRIAM.

### CYNOMYS LEUCURUS sp. nov.

Type No.  $\frac{3908}{3419}$  ♀ ad. Merriam collection. From Fort Bridger, Wyoming, September 15, 1888. Collected by Vernon Bailey. (Original number, 224.)

*Measurements* (taken in flesh).—Total length, 335; tail vertebrae, 53; pencil, 21 (worn—much longer in other specimens); hind foot, 58; ear from crown, 3 (in dry skin).

*General characters*.—Similar in size and general appearance to *C. gunnisoni*, of Baird, but readily distinguished from the latter by the color of the tail and by cranial characters.

*Color* (of type which has nearly completed the change from summer to fall pelage).—Upper parts from nose to basal half of tail grizzled grayish buff, much mixed with black over the posterior part of back and rump; a broad, blackish patch over each eye, and a larger patch, grizzled with buffy, on each cheek below the eye; thighs buff, not mixed with black; under parts generally soiled buffy white, deepest at base of tail; throat and under side of face whitish. Tail, basal half concolor with upper and lower surfaces of body respectively; terminal half whitish all round without trace of dark bar. Specimens in summer pelage are uniformly buffy or grayish yellow above, the black hairs being scarce and not noticeable, except on close examination. One specimen is almost brick red above, which may be due to staining from the soil.

Specimens of *Cynomys leucurus* in summer pelage average lighter in coloration than *C. gunnisoni*, and in fall pelage there is more black on the back. But the principal and most conspicuous difference is in the coloration of the tail, which in *gunnisoni* is concolor with the body, has a submarginal and subterminal black band, the tips of the hairs only being white; while in *leucurus* the black band is absent and the terminal half or two-thirds of the tail is white. Moreover, the tail is shorter in *leucurus* than in *gunnisoni*.

Professor Baird pointed out the striking difference in the tail of this species as compared with that of *gunnisoni*, but having only two specimens of the present form and one of *gunnisoni* he did not separate them.

*Cranial characters.*—The skull of *C. leucurus* agrees in the main with that of *C. gunnisoni* as contrasted with *C. ludovicianus*, but differs from *gunnisoni* in the following particulars: The occiput (viewed from behind) is broader and flatter, and the mastoids are larger, flatter, and more completely in the occipital plane; the audital bullæ are larger and the meatus is less produced laterally; the nasals end more anteriorly compared with the nasal branches of the premaxillaries; the greatest breadth across the nasal branches of the premaxillaries equals or exceeds the interorbital breadth; the antero-inferior angle of the zygomatic arch is thickened so as to form a small triangular plate (instead of being rounded off as in *gunnisoni*).

The cranial differences which separate *Cynomys leucurus* from *C. ludovicianus* are numerous and marked, as may be seen by consulting the following table, in which the differential characters are arranged antithetically:

| CYNOMYS LUDOVICIANUS.   |  | CYNOMYS LEUCURUS.  |
|---|--|--|
| <i>Audital bullæ.</i>   |  |  |
| Moderate; constricted below meatus; meatus small.   |  | Much inflated; not constricted below meatus; meatus large.                             |
| <i>Greatest breadth across audital bullæ equals distance from anterior lip of foramen magnum to—</i>          |  |  |
| Second molar (fourth molariform tooth).   |  | First molar (third molariform tooth).  |
| <i>Basi-occipital (on median line).</i>   |  |  |
| Longer than broad.  |  | As broad as long.  |
| <i>Plane of occiput (viewed from behind).</i>   |  |  |
| Arched, with mastoid portion small and anterior to plane of ex-occipitals.                                    |  | Depressed, with mastoid portion large and on same plane with exoccipitals.             |
| <i>Frontal shield.</i>  |  |  |
| As broad as long.   |  | Much longer than broad.  |
| <i>Interorbital breadth.</i>  |  |  |
| Almost equal to distance from postorbital process to fronto-maxillary suture.                                 |  | One-third narrower than distance from postorbital process to fronto-maxillary suture.  |
| <i>Nasals ending posteriorly.</i>   |  |  |
| About on line with nasal branch of premaxillary.  |  | Anterior to nasal branch of premaxillary.  |
| <i>Nasal branch of premaxillary.</i>  |  |  |
| Ending about on line with fronto-maxillary suture. Widest at anterior edge of zygomatic process of maxillary. |  | Ending considerably posterior to fronto-maxillary suture. Of uniform width throughout. |



CYNOMYS LUDOVICIANUS.

| CYNOMYS LEUCURUS.

*Greatest breadth across premaxillaries.*

Much less than interorbital breadth.

| Equal to or greater than interorbital  
breadth.*Zygomatic arch with antero-inferior angle.*Sharp, and thickened to form a heavy  
triangular plate.

| But slightly thickened.

*Coronoid process of mandible.*

Short, thick, and only slightly recurved.

| Longer, more slender, and more strongly  
recurved.*Upper molar series.*More than twice as far apart anteriorly  
as posteriorly.| Not more than twice as far apart ante-  
riorly as posteriorly.*Last lower molar.*Much longer than broad, with posterior  
cusp produced.| About as broad as long, with posterior  
cusp shortly rounded off.



## DESCRIPTIONS OF THREE NEW GROUND SQUIRRELS OF THE SPERMOPHILUS SPILOSOMA GROUP.

By Dr. C. HART MERRIAM.

♦ In 1833 E. T. Bennett\* published descriptions of a number of new species of mammals said to have been obtained in "that part of California which adjoins to Mexico." The exact locality from which these specimens came has always been in doubt. It has been long known that they did *not* come from any part of California, but from some part of Mexico. Prof. Baird supposed the locality to have been somewhere in southeastern Sonora, while Bachman believed it to have been in northeastern Sonora, or even Chihuahua east of the Sierra Madre. This uncertainty as to the type locality of so many species has always been a matter of annoyance to those who have had to do with the species in question. Among these species is a small spotted spermophile which Bennett named *Spermophilus spilosoma*. I shall not attempt to fix the type of this species, but assume for the present that it agrees in the main with specimens from northern Mexico and extreme western Texas. Regarding it as a central type, the related species which have been thus far described are the following: *Spermophilus obsoletus* Kennicott, from western Nebraska, and three forms described by the writer (North American Fauna, No. 3, pp. 55-58), namely, *S. cryptospilotus*, *S. spilosoma pratensis*, and *S. spilosoma obsidianus*. To these, one additional species and two subspecies are here added, making eight in all. The acquisition of the material on which all of the six new forms are based is due entirely to the biological explorations conducted by the Division of Ornithology and Mammalogy of the Department of Agriculture. The National Museum contains, outside of the Department of Agriculture collection, but two skins of the *spilosoma* group (collected nearly forty years ago by the Mexican Boundary Survey), and five of *obsoletus*. The Department of Agriculture series now numbers nearly sixty excellent skins, accompanied in each case by the skull.

