

ARTICLE XI.—*Notes on Collections of Mammals made in Central and Southern Mexico, by Dr. Audley C. Buller, with Descriptions of New Species of the Genera Vespertilio, Sciurus, and Lepus.* By J. A. ALLEN.

Since the publication, in October, 1889, of my report on the first collection of mammals made by Dr. Buller in Mexico, the American Museum has received from him two additional collections, containing many species not included in his first shipment, among them several apparently new to science. To make the list complete to date, all of the species thus far received from Dr. Buller are mentioned in the present paper, those contained in the former paper being here briefly entered, with a reference to the fuller record already published.

Dr. Buller's collection of mammals numbers 238 specimens, representing 46 species and subspecies, of which seven proved new to science. Several others were new to the fauna of Mexico, and the habitats of others are extended much beyond their previously known limits. Finally, it is safe to say, Dr. Buller's collection of Mammals is one of the most extensive and important ever received from Mexico from any single collector.

In the preparation of this paper I have been greatly indebted to Dr. C. Hart Merriam, Chief of the Division of Economic Ornithology and Mammalogy of the United States Department of Agriculture, for the loan of material, and especially for the opportunity of comparing some of the obscure species of *Vespertilio* and *Hesperomys* with the types of species recently described by him from Arizona, and also with De Saussure's types of all the latter's Mexican species of "*Hesperomys*," fortunately just at present in Dr. Merriam's possession, De Saussure's types having been generously loaned him by the authorities of the Musée d'Histoire Naturelle de Ville de Genève for examination. I am also indebted to Mr. F. W. True, Curator of the Department of Mammals in the United States National Museum, for the opportunity of examining other authentic specimens of De Saussure's species (some of them labeled by De Saussure himself), and also the type of Dr. Coues's *Hesperomys melanophrys*, as well as a good series of Merida specimens of *Lepus*.

1. **Ateles vellerosus** *Gray*.—Female, skin and skull, and male, skull, Chimalapa, Tehuantepec, March 17 and 26, 1890.

2. **Felis onca** *Linn.*.—Skull of a female from the coast range, below Colima, Jan. 15, 1890.

3. **Felis tigrina** *Erxl.*.—An imperfect hunter's skin, without data.

4. **Felis pardalis** *Linn.*.—An imperfect hunter's skin, male, Colima, Jan. 15, 1890.

5. **Felis yaguarundi** *Desm.*.—Two imperfect flat skins, without data.

6. **Putorius brasiliensis frenatus** (*Stew.*).—One specimen, Tepic. (See this Bulletin, II, p. 165.)

7. **Urocyon virginianus** (*Schreber*).—One specimen (without skull), male, Santo Domingo, Tehuantepec, April 25, 1890. It is much smaller than United States specimens, and more strongly colored throughout. It doubtless represents a form well worthy of subspecific recognition.

8. **Procyon lotor hernandezi** (*Wagler*).—One specimen, a female but little more than half grown, Tehuantepec City, Feb. 28, 1890. It agrees well with Arizona specimens in color, which differ much in this respect, as well as in size, from specimens from Eastern North America, and especially from Florida specimens.

9. **Vesperugo fuscus** (*Beauv.*).—Two specimens, males, Sierra de Colima, Jalisco, Dec. 7, 1890. (See also this Bulletin, II, p. 165.)

10. **Antrozous pallidus** (*Le Conte*).—Eleven specimens, one male and ten females, Sta. Cruz del Valle, Guadalajara, Jalisco, Sept. 7 and 8, 1889. Not appreciably different from specimens from Fort Verde, Arizona, collected by Dr. Mearns.

Not previously reported from south of the northern boundary of Mexico.

11. **Plecotus (Corinorhinus) townsendi** (*Cooper*).—One specimen, male, San Pedro, Guadalajara, September 27, 1889.

Not previously recorded from Mexico.

**12. *Atalapha cinerea* (Beauv.).**—One specimen, male, Hidalgo San Marcos, Tonila, Jalisco, Dec. 5, 1889. Apparently not different from California examples. (See also this Bulletin, II, p. 165.)

**13. *Vespertilio lucifugus* Le Conte.**—One specimen, male, Sierra de Colima, Jalisco, December 6, 1889.

**14. *Vespertilio nitidus* H. Allen.**—Two specimens, males, Sierra de Colima, Jalisco, Dec. 6, 1889. These specimens appear to be not typical, either in size or color, and their reference to this species is provisional.

**15. *Vespertilio velifer*, sp. nov.**

Size of *V. albenscens*, with nearly the coloration of *V. nitidus*, and the ears of *V. subulatus*.

Above basal two-thirds of the fur blackish, passing into dark broccoli brown at the surface; below much paler, the surface pale buffy gray. Pelage full and soft, extending on the membranes about as in *V. lucifugus*. Ears of medium size, similar in general form to those of *V. subulatus*, but rather narrower and more attenuate at the tip, the upper posterior third distinctly hollowed, the lower third abruptly much expanded; tragus long, rather narrow, fully or rather more than half the length of the ear, the front border nearly straight, the posterior border slightly rounded as far as a little beyond the middle, then sloping gradually to the rather narrow but rounded tip, with a distinct notch opposite the anterior base.

Wings from the base of the toes; calcaneum strongly developed; feet large; thumb short, stout, with a rather thick claw; tip of last caudal vertebra free.

