

ARTICLE XVI.—*Notes on a Collection of Mammals from Southern Mexico, with Descriptions of New Species of the Genera Sciurus, Tamias, and Sigmodon.* By J. A. ALLEN.

The Museum has recently received a small but very important collection of mammals, made for it by Mr. Audley Buller, during a journey "from Tepic across the Sierra de Nayarit and adjoining ranges of the Sierra Madre to Zacatecas, a distance of over 1000 miles....through one of the most inaccessible and least known parts of this country." The specimens were therefore not collected in a single district, "but over a large extent of country, including some regions where no white man, much less a collector, has ever before penetrated." Mr. Buller further writes that mammals were few in species and scarce. The collection numbers 45 skins, with their skulls, and 10 additional separate skulls, representing 16 species. Of these three are apparently new. One of the finest acquisitions is a specimen (skin and imperfect skull) of the rare *Spermophilus annulatus* Aud. & Bach., previously known only from the original specimen (from an unknown locality, and long since lost), and a single specimen in the U. S. National Museum, collected by Mr. John Xantus on the Plains of Colima, Mexico, in 1863, and described by me in 1867.* Other novelties are a new species of *Sciurus*, a species of *Sigmodon*, and a very distinct new form of *Tamias*, which extends the habitat of the last-named genus several hundred miles south of any point whence it has hitherto been reported.

1. *Putorius brasiliensis frenatus* (Stew.).—This species is represented by a male, taken at Tepic, June 10, 1889.

2. *Atalapha cinerea* (Beauv.).—One specimen, male, Hidalgo San Marcos, Tonila, Jalisco, May 12, 1889.

3. *Vesperugo fuscus* (Beauv.).—Two specimens, male and female, Sierra de Valparaiso, Zacatecas, Aug. 2, 1889. These specimens are quite different from United States examples, particularly in coloration.

4. *Vespertilio* (sp. allied to *nigricans*).—One specimen, male, Hidalgo San Marcos, Tonila, Jalisco, May 8, 1889.

* Mon. N. Am. Rodentia, pp. 886-889.

5. *Macrotus californicus* Baird.—Eight skins and skulls, and three additional skulls, all males. Bolaños, Jalisco, July 3, 1889. "Occurs in immense numbers in the adits and old mine drifts of the Mineral de Bolaños. Of the fourteen captured all were males, whereas in the case of other kinds of bats taken here females generally predominate." (*Audley Buller*, MS. notes.)

In the absence of specimens for comparison, it is difficult to say certainly whether they are the same as California specimens. Judging by descriptions, they seem somewhat darker in color.

6. *Sciurus aureogaster leucops* (Gray).

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

Sciurus leucops ALLEN, Mon. N. Am. Rod., 1877, p. 753.

Sciurus aureigaster ALLEN, Bull. U. S. Geol. and Geogr. Surv., IV, 1878, p. 882 (in part).

Sciurus variegatus ALSTON, P. Z. S., 1878, p. 660; Biol. Centr. Am., Mam., p. 127, June, 1880 (in part—"the *leucops* type" only).

Four specimens, as follows: male and female, Sierra Nevada de Colima, Zapotlan, Jalisco, April 6, 1889; female, Hidalgo San Marcos, Tonila, Jalisco, May 12; male, same locality, May 14. These specimens, all fully adult, differ very little in color, all being pure white below, and dark pure gray above, with the top of the head blackish, the nape and rump rusty, the pelage very soft and full, and the tail very bushy. In all the rusty nape and rump patches are well defined, but vary in shade of color. No. 1989, ♀, shows less rust than the others; No. 1991, ♂, has the largest patches of this tint. Aside from the nape and rump patches the pelage above is dusky tipped with white, with no trace of any subterminal yellowish ring, as noted in specimens from Tehuantepec and Durango (see Mon. N. Am. Rod., pp. 753-755); otherwise, especially in the white belly, they appear to agree with Durango specimens (l. c., p. 754), particularly those with no yellow in the tail.

Compared with a series of specimens of *S. aureogaster* in Mr. Sennett's collection from Tampico, it seems hardly possible that the two forms should be considered as conspecific, the style of coloration being so radically different, the Tampico specimens being also much smaller. In view, however, of former experience

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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.

Mr. Buller writes to me that he thinks the Sierra Nevada de Colima is probably the northern limit of this species, as he found none in the Sierra de Nayarit. "The flesh," he says, "tastes so strongly of turpentine that it is almost uneatable. They build nests of sticks in the pines, and were nesting in April and May. In winter they come down lower to the foothills."