The new forms may be distinguished from those previously known by the following descriptions:

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\* Proceedings of the Zoological Society of London, 1833, 40-41.



## SPERMOPHILUS CANESCENS sp. nov.

Type No.  $\frac{17873}{24813}$  ♂ im. U. S. National Museum (Department of Agriculture collection). From Wilcox, Cochise County, Arizona, November 16, 1889. Collected by Vernon Bailey. (Original number, 676.)

*Measurements* (taken in flesh).—Total length, 156; tail vertebræ, 55; pencil, 10; hind foot, 28; ear from crown, 2 (in dry skin). [Specimen not full grown.]

*General characters*.—Similar to *Spermophilus spilosoma*, but with ground color drab-gray, without any tinge of fulvous or rufous and with the white spots tending to coalesce laterally into irregular wavy transverse bars, which are so close together that the distance between them is less than the width of the markings. Basal third of tail cylindrical; distal two-thirds distichous.

*Color*.—Upper parts drab-gray, much obscured by hoary; head and face hoary; back everywhere covered with transversely elongated whitish markings, which are much crowded and tend to run together laterally, forming transverse wavy bars, separated by narrower dark wavy lines consisting of the dark tips of the hairs. Eyelids and under parts white. Tail above, grizzled grayish-drab, mixed with blackish on the terminal third, and bordered with buffy; tail below, buffy with a submarginal blackish band.

## SPERMOPHILUS SPILOSOMA MACROSPILLOTUS subsp. nov.

Type No.  $\frac{16753}{23753}$  ♀ ad. U. S. National Museum (Department of Agriculture collection). From Oracle, Pinal County, Arizona, June 11, 1889. Collected by Vernon Bailey. (Original number, 129. Teats,  $\frac{5}{8}$ .)

*Measurements* (taken in flesh).—Total length, 220; tail vertebræ, 74; pencil, 19; hind foot, 30; ear from crown, 3 (in dry skin).

*General characters*.—Size medium; ground color above russet-hazel; dorsal spots large, distinct, and far apart.

*Color*.—Ground color above, russet-brown, slightly paler over the nose; top of head and neck mixed with light-tipped hairs; dorsal spots very large, distinct, distant, roundish in outline, and indistinctly bordered posteriorly with dusky; under parts whitish. Tail above, proximal half concolor with back; distal half mixed buffy and black with a buffy border. Tail below, pale ochraceous buff with a partly concealed submarginal black band.

*General remarks*.—The above description applies in every particular to three adult specimens from Oracle. The young differ in being brighter colored and in having the dorsal spots smaller, less spaced, and not so round.

## SPERMOPHILUS SPILOSOMA MAJOR subsp. nov.

Type No.  $\frac{1}{2} \frac{111}{44} \frac{6}{9}$  ♀ ad. U. S. National Museum (Department of Agriculture collection). From Albuquerque, New Mexico, July 22, 1889. Collected by Vernon Bailey. (Original number, 225. Teats,  $\frac{5}{2}$ .)

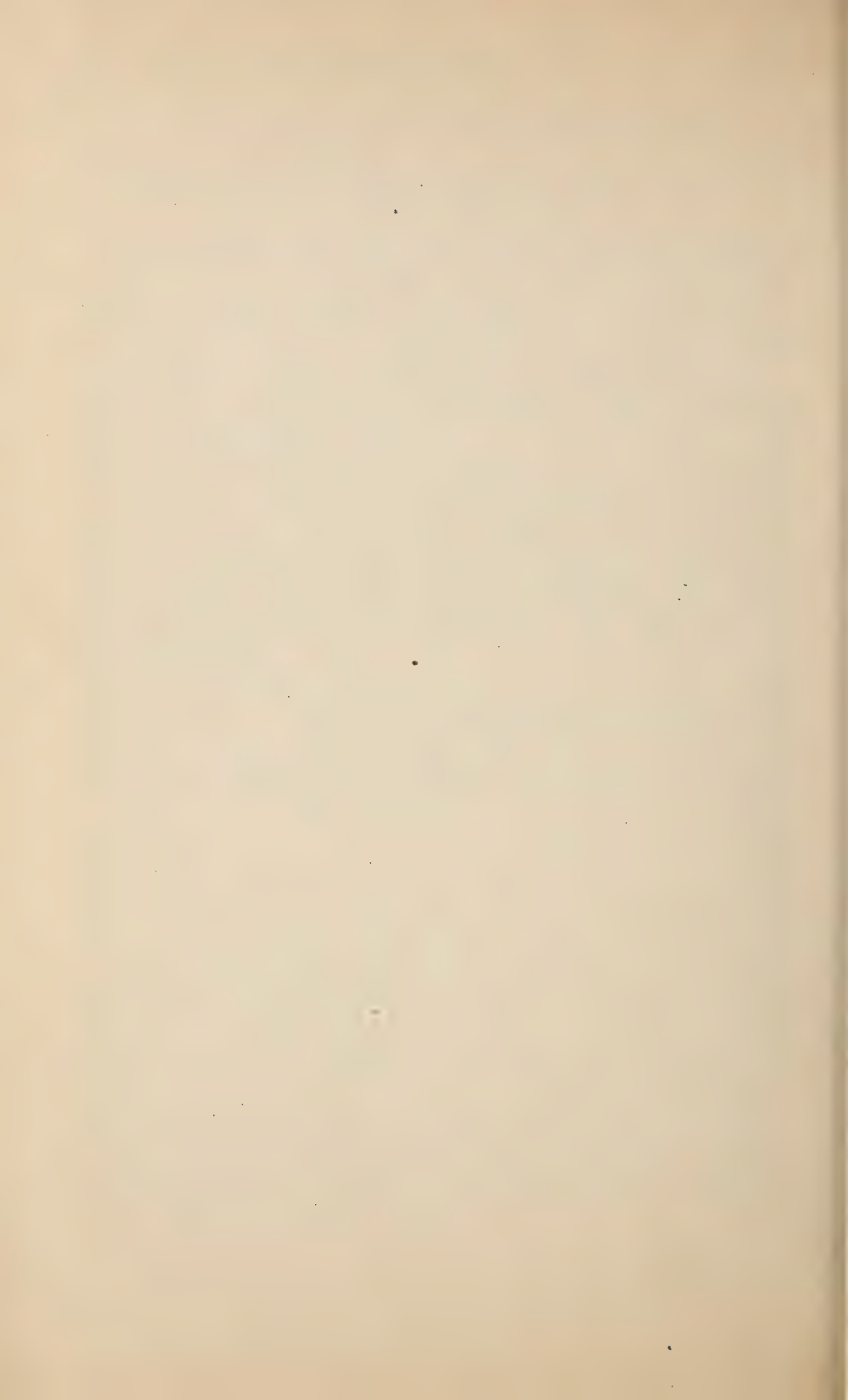
*Measurements* (taken in flesh).—Total length, 234; tail vertebrae, 80; pencil, 18; hind foot, 35; ear from crown, 3 (in dry skin).