Length of head and body (measurements from dry skin), 44 mm.; tail, 33; ear from base of inner margin, 14; tragus, 9; forearm, 42; thumb, 8; third finger (metacarpal, 38; 1st phal., 13; 2d phal., 12; 3d phal., 10), 73; tibia, 17; foot, 11.

Skull broad, rather short; basilar length 14; total length, 16; greatest width, 10.5; lower jaw (front border to condyle), 13. First upper premolar about twice the size of the second, both placed on the inner border of the tooth row.

Type, 2696, ♂ ad., Sta. Cruz del Valle, Guadalajara, Jalisco, Sept. 7, 1889, Dr. A. C. Buller.

Three specimens, one male and two females, and six additional skulls, Sta. Cruz del Valle, Guadalajara, Jalisco, Sept. 7 and 8, 1889.

These specimens agree very closely in size and coloration, and in all other characters, and represent an apparently new species,

quite different from any heretofore described. Its large size readily distinguishes it from any other known Mexican or North American species of the genus, except *V. albescens* Geoffroy, which it appears to equal in size, while differing from it almost as widely as possible in coloration, and also greatly in the size and form of the ear, and in the very differently shaped tragus. Fortunately a Maximilian specimen of *V. leucogaster* Wied, a species currently synonymized with *V. albescens* (see Dobson, Cat. Chir., pp. 326, 327), in the American Museum, enables me to make a direct comparison of *V. albescens* with the present species.

**16. *Vespertilio melanorhinus* Merriam.**—Seven specimens, four males and three females, Sierra Nevada de Colima, altitude 7500 feet, Jalisco, Dec. 6 and 7, 1889. "Taken while drinking at a water-trough."

The series varies in color above from golden brown to dull yellowish brown, irrespectively of sex, the brightest specimens, and also the darkest, including both males and females.

The series has been compared with the type of *V. melanorhinus*, to which the specimens seem distinctly referable.

**17. *Saccopteryx plicata* (Peters).**—This rare species, originally described from a Costa Rican specimen, and only once before reported from Mexico (*cf.* Alston, Biol. Centr.-Am., p. 29), is represented by two skins (males), and eleven specimens in alcohol, collected at Tehuantepec, Feb. 12, 1890. Of the thirteen specimens nine are males and four are females. In the latter the wing sac is rudimentary.

**18. *Nyctinomus brasiliensis* I. Geoffr.**—Nine skins and skulls and eight additional skulls, about equally divided between males and females, all from Sta. Cruz del Valle, Guadalajara, Oct. 5, 1889, except two, taken at San Pedro, Guadalajara, Oct. 16, 1889. There appears to be no sexual variation in size.

The length of the forearm varies from 39 to 43 mm., averaging 41.3. Traces of a gular pouch are distinctly seen in four of the five males, but there is no indication of it in any of the four females.

**19. *Pteronotus davyi* Gray.**—One specimen, male, Plains of Colima, Jan. 15, 1890.

**20. *Macrotus bulleri* H. Allen.**

*Macrotus californicus* J. A. ALLEN, Bull. Am. Mus. Nat. Hist., II, No. 3, p. 166 (Oct. 21, 1889).

*Macrotus bulleri* H. ALLEN, Proc. Am. Phil. Soc., XXVIII, p. 73 (April 14, 1890).

Five specimens (skins), three males and two females, and an additional skull, San Pedro, Guadalajara, Sept. 27, 1889. These are additional to the eleven specimens already recorded from Bolaños (l. c.), and provisionally referred to *M. californicus*.

The series from Bolaños, Northern Jalisco, were taken in July; the series from Guadalajara, Central Jalisco, were collected in September. There is no appreciable difference in coloration in the two series. Above the color is nearly uniform dark plumbeous, with the basal half of the fur pure white; below the color is much lighter and more grayish. The length of the forearm varies from 42 to 48 mm., averaging 45.

On sending the Bolaños specimens to Dr. H. Allen, the well-known specialist in Chiroptera, some time after the publication of my paper on Dr. Buller's first collection of Mexican mammals, Dr. Allen found them to be specifically different from *M. californicus*, and later described them as above cited.

**21. *Macrotus mexicanus* De Saussure.**

*Macrotus mexicanus* DE SAUSSURE, Rev. et Mag. de Zool., 2<sup>e</sup> Sér., XII, 1860, p. 486.

? *Macrotus bocourtianus* DOBSON, Ann. & Mag. Nat. Hist., 4th Ser., XVIII, 1876, p. 436; Cat. Chirop., 1878, p. 467.

Eight skins with skulls, eight additional skulls, and six specimens in alcohol, Tehuantepec City, Jan. 27, 1890.

This series of fourteen specimens differs strikingly in respect to coloration from the series of thirteen specimens from Bolaños and Guadalajara, State of Jalisco, but not appreciably in any other external feature. In both forms the basal half or two-thirds of the fur of the dorsal surface is pure white passing gradually into the darker color of the terminal portion, with the extreme tips of the hairs grayish. In *bulleri* the terminal third or more of the fur is dark plumbeous, varying from dark clove brown to plumbeous black; in *mexicanus* it is dark brown, varying from pale cinnamon to dusky chestnut. The same tints prevail respec-

tively below in the two forms, where, however, the basal white zone is more restricted, the dark subterminal portion is less deeply colored, and the gray tips of the hairs are longer. In *bulleri* the ears and wing-membranes are blackish; in *mexicanus* they are brown. The difference in the general coloration of the two forms is thus very striking, with no tendency to intergradations, so far as the material in hand is concerned.