7. *Sciurus alstoni*, sp. nov.

A series of six skins with skulls and two additional skulls represents a species of *Sciurus* I have never before seen, the premolars being $\frac{1}{1}$ instead of $\frac{2}{1}$, as in all of the other large Mexican *Sciuri* I have hitherto examined. It is of the maximum size, with a very long and very bushy tail, large, broad ears, and the dental formula of the Fox Squirrels of the United States. The only other Neotropical *Sciuri* with the premolars $\frac{1}{1}$ are of small or medium size, and range only from Central America southward.

CHARS. SPECIF.—Size and proportions of *Sciurus fossor*. Length of body (skins), 260 to 304 mm. (10.25 to 12 in.); tail vertebræ, 254 to 287 mm. (10 to 11.25 in.); tail to end of hairs, 320 to 381 mm. (13 to 15 in.). Above the surface of the pelage is pure gray, the hairs being tipped broadly with white and subterminally ringed rather broadly with black; below the surface the hairs are pale rusty brown nearly to the base, this color forming a broad band occupying one-half to two-thirds the length of the hairs, which at the extreme base are rather pale, more or less yellowish, plumbeous, which is also the color of the abundant underfur. Belly and whole lower parts, as well as the inner surface of both fore and hind limbs, pure white to the base. The color of the dorsal surface extends low down on the sides of the body, and is abruptly defined against the pure white of the ventral surface. The outer surface of the fore limbs is much lighter than the back, the white tips to the hairs being longer, till, on the lower arm and manus, the general color is whitish, with less black below the surface, and the basal portions pale yellowish white. The

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outer surface of the hind limbs is similar, the toes being nearly pure white, while the dark color below the surface is more apparent on the top of the feet. Soles of all the feet naked. Top of the head rather darker than the back, with less fulvous beneath the surface. Eye-ring and sides of the nose white, grayish white, or yellowish white. Ears broad, high, rounded at the top, nearly naked internally, sparsely covered with short grayish hairs externally, and with a small, not strongly defined patch of soft, fulvous, or pale yellowish white hairs at the posterior base. Tail full and bushy, the hairs very long; above mixed black and white; sides, both above and below, very broadly fringed with white; below, centrally, cinnamon rufous, varying somewhat in intensity in different specimens, occupying one-third to one-half of the basal portions of the hairs, which are thus broadly white at the tip, rufous at the base, with a broad intervening band of black.

Type, No. 1985, Am. Mus. Nat. Hist., ♂ ad., Sierra de Valparaiso, Zacatecas, July 27, 1889. Coll. Audley Buller.

Of the six skins of this species four are fully adult, while two belong to animals not quite fully grown, the first premolar of the milk dentition being still in place, with the permanent one showing beneath it. There is, however, very little difference in coloration between any of the series, as already indicated in the foregoing description, except that several of the specimens are in much worn pelage, in which the white tips of the hairs of the lower back, rump, and base of the tail are more or less worn away. As all of the specimens were taken in July and August (July 14 to August 3), the above description is of course that of the summer pelage. The following is a list of the specimens, with dates and localities of capture.

Skin.	Skull.	Sex.	Locality.	Date.
1983	1252	♂	S. de Nayarit (S. Madre), Jalisco.....	July 14, '89.
1984	1253	♀	" " " "	" 14, '89.
—	1280	♂	" " " "	" 14, '89.
1985	1254	♂	S. de Valparaiso, Zacatecas.....	" 27, '89.
1986	1255	♀	" " " "	" 27, '89.
1987	1256	♂	" " " "	" 27, '89.
1988	1257	♂	" " " "	Aug. 3, '89.
—	1289	♂	" " " "	July 27, '89.

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In general size and length of tail this species ranks with *S. niger* (and its varieties), *S. fossor*, and *S. arizonensis* of the United States, and *S. griseoflavus* and *S. hypopyrrhus* of Mexico and Central America. It is, however, most nearly allied to the Fox Squirrels (*S. niger* group) of the United States, with which it agrees in having only one upper premolar, and in the pattern of coloration of the tail, by which characters it is sharply separated from each of the other above-mentioned species. It has, however, no very close relationship to any of the Fox Squirrels, as shown by the character of the ear, which is fully twice as large as in any form of *S. niger*.