*General characters*.—This is the largest member of the group thus far discovered, and its color is different from any of the others, being intermediate between *spilosoma* and *obsoletus*.

*Color*.—Ground color above broccoli brown, tinged with pale fulvous over the nose. Spots indistinct and ill defined, bordered posteriorly with dusky; most numerous over the rump. Under parts white. Tail above, proximal half pale reddish-brown, distal half buffy brown with a submarginal black band, bordered with pale buff; tail below, buffy with a partly concealed submarginal black band.

*General remarks*.—A series of a dozen specimens of this subspecies, collected at Albuquerque in July, 1889, by Mr. Bailey, shows the changes resulting from differences in age and in the wear of the pelage. In the young the upper parts are pale vinaceous-cinnamon, the dorsal spots are much more distinct, and both sides of the tail more reddish-brown than in the adults. Adults in worn pelage have the tail pale cinnamon-rufous, and the upper parts faintly tinged with reddish-brown—exposed by the wearing away of the light tips of the hairs.

In color and markings, *Spermophilus spilosoma major* is intermediate between *S. spilosoma* and *S. obsoletus*, though it lacks the coal-black edgings to the indistinct spots of the latter, and is larger than either.





DESCRIPTIONS OF THREE NEW KANGAROO RATS, WITH REMARKS ON  
THE IDENTITY OF *DIPODOMYS ORDII* OF WOODHOUSE.\*

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By Dr. C. HART MERRIAM.

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In North American Fauna, No. 3, I proposed the genus *Dipodops* for the kangaroo rats having five toes on the hind feet, as distinguished from *Dipodomys* proper, which has but four toes.† In several instances the external resemblances between species belonging to one genus and those belonging to the other are so exceedingly close that it is unsafe to name museum specimens without actually counting the toes. The most extraordinary and perplexing instance of this kind which has come to my notice is that of two species inhabiting the same localities at El Paso, Tex. They are so much alike in size, color, and proportions, that, without reference to the number of toes, the closest scrutiny is necessary to discriminate between them. In fact, the differences are so slight that a naturalist of note has suggested to me that they might be one and the same species, the presence or absence of the useless digit being a mere individual variation, as is known to be the case in the kittiwake gull (*Rissa tridactyla*). The possibility of such a parallel was so contrary to the results of my study of the group (having examined several hundred specimens without finding a single instance of individual variation, either in the number or relative size of the digits) that I felt impelled to make a particularly critical study of the El Paso kangaroo rats for the purpose of ascertaining the facts in the case. Owing to the indefatigable zeal of the chief field naturalist of the Division, Mr. Vernon

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\* It was my intention to publish a revision of the North American kangaroo rats in the present number of Fauna, but unforeseen delays, particularly in securing proper illustrations, have prevented.

† I am aware that Dobson has published a special paper "On the Unimportance of the Presence or Absence of the Hallux as a Generic Character in Mammalogy" (Proc. Zool. Soc. London, 1884, 402-403); but his argument was based wholly upon a study of the hallux in the insectivorous hedgehogs (*Erinaceus*), a group which presents, according to his own statement, all intermediate conditions in the development of this digit, and in one species of which (*E. albiventris*) Dr. Dobson found an individual, an old female, which had a hallux on the left foot but not on the right. No such variations occur in the genus *Dipodops*; in fact, the constancy in the length of the hallux in the several species is remarkable, as will appear in my forthcoming paper on the group.

Bailey, a series of sixteen beautifully prepared specimens was available, including both sexes and different ages of both species, accompanied by tables of measurements taken in the flesh. The results of this study may be briefly stated: The two forms may be distinguished without counting the toes, by external differences of color and proportions, constant though slight, and by numerous cranial characters. (The latter are pointed out under the head of *Dipodomys ambiguus*, where the cranial characters of the two animals are contrasted in detail.) Therefore, notwithstanding the close external resemblance of the two El Paso kangaroo rats, they really are not closely related at all, but belong to distinct genera. Mr. Bailey, who collected the specimens, writes me that he had no difficulty in distinguishing them in the flesh, the *Dipodops* being stouter and heavier than the *Dipodomys*, and having a thicker and shorter tail.

Careful comparison of Woodhouse's original description of *D. ordii* from El Paso, Tex., with the present excellent series of both forms from the same locality, has convinced me that *D. ordii* is the 5-toed animal (a *Dipodops*) leaving the 4-toed (a *Dipodomys*) to be described. The latter is here named *Dipodomys ambiguus*, and *Dipodops ordii* is re-described from abundant material accompanied by trustworthy measurements taken in the flesh.

#### DIPODOMYS AMBIGUUS sp. nov.

Type No.  $\frac{18817}{5047}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From El Paso, Texas, December 13, 1889. Collected by Vernon Bailey. (Original number, 782.)