A comparison of the skulls shows well-marked cranial differences between the two forms, the skull in *M. mexicanus* being much the larger, with the rostral portion much broader, and quite different in general contour.

The type of De Saussure's *M. mexicanus* came from Yautepec, in the *tierra caliente* south of the City of Mexico, and hence from a region physiographically very different from that inhabited by *M. bulleri*. His description appears to agree perfectly with the Tehuantepec specimens above referred to *M. mexicanus*.

*M. mexicanus*, *M. bulleri*, and *M. waterhousii* (*M. californicus* is not at hand for comparison), differ very markedly from each other in coloration, but only slightly in size or other external features. The ears appear rather larger in both *M. waterhousii* and *M. bulleri* than in *M. mexicanus*. *M. waterhousii* seems also to be slightly the largest of the three forms, and *M. bulleri* the smallest, the length of the forearm varying as follows: *M. bulleri*, 42 to 48 mm., averaging 45; *M. mexicanus*, 48 to 53, averaging 51; *M. waterhousii*, 51 to 53, averaging 52. In coloration *M. bulleri* is much the darkest and *M. mexicanus* the lightest and most rufescent, especially below. *M. waterhousii* is intermediate, being darker and less rufescent than *M. mexicanus*, but not nearly so dark above as *M. bulleri*, though of about the same tint below. *M. waterhousii*, however, differs from both the others in having the posterior third of the dorsal surface lighter and of a decided yellowish brown, in contrast with the sooty grayish brown of the rest of the dorsal surface, while in the others the whole dorsal region is concolor.

The length of the free portion of the tail varies in all; while generally only the last caudal vertebra is wholly free, not unfrequently half or more of the autepenultimate is also free. This is notably the case in both *M. waterhousii* and *M. mexicanus*. It

hence seems not improbable that *M. boucourtianus*, from Vera Paz, based mainly on this last feature, may be referable to *M. mexicanus*.

**22. *Sturnira lilium* (E. Geoffr.).**—One specimen, Sierra Nevada de Colima, Jalisco, Dec. 6, 1889.

This is apparently the first record for this species from any point north of Honduras and Costa Rica.

**23. *Artibeus carpolegus* Gosse (?).**

*Artibeus jamaicensis* DE SAUSSURE, Rev. et Mag. de Zool., 1860, p. 438.

*Artibeus perspicillatus* ALSTON, Biol. Centr.-Am., Mam., 1879, p. 47 (Mexican and Central American references).

Two specimens, male adult in alcohol, and female adult, skin, Santo Domingo, Tehuantepec, May, 1890. (For remarks on these specimens see this Bulletin, *antea*, pp. 170-172.)

**24. *Sciurus aureogaster* Cuv.**

*Sciurus aureogaster* F. CUVIER, Hist. des Mam., III, liv. lix, 1829; ALLEN, N. Am. Roden., 1877, p. 700; Bull. U. S. Geol. Surv., IV, 1878, p. 882 (in part).

*Sciurus variegatus* ALSTON, P. Z. S., 1878, 660 (in part—the "*aureogaster* type" only); Biol. Centr.-Am., Mam., 1880, p. 127 (in part, not the figure, pl. xi).

Two skins with skulls and one additional skull, Sarabia, Tehuantepec, Mexico, April 19, 1890.

These are very red examples of this form, the whole ventral surface being not only deep orange red, but the same color extends high up on the sides of the body and across the shoulders, so as to occupy the whole thoracic region from the nape to beyond the scapulæ, and including also both fore and hind limbs, except the feet, which are dark gray more or less mixed with dark red. The rest of the dorsal surface is varied with dark rufous, black, and white, the hairs being tipped with white, then ringed narrowly with black, and then broadly banded with deep chestnut red.

In Mr. Sennett's six specimens from near Tampico, to which I have previously referred (Bull. Am. Mus., II, p. 166), the hairs of the dorsal surface are much more broadly tipped with white, and the red of the ventral surface, while extending far up over the shoulders and covering the fore limbs, scarcely reaches the median dorsal line. It is worthy of note that Mr. Sennett's

specimens were taken in May, and that among them is a suckling, apparently only a few days old, which has the same pattern of coloration and about the same tints as the adults. These specimens of course represent the summer or breeding pelage.

## 25 *Sciurus leucops* (Gray).

*Sciurus aureogaster* GEOFFROY, Voyage de la Venus, Zool., 1855, p. 156, pll. x, xi (not *S. aureogaster* F. Cuvier, 1829).

*Macroxus leucops* GRAY, Ann. and Mag. Nat. Hist., 3d Ser., XX, 1867, p. 427.

*Sciurus leucops* ALLEN, N. Am. Roden., 1877, p. 753.

*Sciurus variegatus* ALSTON, P. Z. S., 1878, p. 660; Biol. Centr.-Am., Mam., 1880, p. 127, pl. xi (the "*leucops* type" only).

Six skins and skulls, Tehuantepec City, State of Oaxaca, Feb. 3 to March 9, 1890.

These specimens appear to typically represent the *Macroxus leucops* of Gray, described from "Oaxaca." The material now before me, taken in connection with that previously examined, leads me to resume the position I took in 1877 (N. Am. Roden., pp. 750-756) regarding the status of the forms then recognized as *S. aureogaster* and *S. leucops*, from which I have since wavered,\* in deference to Mr. Alston's conclusions.† The pattern of coloration in the two forms is very different, in *leucops* there being always a well-defined nuchal patch of rufous, and generally another rufous area on the rump, the latter, however, sometimes absent. While the color of the ventral surface may vary from pure white, through buff and pale yellow to golden and even orange rufous, it does not extend up the sides of the body at the shoulders, nor encroach upon the outer surface of the limbs, as in *aureogaster*, the line separating the colors of the dorsal and ventral surfaces being a straight line at the usual point in other mammals having the two surfaces differently colored. The skull, while of nearly the same size in the two forms, is much heavier and stronger in *aureogaster*, with the first premolar much larger and the dentition much heavier.