The skull, in size, form, and general character, much resembles the skull of *S. niger ludovicianus*, but certain minute differences in the position and form of some of the foramina and sutures render the two types readily separable. The absence of a minute second upper premolar renders *S. alstoni* easily separable from all of the larger Mexican *Sciuri*. In respect to external characters, this species evidently somewhat resembles in color *S. griseoflavus* (Gray), as defined by Alston (P. Z. S., 1878, p. 660) and Gray, except that the lower parts are white instead of yellowish red (a not important difference, in view of the usual variability of Mexican Squirrels in this respect), and the tail has only one broad black lateral band on each side instead of several narrow ones. As Mr. Alston observed, *S. griseoflavus* is obviously closely related to *S. arizonensis*, of which it may be only a southern form; in which case it can have no close affinity with *S. alstoni*. Neither Gray nor Alston gives the dental formula of *S. griseoflavus*, nor any measurements, or has anything to say respecting the size of the ears. The Mexican Squirrels generally have large ears in comparison with those of the more northern species, but in *S. alstoni* they attain a size much larger than in any other Mexican species I have seen (*S. griseoflavus* is the only one I have not examined). In *S. alstoni* the ear is both high and broad, being fully twice the dimensions of the ear in *S. niger ludovicianus*, the height ranging from 23 to 25.5 mm. (.90 to 1.00 in.), and the width at base from 21.5 to 24 mm. (.85 to .95 in.). In *S. hypopyrrhus* the ear is high, narrow, and pointed, and while nearly as high as in *S. alstoni*, the breadth is fully a third less.

I take pleasure in naming this apparently very distinct species in memory of the late Mr. E. R. Alston, who has done so much to increase our knowledge of the mammals of Mexico and Central America, and especially in elucidation of the Neotropical *Sciuri*.

Of this species Mr. Buller writes: "Very plentiful in the Sierra de Bolaños, a part of the Sierra de Nayarit, at an altitude of 7,500 to 8,000 feet. Habits apparently similar to those of *S. leucops*, which species it may replace north of the Sierra Nevada de Colima."

8. *Spermophilus grammurus macrourus* (Benn.).

Spermophilus macrourus BENNETT, P. Z. S., 1833, p. 41; "DUGÉS, La Natureleza, I, p. 137."

"*Spermophilus grammurus*? SAY," DE SAUSSURE, Rev. et Mag. de Zool., 2d sér., XII, 1860, p. 36.

Mr. Buller's collection contains four specimens (three males and one female, all adult), from Zapotlan, State of Jalisco, which represent a form quite distinct from *Spermophilus grammurus*, as the latter is found in Colorado, Texas, New Mexico, and Arizona. The general color above is blackish, mixed with gray or brownish gray, darkest on the anterior half of the body, with a rather distinct almost pure blackish crown. The general blackish effect is produced by the dark rings of the individual hairs of the dorsal surface being much blacker and much broader than in true *grammurus*, with less gray at the tips. The tail is very full and bushy, the individual hairs with four zones of deep black, instead of three (sometimes only two) of blackish, as in *grammurus*. The lower surface is also much darker than in *grammurus*, owing to the dusky basal portion of the hairs being darker and more extended. The ears are much lower and more rounded.

In respect to size this form is as large as the largest specimens of *grammurus*, thus somewhat exceeding the average size of the latter. The skull averages 4 mm. (.15 in.) longer, and slightly broader, than in *grammurus*, with a much longer tooth-row and heavier dentition. The length of the upper molar series in *macrourus* is 13.5 mm. (.53 in.), against 10 mm. (.44 in.) in *gram-*

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murus, with the breadth of the individual teeth proportionately greater, giving a conspicuously more massive dentition.*

In general appearance *macrourus*, through the grizzled blackish coloration of the upper surface and the low rounded ears, is very different from any hitherto described form of *grammurus*. Its dusky appearance does not indicate a tendency to melanism, while if it should be so considered, the other differences serve to clearly distinguish it from any of its allies, unless it be Mr. Bryant's *S. grammurus atricapillus*, recently described† from Lower California. The description, however, is too brief to give a clear conception of the characters of *atricapillus*. It has nothing in its general appearance to suggest any close relationship with *S. grammurus beecheyi*.