*Measurements* (taken in flesh).—Total length, 233; tail vertebræ, 133; pencil, 32; hind foot, 37; ear from crown, 7; from anterior root, 12 (in dry skin).

*General characters*.—Hind toes, 4; size rather small for a true *Dipodomys*. Terminal third of tail crested-penicillate. Closely resembles *Dipodops ordii*, from the same locality, but is more slender and the color of its upper parts is buffy-drab instead of deep ochraceous-buff.

*Color*.—Upper parts buffy-drab, brightest on the sides, where it is faintly tinged with pale ochraceous-buff, and everywhere mixed with black-tipped hairs, which are most conspicuous on the rump. Upper tail-stripe dusky from basal ring to extreme tip, the bases of the hairs white; lower tail-stripe dusky, and when unworn reaching the dusky tip, leaving a white stripe on each side which ends about opposite the end of the vertebræ.

*Cranial characters*.—Compared with *Dipodops ordii* the skull of *Dipodomys ambiguus* is broader interorbitally; the length of the nasals is about equal to the interorbital breadth at plane of lachrymals; the expanded orbital bridge of the maxillary ends postero-laterally in a small projecting lobule, with a concavity in front of it; the breadth of the

frontals posteriorly is about equal to the distance from the foramen magnum to the incisive foramina, and is considerably greater than the distance from front of incisor to back of last molar; the postero-superior angle of the squamosal is sharply angular; the height of cranium above symphysis of audital bullæ is much less than the interorbital breadth at plane of lachrymals; the angular process of mandible is relatively short and blunt; the breadth of the skull across the inflated mastoids equals the distance from the anterior lip of the foramen magnum to the posterior rim of alveolus of incisor; the greatest breadth across the zygomatic processes of the maxillaries equals the distance from occipital condyle to front of incisive foramina.

*Dipodomys ambiguus* is closely related to *D. merriami*, recently described by Dr. Mearns,\* but differs from it in having shorter ears and tail and longer hind feet. The thigh patch is very much smaller—hardly a third as large as in *D. merriami*. Unfortunately, the skull of the latter has been lost, so that no cranial comparisons can be made. The examination of specimens from intermediate localities may result in reducing *ambiguus* to subspecific rank.

CRANIAL CHARACTERS OF *Dipodomys ambiguus* CONTRASTED WITH THOSE OF *Dipodops ordii*.

*DIPODOPS ORDII.*

*DIPODOMYS AMBIGUUS.*

*Interorbital breadth at fronto-parietal suture.*

|   |   |
|---|---|
| = Distance from front of incisor to back of last molar.                   | Much longer than distance from front of incisor to back of last molar.    |
| = Distance from parietals to middle of nasals.                            | Longer than distance from parietals to middle of nasals.                  |
| = Distance from foramen magnum to front of molar series.                  | Much longer than distance from foramen magnum to front of molar series.   |
| Considerably less than distance from foramen magnum to incisive foramina. | About equal to distance from foramen magnum to incisive foramina.         |
| Less than distance from fronto-premaxillary suture to interparietal.      | About equal to distance from fronto-premaxillary suture to interparietal. |

*Breadth of orbital bridge of maxillary.*

|   |  |
|---|--|
| Much less than width of rostrum across widest part of premaxillaries. | = Breadth of rostrum across widest part of premaxillaries. |
|---|--|

*Expanded orbital bridge of maxillary.*

|   |  |
|---|--|
| Narrowly rounded off postero-laterally, without trace of projecting lobule. | Ending postero-laterally in a projecting lobule. |
|---|--|

*Post-palatal notch.*

|   |  |
|---|--|
| Reaching plane of interspace between second and third molars. | Barely reaching plane of middle of last molar. |
|---|--|

\* Bull. Am. Mus. Nat. Hist., N. Y., ii, 290-291. Separates issued February 21, 1890.



*DIPODOPS ORDII.**DIPODOMYS AMBIGUUS.**Length of nasal bones.*

|   |   |
|---|---|
| Much greater than inter-orbital breadth at plane of lachrymals. | Equal to interorbital breadth at plane of lachrymals. |
|---|---|

*Breadth of middle portion of basi-occipital.*

|  |   |
|--|---|
| About half, or less than half, its length. | Considerably more than half its length. |
|--|---|

*Tympanic capsule terminating anteriorly.*

|   |  |
|---|--|
| On same plane with inflated mastoid, the two together forming a uniformly rounded mass. | In a blunt projection below the inflated mastoid, the latter being concave or emarginate immediately above it. |
|---|--|

*Postero-superior angle of squamosal.*

|                  |                  |
|------------------|------------------|
| Broadly rounded. | Sharply angular. |
|------------------|------------------|

*Greatest vertical depth of inflated mastoid.*

|                     |                             |
|---------------------|-----------------------------|
| = Length of nasals. | Less than length of nasals. |
|---------------------|-----------------------------|

*Height of cranium above symphysis of audital bulla.*

|                         |                                      |
|-------------------------|--------------------------------------|
| = Interorbital breadth. | Much less than interorbital breadth. |
|-------------------------|--------------------------------------|

*Condylar process of mandible.*

|                         |                          |
|-------------------------|--------------------------|
| Twice as long as broad. | Nearly as broad as long. |
|-------------------------|--------------------------|

*Angular process of mandible.*

|  |  |
|--|--|
| Very long and sharp (distance from tip to tip much greater than distance from condyle to tip of incisors). | Relatively short and blunt (distance from tip to tip about equal to or slightly exceeding distance from condyle to tip of incisors). |
|--|--|

*Greatest breadth of cranium across inflated mastoids.*

|  |   |
|--|---|
| Exceeds distance from anterior lip of foramen magnum to alveolus of incisor. | Equals distance from anterior lip of foramen magnum to alveolus of incisor. |
|--|---|

*Greatest breadth across maxillaries.*

|  |   |
|--|---|
| Equals distance from occipital condyle to posterior border of incisive foramina. | Equals distance from occipital condyle to anterior border of incisive foramina. |
|--|---|