The six specimens from Tehuantepec City vary considerably in color above, and greatly in the color of the ventral surface. All have a large fluffy conspicuous white patch behind the ear (possibly disappearing later in the season). The nuchal patch is

\* Bull. U. S. Geol. Surv., IV, 1878, p. 882.

† P. Z. S., 1878, pp. 660-662.



strongly developed (about two inches long and nearly as broad), varying in color, however, from rather pale rufous mixed with gray to deep clear ferrugineous. The rump patch is less strongly colored, less clearly defined, and in two specimens is quite obsolete. The ventral surface in two specimens is grayish white; in a third faintly washed with buff; in a fourth deep yellowish buff; in a fifth orange rufous, and in the sixth deep orange rufous.

## 26. *Sciurus cervicalis*, sp. nov.

*Sciurus aureogaster leucops* ALLEN, Bull. Am. Mus. Nat. Hist., II, Art. XVI, Oct. 21, 1889, p. 166 (excluding synonyms).

Eight specimens, as follows: Sierra Nevada de Colima, Jalisco, Dec. 1-11, 1889, six specimens; Hacienda San Marcos, Volcan de Fuego, Tonila, Jalisco, Dec. 30, 1889, one specimen; Plains of Colima, Jan. 10, 1890, one specimen. These with four previously received and reported upon (l. c.) form a series of 12 specimens, collected during the months of December, January, April, and May. The series is remarkably uniform as regards coloration, in this respect May and December specimens being indistinguishable, while the range of individual variation is astonishingly narrow, and is covered by the remarks on the four specimens in my former paper on Mexican Mammals (l. c.).

In comparing the first four examples with a series of Tampico specimens of *S. aureogaster* I said, "it seems hardly possible that the two forms should be considered as conspecific, the style of coloration being so radically different. . . . In view, however, of former experience in respect to the variability of Mexican Squirrels, especially in color, it seems probable that Mr. Alston's view that the *S. leucops* is only a form of *S. aureogaster* Cuv., occupying a distinct habitat of its own, is correct."

I then reluctantly identified this form with *S. leucops*, under the name *S. aureogaster leucops*, noting, however, that it differed from any *leucops* specimens I had previously examined. I have since (thanks to Mr. Buller's excellent work) received specimens of true *leucops* from near the type locality, and also additional specimens of *aureogaster*. This new material shows that not only are *leucops* and *aureogaster* very distinct forms, each with its own habitat, but that the specimens from Jalisco then referred to *leucops* repre-

sent still another form very different from either. This may be characterized under the name above given, as follows :

Top of head black, generally varied more or less with gray, through the gray tipping of some of the hairs ; general color above dark gray, the hairs plumbeous at base, subterminally broadly ringed with black and narrowly tipped with white ; a broad nuchal patch, extending generally from the hinder portion of the crown to the shoulders, and more or less on to the sides of the neck, yellowish rufous varied with black, the hairs here being tipped with rusty instead of white ; a very broad area of the same color as the nuchal patch covers the lower back and rump, extending from a point opposite the hips to the base of the tail, and across from one hip to the other. (These patches vary somewhat in size and in the tone of the rufous, which varies from yellowish rusty to brownish rusty. In one specimen these patches are quite pale, and in another nearly obsolete, but in the other ten are conspicuously developed.) Below pure white, in summer pelage (May specimens) the hairs being pure white to the base, in winter specimens with the basal portion ashy. The tail, both above and below, is black, washed heavily with white, the hairs of the upper surface being generally wholly black from near the tip to the base, with a long white tip, those of the lower surface white at the extreme base, then narrowly ringed with black, followed by a narrow band of white, and this with a broad band of black and a long white tip. Feet varying from nearly pure white to grayish white ; ears gray varying to blackish, generally more or less tinged with rusty, with a white woolly patch at the posterior inner base, well developed in winter specimens.

*Measurements.*—Head and body, 250 mm. ; tail, 330 ; total length, 550–600 mm. (collector's measurements). Hind foot, 60–63 ; height of ear from crown, 18–20 (from skin).

Type, No. 1991, Hacienda San Marcos, Tonila, Jalisco, ♂ ad., May 14, 1889.

Summer and winter specimens appear to differ only in the pelage in winter being longer and softer than in summer, the fluffy white post-auricular patches better developed, and in the white of the ventral surface being somewhat grayish, from the basal portion of the pelage being ashy.

While both *S. leucops* and *S. cervicalis* have generally distinct rufous nuchal and rump patches, they are very different in the two forms, not only in color but in the position occupied by the rufous portion of the hairs composing these patches. In *S. cervicalis* the rusty tint is restricted to the tips of the hairs, and simply replaces the gray tipping of the hairs on the rest of the dorsal surface ; in *S. leucops* the tips of the hairs of the rump patch are gray, the rufous occupying the subterminal instead of the terminal color zone of the hairs, while in the nuchal patch the rufous occupies all but the extreme base of the hairs. In other words the subterminal color zone in *cervicalis* is black ; in *leucops* rufous.

Furthermore, in *cervicalis* the only rufous tint present is the tipping of the hairs of the nuchal and rump patches, while in *leucops* it more or less deeply suffuses the whole sub-apical portion of the dorsal pelage.

*S. cervicalis* ranges from the Plains of Colima (to which, according to Dr. Buller, it migrates in winter) up to the summits of the neighboring Sierras, some of the specimens being labeled as taken at an altitude of 12,000 feet, while *S. leucops* and *S. aureogaster* both come only from the *tierras calientes* of eastern and southeastern Mexico. These two occur together, however, in the neighborhood of Tehuantepec, as shown not only by the present collection, but by material which passed through my hands in 1876. Then, as now, I considered them distinct species.

Probably *S. cervicalis* has, like the next species, a rather restricted distribution, the specimens received from Dr. Buller being all from the mountains of Colima, except one taken in January, on the plains at the base of the Sierra.

## 27. *Sciurus nayaritensis* Allen.

*Sciurus alstoni* ALLEN, Bull. Am. Mus. Nat. Hist., II, No. 3, Art. XVI, Oct. 21, 1889, p. 167 (not *S. alstoni* Anderson, 1878).

*Sciurus nayaritensis* ALLEN, Bull. Am. Mus. Nat. Hist., II, No. 4, Feb. 1890, p. vii.

No specimens have been received since those already described (l. c.). Attention, however, should be called to the change of name, published Feb., 1890, in "Additions and Corrections" to Volume II of this Bulletin, that originally given proving to be preoccupied.

## 28. *Spermophilus grammurus macrourus* (Bennett).—

Three specimens, male and female adult, and a young (half-grown) female, Zapotlan, Jalisco, Dec. 13, 17, and 23, 1889. (See also this Bulletin, II, p. 170.) These scarcely differ from the four April specimens previously recorded, although taken at the opposite season of the year. They bear out all that was claimed for this subspecies in my former paper.

29. *Spermophilus spilosoma* Bennett. — Two specimens, Zacatecas. (See this Bulletin, II, p. 172.)

**30. *Spermophilus annulatus* Aud. & Bach.**—In addition to the single specimen recorded in my former paper (this Bulletin, II, p. 172), Dr. Buller has sent eight others, two males and six females, and three additional skulls, collected at the Hacienda Nogueras, Colima, Nov. 13–15, 1889.

Dr. Buller adds to his former notes as follows: "Local name, *Tesmo*. Said not to occur above Ranch 'El Trapiche,' on road between Colima and Tonila. Below Colima ranges to the base of coast range, to where sand commences. Lives in holes in sides of dykes. Also in stone walls and walls of barns, in the vicinity of habitations. Food, maize, and seeds of *Pasta Christi*."

The extremes of the series vary somewhat in depth of color, the light tipping of the hairs of the dorsal surface varying from buff to yellowish rufous, with corresponding differences in the intensity of color of the sides of the neck, limbs, and ventral surface.

### 31. *Tamias bulleri* Allen.

*Tamias asiaticus bulleri* ALLEN, Bull. Am. Mus. Nat. Hist., II, No. 3, Art. XVI, Oct. 21, 1889, p. 173.

*Tamias bulleri* ALLEN, *ibid.*, III, No. 1, Art. IV, June, 1890, p. 92.

Eight specimens, Sierra de Valparaiso, Zacatecas (see this Bulletin as cited above). The later collections contain no additional specimens.

**32. *Mus rattus* Linn.**—Two adult males, Zapotlan, Jalisco, Dec. 17 and 21, 1889. (See also this Bulletin, II, p. 179.)

**33. *Mus alexandrinus* E. Geoffr.**—One adult male, Zapotlan, Jalisco, Dec. 20, 1889.

**34. *Mus musculus* Linn.**—Four specimens, Tehuantepec City, Feb. 12 and May 12, 1889.

**35. *Neotoma ferruginea* Tomes.**—Four specimens: three females, Tehuantepec City, Feb. 27 and 28; one male, Santo Domingo, Tehuantepec, April 25, 1890.

### 36. *Sigmodon hispidus berlanderi* (Baird).

*Hesperomys (Deilemys) toltecus* DE SAUSSURE, Rev. et Mag. de Zool., 2<sup>e</sup> Ser., XII, 1860, p. 98.

Four specimens, Colima Plains, Jan. 5–11, 1890; one specimen, Santo Domingo, Tehuantepec, May 1, 1890.

These specimens seem to be indistinguishable from De Saussure's types of his *Hesperomys toltecus*, from the "Cordilière de la province de Vera Cruz," which, through the kindness of Dr. C. Hart Merriam, I have had an opportunity to examine.

**37. *Sigmodon fulviventor* Allen.**—One specimen, Zacatecas. (See this Bulletin, II, p. 180.)

**38. *Hesperomys leucopus sonoriensis* (Le Conte).**—See this Bulletin, II, p. 180.

**39. *Hesperomys aztecus* De Saussure.**—Two specimens, Jalisco. (See this Bulletin, II, p. 179.)

A comparison of these two specimens (shown by the skulls to be not fully mature) with two of De Saussure's three original specimens of this species, shows their former reference to *H. aztecus* to have been correctly made. They are a little smaller than De Saussure's specimens, but agree with them almost exactly in color and in all external details.

**40. *Hesperomys melanophrys* Coues.**

*Hesperomys mexicanus* ALLEN, Bull. Am. Mus. Nat. Hist., II, p. 179 (not *H. mexicanus* De Saussure).