*Measurements (taken in the flesh) of Dipodomys ambiguus from El Paso, Texas.*

| National Museum No. | Original No. | Locality.         | Date.   | Sex.  | Total length. | Tail vertebræ. | Hind foot. | Remarks. |
|---------------------|--------------|-------------------|---------|-------|---------------|----------------|------------|----------|
|                     |              |                   | 1889.   |       |               |                |            |          |
| 18143<br>25041      | 768          | El Paso, Tex..... | Dec. 11 | ♂     | 252           | 147            | 38         |          |
| 18145<br>25043      | 775          | ...do.....        | Dec. 12 | ♂     | 236           | 141            | 33         |          |
| 18147<br>25045      | 782          | ...do.....        | Dec. 13 | ♂ ad. | 233           | 133            | 37         | Type.    |
| 18139<br>25037      | 783          | ...do.....        | Dec. 13 | ♂ ad. | 245           | 145            | 38         |          |
| 18146<br>25044      | 794          | do.....           | Dec. 14 | ♀ im. | 240           | 145            | 38         |          |
| 18148<br>25046      | 795          | ...do.....        | Dec. 14 | ♂     | 250           | 154            | 37         |          |
| 18149<br>25047      | 800          | ...do.....        | Dec. 15 | ♂ ad. | 257           | 155            | 39         |          |
| 18144<br>25042      | 801          | ...do.....        | Dec. 15 | ♀     | 248           | 152            | 38.5       |          |
| 18140<br>25038      | 806          | ...do.....        | Dec. 17 | ♂     | 261           | 154            | 39         |          |
| 18136<br>25034      | 807          | ...do.....        | Dec. 17 | ♂     | 251           | 150            | 38.5       |          |
| 18138<br>25036      | 818          | ...do.....        | Dec. 18 | ♀ im. | 210           | 111            | 39         |          |
| 18137<br>25035      | 808          | ...do.....        | Dec. 17 | ♀ im. | 250           | 149            | 38         |          |

### DIPODOPS ORDII Woodhouse.

Duplicate type No.  $\frac{18133}{25033}$  ♀ ad. U. S. National Museum (Department of Agriculture collection). From El Paso, Texas, December 11, 1889. Collected by Vernon Bailey. (Original number, 769.)

*Measurements* (taken in flesh).—Total length, 240; tail vertebræ, 134; pencil, 30; hind foot, 38. Ear from crown, 7; from anterior base, 12 (in dry skin). Length of hallux from heel, 20.

*General characters*.—Hind toes, 5; size, medium; form, stout and thick set, with a thick tail; tail, crested-penicillate on terminal third; general color, deep ochraceous-buff, brightest on the sides.

*Color*.—Upper parts from tip of nose to base of tail, and extending down outer side of leg to heel, deep ochraceous-buff varying to ochraceous, darkest on the back and brightest on the sides, not conspicuously mixed with black-tipped hairs except on the rump. Upper tail-stripe dusky from basal ring to extreme tip, the hairs white at base; under tail-stripe dusky, sometimes reaching and sometimes falling short of the dusky tip. Lateral tail-stripes white, reaching to or a little beyond end of vertebræ.

*Cranial characters*.—Compared with *Dipodomys ambiguus* from the same locality (El Paso, Tex.), the skull of *Dipodops ordii* is narrower

interorbitally; the length of the nasals is considerably greater than the interorbital breadth at plane of lachrymals; the expanded orbital bridge of the maxillary is shortly rounded off postero-laterally; the breadth of the frontals posteriorly is considerably less than the distance from the foramen magnum to the incisive foramina, and about equals the distance from front of incisor to back of last molar; the postero-superior angle of squamosal is broadly rounded; the height of cranium above symphyses of audital bullæ equals interorbital breadth at plane of lachrymals; the angular process of mandible is relatively long and sharp. The cranial characters of *Dipodops ordii* have been contrasted with those of *Dipodomys ambiguus* under the head of the latter animal.

*Measurements (taken in the flesh) of Dipodops ordii, from El Paso, Texas.*

| National Museum No. | Original No. | Locality.         | Date.            | Sex.   | Total length. | Tail vertebræ. | Hind foot. |
|---------------------|--------------|-------------------|------------------|--------|---------------|----------------|------------|
| 18142<br>25040      | 763          | El Paso, Tex..... | 1889.<br>Dec. 10 | ♂      | 231           | 133            | 38         |
| 18135<br>25033      | 769          | ...do.....        | Dec. 11          | ♀      | 240           | 134            | 38         |
| 18141<br>25039      | 781          | ...do.....        | Dec. 13          | ♂ ad.  | 240           | 138            | 37         |
| 18150<br>25048      | 802          | ...do.....        | Dec. 16          | ♂ juv. | 210           | 120            | 38         |
| 18134<br>25032      | 764          | ...do.....        | Dec. 10          | ♂      | 231           | 131            | 38         |

**DIPODOMYS SPECTABILIS sp. nov.**

Type No.  $\frac{17886}{24823}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From Dos Cabezos, Cochise County, Arizona, November 22, 1889. Collected by Vernon Bailey. (Original number, 695.)

*Measurements (taken in flesh).*—Total length, 350; tail vertebræ, 211; pencil, 30; hind foot, 52. Ear, from crown, 10; from anterior base, 16 (in dry skin).

*General characters.*—Largest of the genus, equaling or even surpassing *D. deserti* in size. Tail with hairs nearly twice as long as head and body and very handsome, having a long terminal brush of pure white surmounting a broad band of black; hairs on proximal half of tail short and appressed; of terminal half, long and free; at the same time the tail is not distinctly crested above as in several other species.

*Color.*—Upper parts, from nose to root of tail, ochraceous-buff mixed with black-tipped hairs, brightest and purest on the sides, palest on the cheeks, and mixed with clay-color on the head. Hip patch ochraceous, becoming dusky as it passes down the leg and dilating behind the ankle so as to form a large blackish spot which reaches the heel.



Supraorbital white spot obscured. Upper and lower tail stripes dusky, meeting a little behind the middle and forming a broad black subterminal band (occupying about one-third the total length of the tail), beyond which is a large terminal brush of pure white. The white side-stripes disappear a little beyond the middle of the tail.

*Cranial characters.*—Skull large and heavy for a *Dipodomys*. Inflated mastoids separated on top of the skull by about 3<sup>mm</sup>, so that there is a distinct interparietal, cuneate in shape. In *D. deserti*, the only species approaching *D. spectabilis* in size, the mastoids meet immediately behind the parietals, having at most an inconspicuous spicule between them. The two species differ further in the maxillary bridge of the orbit, which is fully a third broader in *spectabilis* than in *deserti*, and in the inter-orbital breadth of the frontal, which is much greater in the former. *D. deserti* has the flattest skull of any known member of the genus; in *D. spectabilis* it is higher and the mastoids are more rounded. In *D. spectabilis* the antero-posterior diameter of the orbit just outside of the lachrymal is equal to or less than the length of the fronto-maxillary suture, while in *deserti* it is much greater. In *D. spectabilis* the breadth of cranium across inflated mastoids equals the distance from anterior lip of foramen magnum to tips of upper incisors (falling far short of alveolus) while in *deserti* the mastoid breadth equals distance from same point to front of alveolus of upper incisor. In *D. spectabilis* the greatest breadth across maxillaries equals distance from occipital condyle to front of incisive foramina, in *deserti* to posterior border of same foramina. In *D. spectabilis* the condylar process of the mandible is broader and bent upward at a stronger angle than in *deserti*, and the transversely elongated angular process is very much longer.

*General remarks.*—This elegant species presents the darkest tail and richest coloration known in the genus, while its nearest relative (*D. deserti*) is distinguished from all others by the pallor of its colors. In some respects *D. spectabilis* resembles the type of the genus (*D. phillipsi*), but it is very much larger and requires no comparison with that species. *D. spectabilis* inhabits a wide range of country in the lower Sonoran faunal province. The Department of Agriculture series consists of thirty beautifully prepared skins and skulls (all collected by Mr. Bailey), from the following localities: Oracle, Calabasas, and Dos Cabezas, Ariz.; Deming and Albuquerque, New Mexico; Sierra Blanca, Tex.; and Magdalena, Sonora, Mexico. The largest specimens are from Albuquerque and may merit subspecific separation.

The following table of measurements affords an index to the variation in size in the several localities.

Measurements (taken in flesh) of thirty specimens of *Dipodomys spectabilis* from various localities.

| National Museum No. | Original No. | Locality.                | Date.            | Sex.   | Total length. | Tail vertebrae. | Hind foot. | Remarks. |
|---------------------|--------------|--------------------------|------------------|--------|---------------|-----------------|------------|----------|
| 16821<br>23732      | 139          | Oracle, Ariz.....        | 1889,<br>June 12 | ♂ ad.  | 353           | 206             | 52         |          |
| 16822<br>23733      | 140          | ...do .....              | June 12          | ♂ im.  | 341           | 202             | 51         |          |
| 16823<br>23734      | 141          | ...do .....              | June 12          | ♀ ad.  | 330           | 193             | 47         |          |
| 17745<br>24686      | 605          | Calabasas, Ariz .....    | Oct. 26          | ♂ ad.  | 325           | 187             | 50         |          |
| 17746<br>24687      | 606          | ...do .....              | Oct. 26          | ♀      | 313           | 170             | 40         |          |
| 17747<br>24688      | 610          | ...do .....              | Oct. 27          | ♂ ad.  | 325           | 196             | 44         |          |
| 17748<br>24689      | 611          | ...do .....              | Oct. 27          | ♀      | 315           | 184             | 48         |          |
| 17749<br>24690      | 612          | ...do .....              | Oct. 28          | ♀      | 325           | 194             | 45.5       |          |
| 17750<br>24691      | 614          | ...do .....              | Oct. 29          | ♂ ad.  | 340           | 200             | 52         |          |
| 17751<br>24692      | 615          | ...do .....              | Oct. 29          | ♀      | 330           | 200             | 50         |          |
| 17752<br>24693      | 616          | ...do .....              | Oct. 29          | ♀      | 325           | 195             | 48         |          |
| 17753<br>24694      | 617          | ...do .....              | Oct. 29          | ♂ ad.  | 333           | 198             | 48         |          |
| 17754<br>24695      | 618          | ...do .....              | Oct. 29          | ♀      | 335           | 204             | 47         |          |
| 22652               | 619          | ...do .....              | Oct. 29          | ♂ ad.  | 320           | 192             | 48         |          |
| 17886<br>24823      | 695          | Dos Cabezos, Ariz.....   | Nov. 22          | ♂ ad.  | 350           | 211             | 52         | Type.    |
| 17887<br>24824      | 702          | ...do .....              | Nov. 23          | ♀ im.  | 331           | 190             | 51         |          |
| 17888<br>24825      | 703          | ...do .....              | Nov. 23          | ♀      | 335           | 194             | 51         |          |
| 17889<br>24826      | 704          | ...do .....              | Nov. 23          | ♀      | 350           | 209             | 54         |          |
| 17820<br>24757      | 620          | Magdalena, Mexico.....   | Nov. 2           | ♀      | 320           | 183             | 48         |          |
| 17821<br>24758      | 621          | ...do .....              | Nov. 2           | ♂ ad.  | 320           | 187             | 48         |          |
| 17131<br>24064      | 226          | Albuquerque, N. Mex..... | July 23          | ♂ ad.  | 355           | 220             | 56         |          |
| 17133<br>24066      | 227          | ...do .....              | July 23          | ♂ ad.  | 390           | 236             | 57         |          |
| 17132<br>24065      | 230          | ...do .....              | July 24          | ♀      | 350           | 215             | 55         |          |
| 18019<br>24930      | 753          | Deming, N. Mex .....     | Dec. 5           | ♀ ad.  | 350           | 206             | 52         |          |
| 18065<br>24964      | 754          | ...do .....              | Dec. 6           | ♂ ad.  | 345           | 203             | 54         |          |
| 18066<br>24965      | 755          | ...do .....              | Dec. 6           | ♀ juv. | 226           | 123             | 48         |          |
| 18067<br>24966      | 756          | ...do .....              | Dec. 6           | ♂ juv. | 218           | 126             | 48         |          |
| 18092<br>24990      | 822          | Sierra Blanca, Tex.....  | Dec. 21          | ♀      | 365           | 217             | 55         |          |
| 18091<br>24989      | 849          | ...do .....              | Dec. 25          | ♀      | 333           | 196             | 52         |          |
| 18093<br>24991      | 851          | ...do .....              | Dec. 26          | ♂      | 294           | 160+            | 52         |          |

## DIPODOMYS CALIFORNICUS sp. nov.

Type No.  $\frac{16618}{23544}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From Ukiah, Mendocino County, California, May 4, 1889. Collected by Theodore S. Palmer. (Original number, 46.)