The single specimen, from Zacatecas, formerly reported (l. c.), has since been compared with De Saussure's type of *H. mexicanus* and found to be very different. On the other hand, it agrees well with the type of Coues's *H. melanophrys*, to which species it is now referred. *H. mexicanus* and *H. melanophrys* prove on comparison to be very different species.

**41. *Hesperomys (Nyetomys) sumichrasti* De Sauss.**—Five specimens, three adult males, one adult female, and one immature female, Santo Domingo, Tehuantepec, April 24 to May 1, 1890. The young specimen differs from the adults in being yellowish ashy above instead of golden cinnamon.

These specimens have been compared with De Saussure's types (see above, p. 175), with which they strictly agree.

**42. *Oryzomys conesi* (Alston).**—One specimen, adult male, Hacienda San Marcos, Tonila, Jalisco, Dec. 30, 1889.

**43. *Lepus sylvaticus aztecus*, subsp. nov. .**

Smaller than *L. sylvaticus* of the Eastern States, with much longer ears (in this respect resembling *L. arizonæ*), and lighter in coloration.

Length (measurements from skins) of head and body, 300 mm. ; tail to end of hairs, 37 ; length of hind foot, 82 ; height of ear from notch, 64.

Top of head and middle of back buffy cinnamon varied with black, the hairs light plumbeous at base, subterminally ringed with pale buffy cinnamon and tipped with black ; sides gray, the hairs ashy at base, broadly ringed with white and tipped with black ; sides of neck brownish, nearly like the middle of the back ; large nape spot and outer surface of limbs bright yellowish rufous ; upper surface of fore feet yellowish white, of hind feet pure white, which extends upward in a narrow band along the inner anterior edge of the leg to the inner side of the thigh ; lower surface pure white, nearly to the base of the hairs ; breast band yellowish white, the hairs brownish beneath the surface ; a well defined supra- and subocular grayish white stripe, meeting in front and behind the eye, giving the effect of a broad grayish white band through the eye, from near the nose to the base of the ear ; cheeks gray, with a small spot of rusty brown below the eye ; upper surface of the tail light cinnamon rufous, the same color extending forward on to the rump, the hairs plumbeous (in some specimens dusky plumbeous) at the base broadly tipped with light rufous. Ears very large, scantily haired, dark brownish gray, darkening to blackish towards the tip and along the anterior border externally ; anterior border towards the base fringed externally with white.

*Cranial Characters.*—Skull, basilar length, 56 mm. ; total length, 72 ; breadth at middle of zygomatic arch, 35 ; at base of occiput, 23, at postorbital constriction, 12 ; nasals, length, 33, breadth at anterior border, 10, at posterior border, 17 ; length of malar bone, 31 ; length of upper molar series along the crowns, 12, at alveolar border, 14 ; lower jaw, length from front to angle, 53, height at condyle, 36.

The posterior end of the postorbital process is in contact with the brain-case, but not fused with it. In general features the skull is similar to that of *L. sylvaticus*, differing from it merely in being rather smaller than average northern skulls.

Type,  $\frac{3116}{1488}$ , ♂ ad., Tehuantepec City, Feb. 19, 1890.

Three adult males, skins and skulls, and one additional skull, as follows : Salina Cruz, Feb. 17, Sta. Maria Petapa, April 29, Santo Domingo, April 30, 1890, Isthmus of Tehuantepec ; Tehuantepec City, Feb. 19, 1890.

This form differs from *L. sylvaticus* in having the middle of the dorsal surface much paler, the sides grayer, and the upper surface of tail and rump cinnamon rufous instead of dusky gray, and in the very much larger size of the ears. In respect to the size of the ears it closely resembles *L. arizonæ*, but differs from it in much larger size, and greatly in coloration, through the almost entire absence in the latter of any rufous in the coloration of the upper surface.

#### 44. *Lepus insolitus*, sp. nov.

Similar in general appearance externally to *Lepus sylvaticus*, but much paler in color, much larger, and with much larger ears, but especially different in the structure of the malar bone, which is exceptional in its character. Also generally similar in size and color to *L. vera-crucis* Thomas, recently described from Vera Cruz, but apparently different.

Length (of skin), 440 mm. ; tail to end of hairs, 40; hind foot to end of claws, 92; height of ear from notch, 74, above crown, 78.

Above sandy buff mixed with black, more grayish on the sides, black prevailing over most of the dorsal region, hairs at base dark plumbeous, ringed with black, then with sandy buff, and tipped with black; nape patch and fore limbs externally from shoulder to carpus deep rufous; upper surface of fore feet brownish yellow; hind limbs posteriorly and externally yellowish brown; upper surface of hind feet white, continuous with a whitish band running up the front inner edge of the leg; light area surrounding the eye buffy gray; upper surface of tail and contiguous portion of rump pale rusty brown, the hairs plumbeous at extreme base and slightly black tipped; ears sparsely haired, externally rusty brownish gray, blackish along the edge towards and at the tip; internally ears naked to near the tip, where they are sparsely covered with yellowish brown hairs for the terminal fifth; ventral surface pure white, the hairs wholly clear white to the base; a faint wash of yellowish along the sides bordering the white ventral area; breast pale yellowish brown, plumbeous beneath the surface. Feet not heavily furred.