*Measurements* (taken in flesh).—Total length, 302; tail vertebræ, 183; hind foot, 43; pencil, 16. Ear, from crown, 9; from anterior base, 16 (in dry skin).

*General characters*.—Size medium, about equaling *D. agilis*; ears large; tail long, with a pure white pencil; tail crested penicillate, but crest not conspicuous; color darker than in any other known species of the group.

*Color*.—Upper parts from nose to band across thigh sepia-brown, suffused with pale ochraceous-buff, which is brightest on the sides. Thigh patches large, becoming dusky in passing down the legs, and forming a black spot behind and on the sides of the ankle. Eyelids black, supraorbital white spot distinct; black mark at base of whiskers large and distinct. Upper and lower tail stripes black, meeting a short distance in front of terminal pencil, which is pure white.

*Cranial characters*.—Top of skull considerably arched (relatively); mastoids about 3<sup>mm</sup> apart; interparietal not twice as long as broad; height of brain case above symphysis of audital bullæ considerably greater than breadth of united frontals between lachrymals; lachrymals large; expanded orbital bridge of maxillary broad; interorbital breadth at posterior border of frontals equal to distance from inferior lip of foramen magnum to center of crown of premolar; breadth across inflated mastoids equal to distance from occipital condyle to front of incisive foramina; greatest breadth across zygomatic processes of maxillaries equal to distance from occipital notch to nasals; angular process of mandible long and pointed.

*Measurements (taken in flesh) of Dipodomys californicus.*

| National Museum No. | Original No. | Locality.        | Date.             | Sex. | Total length. | Tail vertebræ. | Hind foot. | Remarks. |
|---------------------|--------------|------------------|-------------------|------|---------------|----------------|------------|----------|
| 16617<br>23543      | 32           | Ukiah, Cal ..... | 1889.<br>April 28 | ♀    | 287           | 170            | 44         |          |
| 16618<br>23544      | 46           | .. do .....      | May 4             | ♂    | 302           | 183            | 43         | Type.    |
| 16619<br>23545      | 47           | .. do .....      | May 4             | ♂    | 295           | 180            | 41         |          |
| 16620<br>23546      | 52           | .. do .....      | May 7             | ♂    | 305           | 181            | 43         |          |





DESCRIPTION OF A NEW POCKET GOPHER OF THE GENUS GEOMYS,  
FROM WESTERN NEBRASKA.

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By Dr. C. HART MERRIAM.

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Numerous specimens of pocket gophers received from the sand hills of western Nebraska differ from typical *Geomys bursarius* of the Mississippi Valley in paler coloration, and in never attaining the size of full-grown individuals of the latter species. For the present the new form will be treated as a subspecies as follows :

**GEOMYS BURSARIUS LUTESCENS** subsp. nov.

Type No.  $\frac{16677}{23555}$  ♀ ad. U. S. National Museum (Department of Agriculture collection). From Sand Hills, Birdwood Creek, Lincoln County, Nebraska, May 27, 1889. Collected by A. B. Baker.

*Measurements* (taken in flesh).—Total length 265; tail vertebræ 86; hind foot 33.

*Color*.—Upper parts uniform buffy-clay color except the nose, which is dusky. Under parts similar to the upper, but paler, and with the plumbeous basal fur showing through.

*Cranial characters*.—Compared with skulls of *Geomys bursarius* of the same size, *G. bursarius lutescens* is heavier, with more strongly developed ridges and processes. The inflated mastoids are larger, occupying a larger part of the occipital plane of the skull, and bulging further posteriorly. The audital bullæ also are somewhat larger.





DESCRIPTION OF A NEW SPECIES OF HESPEROMYS FROM SOUTHERN  
FLORIDA.

By Dr. C. HART MERRIAM.

In the spring of 1889, Mr. Morris M. Green, an assistant in the Division of Ornithology and Mammalogy, was sent to southeastern Florida for the purpose of studying its fauna and collecting the mammals and birds of the region. Among other specimens of interest he brought back a dozen skins and skulls of a large and highly-colored white-footed mouse, which has not been described. It belongs to a sub-tropical group, and is closely related to *Hesperomys floridanus* Chapman.\* Two were captured at Canaveral and ten at Lake Worth (on the east side of the lake). Mr. Green states that "they burrow in the sand and eat the seeds of scrub-palmettoes, but are most common in parts of the scrub where there are few scrub-palmettoes and many scrub-oaks." The new species may be known from the following description :

HESPEROMYS MACROPUS sp. nov.

(Plate III, teeth.)

Type No.  $\frac{1652113}{2}$  ♂ ad. U. S. National Museum (Department of Agriculture collection). From Lake Worth, Florida, May 5, 1889. Collected by Morris M. Green. (Original number, 72.)

*Measurements* (taken in flesh).—Total length 203; tail vertebræ 96; hind foot 29; pencil 2. Ear from crown 17; from notch 21 (in dry skin).

*General characters*.—Size large; hind feet very long. Soles naked to heel. Ears large and broad; tail of medium length, nearly naked, showing the annuli distinctly; a distinct pectoral spot; whiskers very long and stiff.

*Color*.—Upper parts buffy-ochraceous, brightest on the sides, and mixed with black-tipped hairs along the back, forming a distinctly darker dorsal area. Under parts, including sides of nose in front of whiskers, creamy-white, with a distinct ochraceous spot on the breast. Tail concolor, slightly paler below than above.

\* Bull. Am. Mus. Nat. Hist., N. Y., II, 3, 117. Separates issued June 7, 1889.

*Cranial characters.*—Skull very large and long (basilar length from occipital condyle to front of premaxillary 27.5; greatest length 30.5; length of molar series of teeth 4.2; interorbital breadth 4.6), its size alone being sufficient to distinguish it from any other species inhabiting the United States, not excepting *H. californicus*. The brain case is moderately arched above, and there is an indistinct supraorbital bead, which is continued posteriorly as a slight ridge along the parieto-squamosal suture. The rostral portion of the skull is long; the nasals long, narrow posteriorly, and extending backward considerably beyond the nasal branches of the premaxillaries. The incisive foramina reach the plane of the first molar; the palatal notch does not reach plane of last molar; the palatine foramina are situated opposite the second molar instead of on the plane of the interspace between the first and second. The zygomatic arches are very slender, broadest posteriorly, and dip down to the plane of the palate; in the dry skulls they curve in a little just in front of the widest part. The interparietal is narrower antero-posteriorly than in *H. leucopus* or *H. gossypinus*.

*General remarks.*—*Hesperomys macropus* requires comparison with but one species, *H. floridanus*. It differs from *floridanus* in color and in having larger ears (21 instead of 17.5 from notch), much longer hind feet (29 instead of 24), and larger and stiffer whiskers. No cranial comparisons can be made with *H. floridanus*, because the skull of the latter was not preserved.

I am indebted to Dr. J. A. Allen, curator of mammals and birds in the American Museum of Natural History, for the loan of the type specimen of *Hesperomys floridanus* for comparison with the present species.

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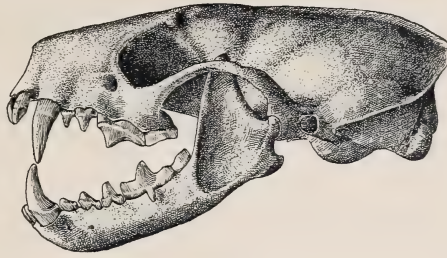
PLATE I.

(All natural size.)

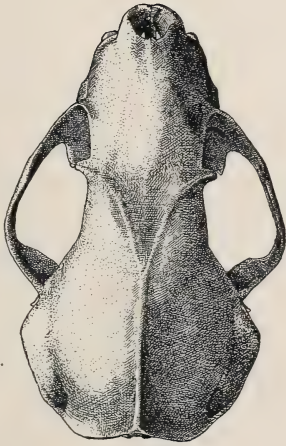
1-3. *Spilogale phenax* (No.  $\frac{2100}{1300}$ ) ♂ ad. Nicasio, California. *Type*.

4-6. *Spilogale leucoparia* (No.  $\frac{7498}{1378}$ ) ♂ ad. Mason, Texas.

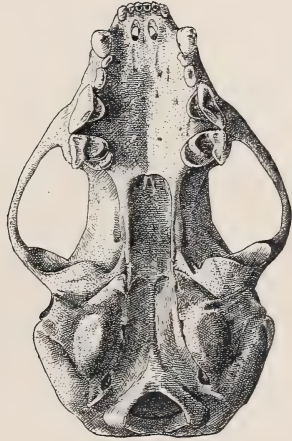
(Fig. 6 shows the inflated mastoid capsules from behind.)



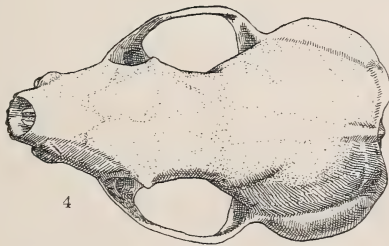
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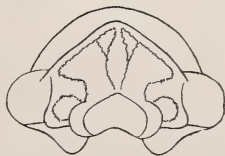
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1-3. *Spilogale phenax* sp. nov.

4-6. *S. leucoparia* sp. nov.

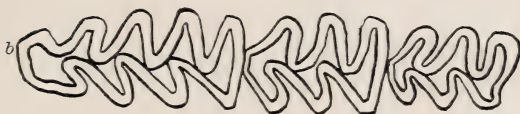
PLATE II.

(All magnified about 15 diameters.)

1. *Evotomys occidentalis* (No.  $\frac{24351}{14447}$ ) ♂ ad. Aberdeen, Washington. *Type*.
  - a. Upper molar series.
  - b. Lower molar series.
2. *Evotomys californicus* (No.  $\frac{23020}{17011}$ ) ad. Eureka, California. *Type*.
  - a. Upper molar series.
  - b. Lower molar series.
3. *Evotomys galei* (No.  $\frac{2202}{602}$ ) ♀ ad. Gold Hill, Colorado. *Type*.
  - a. Upper molar series.
  - b. Lower molar series.



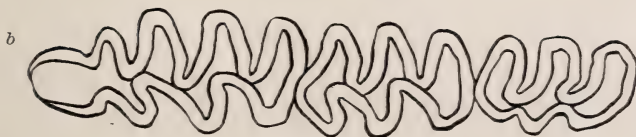
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3



1. *Evotomys occidentalis* sp. nov.

2. *E. californicus* sp. nov.

3. *E. galei* sp. nov.



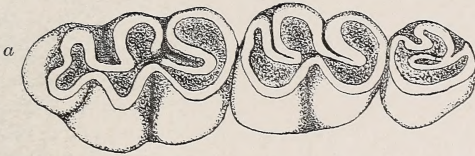
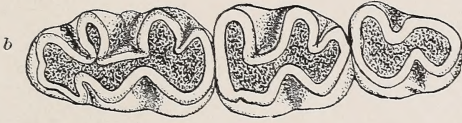
PLATE III.

(All magnified about 15 diameters.)

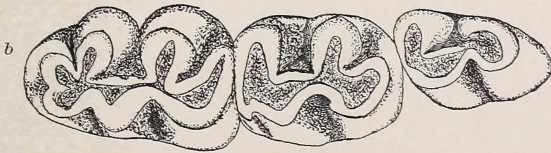
- 1 *Hesperomys macropus* (No.  $\frac{22513}{16382}$ ) ♂ ad. Lake Worth, Florida. *Type*.
  - a. Left upper molar series.
  - b. Left lower molar series.
2. *Hesperomys macropus* (No.  $\frac{22514}{16380}$ ) ♂. Lake Worth, Florida. (A younger specimen.)
  - a. Left upper molar series.
  - b. Left lower molar series.



1



2



*Hesperomys macropus* sp. nov.: fig. 1, type; fig. 2, a younger specimen.



DWARF SCREECH OWL.

(*Megascops flammeolus idahoensis* subsp. nov.)