Skull, basilar length, 66 mm. ; total length, 83; greatest width (opposite anterior end of orbital foramen), 39; interorbital breadth, 21; intertemporal breadth, 20.5; nasals, length, 34, width anteriorly, 12, posteriorly, 18.5; length of malar bone, 36; length of palatine foramen, 21; least length of palatal bridge, 8, width, 11.5; length of upper molar series at crown surface, 22.5; length of lower jaw, 58; height at condyle, 40.

Type,  $\frac{3}{1}\frac{3}{1}\frac{3}{1}$ , ♂ ad., Plains of Colima, Jan. 15, 1890.

A second specimen (♀ ad., near City of Colima, Jan. 7, 1890), agrees essentially in size, but is in thin, very worn pelage, and is less black above, doubtless owing to the wearing away of the long black tips of the hairs.

While in a general way strongly resembling externally both *L. sylvaticus* and *L. vera-crucis*, it differs from the former in much larger size, disproportionately larger ears, the less amount of rufous and greater prevalence of black above; and from the latter in the whiteness of the ventral surface, and in other minor details of coloration. It differs from all of the species of *Lepus* known to me in the peculiar structure of the malar bone, which is formed on the general pattern of that of *Lepus aquaticus*, with, however, its peculiarities greatly exaggerated. Externally for its anterior

half both the upper and lower borders are greatly produced, especially the lower, which is somewhat everted or deflected upward and incurved, the two produced borders thus forming between them a deep groove on the external surface of the anterior half of the malar bone, the groove being deepest anteriorly and there partly covered by the incurved lower edge of the malar. The square process occupying the anterior fourth of the malar in the *L. sylvaticus* group is in effect extended backward, gradually narrowing till it becomes obsolete posterior to the middle of the malar bone. The form of this bone is thus very different in the two species when viewed either from below or from the side. The postorbital processes touch the brain-case at tip but are not fused with it, as in the *L. aquaticus* group.

In accordance with the great development of the external ear, the auditory bullæ are correspondingly enlarged.

The only species with which this needs comparison is apparently the *Lepus verae-crucis*, from the opposite coast of Mexico.

**45. *Tatusia novemcincta* (Linn.).**—Male, Volcan de Fuego, Tonila, Jalisco, Dec. 27, 1889.

**46. *Didelphys (Micoureus) murina* Linn.**—Six specimens, four males and two females, Santo Domingo de Guzman, Tehuantepec, April 25 to May 2, 1890.

These specimens are doubtfully referred to this species, which they resemble in size. None of them, however, have the general color above "bright rufous," or "deep dull rufous," as described respectively by Alston and Thomas. Some are clear ashy, others ashy brown, with a very faint fulvous or exceedingly slight rufescent tinge.

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**Additional Notes on Mexican Leporidae.**—Since the above was put in type I have had opportunity, through the kindness of Mr. F. W. True, Curator of the Department of Mammals in the United States National Museum, of reexamining specimens of *Lepus* from Merida, Yucatan, and Mirador, Mexico, referred by me in 1877 (N. Am. Roden., pp. 365 and 361) respectively to *Lepus aquaticus* and *L. palustris*.



***Lepus sylvaticus aztecus* Allen.**

Five adult and two young specimens of *Lepus*, belonging to the U. S. National Museum, from Merida, Yucatan, collected by Dr. A. Schott in February and March, 1865, were formerly referred by me (N. Am. Roden., pp. 365-367) to *Lepus aquaticus*. Three of these specimens are now before me, and while externally much resembling *L. aquaticus*, a skull, now for the first time removed from one of the skins for examination, shows that they are not *L. aquaticus* but referable to my *L. sylvaticus aztecus*, described on page 188 of the present paper, with which these specimens are found to agree in both external and cranial characters. The skins were badly prepared and somewhat overstuffed, and without recourse to the skull might readily be mistaken for *L. aquaticus*, the coloration being nearly the same, and the feet very scantily furred for a member of the *L. sylvaticus* group. Other specimens collected at Mirador, by Dr. Schott, and forming part of the same collection, were referred by me to *L. sylvaticus*, as were specimens from Tehuantepec, collected by Mr. F. Sumichrast (l. c., pp. 330 and 336). The latter series included a number of skulls, which served for the ready identification of the Tehuantepec series. Although these specimens are not now accessible for reexamination, I have little doubt of their being referable to the form here recognized as *L. sylvaticus aztecus*. A part of the Orizaba specimens are referable to the following species :

***Lepus verae-crucis* Thomas.**

*Lepus verae-crucis* THOMAS, P. Z. S., 1890, p. 74, pl. vii.

*Lepus aquaticus* ALLEN, N. Am. Roden., 1877, p. 364 (in part, Orizaba specimens only).—ALSTON, Biol. Centr.-Am., Mam., p. 180 (Dec. 1880), in part, or so far as based on the preceding.

A reexamination of the Orizaba specimens referred by me in 1877 (l. c.) to *L. aquaticus* shows, on removal of the skull from the skin, that they belong to the *L. sylvaticus* type instead of to *L. aquaticus*. I have little doubt that they are identical with what Mr. Oldfield Thomas has recently described as *Lepus verae-crucis*, based on specimens from Las Vigas, Jalapa, a locality not far from Orizaba. In general size and in external characters it closely resembles my *L. insolitus*, described above, but the skull

is very much broader, and the form of the malar bone very different. Both species somewhat resemble *L. aquaticus* externally, but are readily separable from it and from each other by the cranial characters.

***Lepus truei*, sp. nov.**

? *Lepus palustris* TOMES, P. Z. S., 1861, p. 281 (Dueñas, Guatemala).

*Lepus palustris* ALLEN, N. Am. Roden., 1887, p. 360 (in part, the Mirador specimen only).—ALSTON, Biol. Centr.-Am., Mam., p. 179 (Dec. 1880), so far only as based on the above.

In 1877 a single specimen of *Lepus* from Mirador was referred by me (l. c.) to *Lepus palustris*. This was the only specimen thus referred, or then known to me, from any point outside of South Carolina and Georgia. Florida has since been added to its known range, but it has not yet been found at any point in the Gulf States west of Florida, where considerable collecting has since been done. Hence the single record from so remote a point as Mirador, Mexico, has of late seemed open to serious question. I am hence much gratified to be able to revise the record by a reëxamination of the Mirador specimen. It is in poor condition, but is still available for study. The skull having just now been removed by my request, it proves to represent a very distinct type of the genus, so far as cranial characters are concerned. Externally it so much resembles *L. palustris*, that on seeing it again after a long interval the question arose as to whether its alleged Mirador origin might not have resulted from a transposition of labels. As soon, however, as the skull became available it was evident that the resemblance of the Mirador specimen to *L. palustris* was wholly superficial, and limited to external characters. It differs, however, somewhat from *L. palustris* in coloration, as stated in my former reference to it, as follows: "By far the most highly-colored specimens is one from Mirador (near Vera Cruz), Mexico, in which the black is considerably more prevalent than in average specimens from the Atlantic States. The grayish area below is also more restricted and more suffused with brownish." Mr. Alston quotes this (l. c.), and adds: "The same remarks apply to an example contained in Mr. Salvin's Guatemalan collections in the British Museum," the specimen here referred to being the one mentioned by Tomes (l. c.), from

Dueñas. These two specimens are apparently all thus far referred to *L. palustris* from Mexico or Central America, or from any point outside of the lowlands of the coast region of South Carolina and Georgia, and the peninsula of Florida.

In now describing this new form, it gives me pleasure to name it in honor of the Curator of Mammals at the U. S. National Museum, to whose kind offices I have been many times indebted.

Similar to *L. palustris* in all external characters, except that it is rather darker in color, and much more varied with black above, which is almost the prevailing tint over much of the dorsal region. Feet quite as scantily furred as in *L. palustris*. The skin is unfilled, and hence satisfactory measurements cannot be taken. (The feet have been partially denuded by insects.) It is evidently smaller than average full grown specimens of *L. palustris*. Length of hind foot, 75 mm. ; of fore foot, 40 ; height of ear from crown, 54 ; from notch, 46.

*Cranial Characters.*—The skull is imperfect, lacking most of the occipital portions. It shows the animal to have been fully adult. In dorsal outline it much resembles skulls of *L. sylvaticus aztecus*, except that the cranial portion is more depressed posteriorly ; the frontal and parietal bones much pitted, as in *L. palustris* and *L. aquaticus*. The postorbital processes are slender, and barely touch the cranium posteriorly, thus enclosing a large broadly oval foramen. The zygoma is broad and short, flattened below anteriorly and not much expanded, with the sinus on the lateral face anteriorly about as in *L. sylvaticus*. The zygomatic and mastoid portions are vertically much expanded, the zygoma being thus much shorter and relatively much broader than in any of the allied forms ; with a length of 28 mm. the vertical breadth is 4.5, against 30 and 4 respectively in *L. sylvaticus aztecus*, and 34 and 3.5 in *L. palustris* of corresponding general size. The teeth are broad, the middle upper molars having a transverse breadth at the crown surface of 4 mm. against a total length of the upper molar series of 12. The palatal region is very broad (distance between inner base of middle molars 12.5), with a very short palatal bridge (6 mm.) ; there is a slender spiny process on the anterior border, with, however, no trace of any on the posterior border. The palatal walls are widely separated, forming a broad U-shaped arch instead of the narrower and more sharply V-shaped arch of *L. palustris* and other allied forms. The basisphenoid stands at about the usual angle with the axis of the skull, and the basioccipital lies in the same plane, instead of forming, as in allied species, an obtuse angle with the basisphenoid. The nasal bones are much flattened and much less than half as much arched in front as in any allied form. The posterior half of the brain-case is very abruptly depressed, in conformity to the depressed plane of the basioccipital below. The middle portion of the skull is very broad in comparison with the width of the brain-case, or with the total length of the skull.

The following are the principal measurements : Basilar length, 57 mm. ; total length (?) ; greatest breadth (at zygomatic arch), 35 ; least interorbital breadth,

25 ; palatal breadth at middle of palatal bridge, 11 ; length of nasals, 27 ; width of nasals posteriorly, 14 ; width at anterior border, 10 ; length of zygoma, 28 ; length of upper molar series at alveolar border, 14 ; length of lower jaw (?) ; height at coronoid process, 32.

Type,  $\frac{6887}{26953}$ , U. S. Nat. Mus., Mirador, Mexico ; C. Sartorius.

It hence appears that thus far no authentic specimens of either *L. palustris* or *L. aquaticus* are known from Mexico, the habitat of the former being, so far as now known, Florida and the coast region of Georgia and the Carolinas, and of the latter, the Gulf coast of the United States, from western Alabama to Texas, and thence northward in the cane-brake region to southern Illinois. Their introduction into the list of Mexican mammals, so far as the present writer is concerned, is due to the fact that the skulls of the Mexican specimens referred to these species were not removed from the skins for examination, the determinations being based on external characters, which proved very misleading.





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