This subspecies seems to be beyond question the *Spermophile* described long since (P. Z. S., 1833, p. 41) by Mr. Bennett under the name *Spermophilus macrourus*, Mr. Buller's specimens closely agreeing with Mr. Bennett's description. In 1877 (Mon. N. Am. Roden., pp. 827, 832) I referred rather confidently *S. macrourus* to *S. grammurus beecheyi*, mainly on the supposition that the original specimens came from California, the habitat being given as "from that part of California which adjoins to Mexico." The late Mr. Alston has since examined Mr. Bennett's type in the British Museum, which he refers to as "from Western Mexico," and which he considers as "a somewhat dark example of the typical form of *S. grammurus*." Dr. Dugés has also already recorded *Spermophilus macrourus* from the Mexican States of Jalisco and Guanajuato. De Saussure also evidently describes (l. c.) this form under the name "*Spermophilus grammurus?* Say."

Mr. Buller says (MS. notes): "Habitat, stone walls close to public roads and in vicinity of habitations. They appeared to me decidedly darker in color, and in other respects slightly different from the species commonly found in the neighborhood of Guadalajara, specimens of which I hope to send you later."

* In this connection it is interesting to note that in *grammurus* proper the dentition becomes heavier from the north southward, Colorado specimens having much smaller teeth than specimens from near the Mexican border of Texas and New Mexico, as shown by the measurements given of the skulls of *grammurus* in "North American Rodentia," p. 834, table LXXXII.

† Proc. Cal. Acad. Sci., 2d ser., Vol. II, 1889, p. 26.

9. *Spermophilus annulatus* Aud. & Bach.—A single specimen (No. 1980, Am. Mus. Nat. Hist.) in Mr. Buller's collection, a female, taken at San Blas, Territorio de Tepic, May 1, 1889, agrees perfectly with my description* and recollection of the only specimen of this rare species known to me to be extant. This was taken by Mr. John Xantus on the Plains of Colima, Western Mexico, in 1863 (No. 7018, U. S. Nat. Mus.). I have nothing to add to the account already given (l. c.) of the external characters of the species. The skull accompanying this skin is unfortunately incomplete, lacking the basal and hinder portions of the cranium, and thus nearly useless for purposes of measurement. The remaining portion of the skull shows conclusively that the species is a member of the subgenus *Otospermophilus*, where I formally provisionally placed it (l. c., p. 821), and that its nearest allies are the *S. grammurus* group. The first upper premolar is very slender, not more than one-fifth or one-sixth the size of the second. The anteorbital portion of the skull is rather short, and the interorbital portion very broad.

This specimen, Mr. Buller informs me, was given him by Mr. W. B. Richardson, who, by Mr. Buller's request, has kindly written me as follows: "I noticed this species from San Blas to Santiago (the only two places I visited on the coast). It frequents the silk-cotton and other large trees, nesting in holes of those trees, and living on the wild fruit and nuts found in the hot coast country. Eastward, after leaving the borders of the mangrove swamps and on the ascent to the higher country, I never saw any. I met with them only around the dense mass of vines and tangled brush that climb around the larger trees. I shot three, and intend to send the other two to Mr. Sennett."

10. *Spermophilus pilosoma* Benn.—This is another of the species of mammals described by Mr. Bennett, in 1833, "from that part of California which adjoins to Mexico." Mr. Buller's collection contains two specimens of this still rare species, taken August 17, 1889, at Zacatecas. This extends the range of the species considerably southward of its previously known point of occurrence—namely, Janos, Sonora.

* Mon. N. Am. Rod., p. 886.

Mr. Buller says (MS. notes): "Were taken on the plateaux about 5,600 feet above sea level, near the city of Zacatecas, where they occur in great numbers."

11. *Tamias asiaticus bulleri*,* sp. nov.

The greatest surprise afforded by Mr. Buller's collection is perhaps a fine series of specimens of a form of the genus *Tamias*, this genus having not heretofore been reported from any point much south of the northern boundary of Mexico. Indeed, the late Mr. Alston, as recently as 1882 (Biol. Cent. Am., Mam., p. 134) could point to no "direct evidence" of its occurrence in Mexico, and therefore excluded the genus from his enumeration of the mammals of that country. Since then we have received specimens of *T. a. dorsalis* from near the southern boundary of Arizona, and a form nearly allied to *T. a. quadrivittatus* has been taken in Northwestern Mexico. It now turns out that the genus *Tamias* is represented by a peculiar and hitherto undescribed form in the Sierra de Valparaiso, State of Zacatecas, where it is said by Mr. Buller to be "very abundant."† His collection contains nine specimens, eight of which are represented by both skins and skulls, and one by only a skull.

DESCRIPTION. — Average measurements, taken from skins: length of head and body, 127 mm. (5.00 in.); tail vertebræ, 98 mm. (3.85 in.); tail to end of hairs, 125 mm. (4.93 in.); hind foot, 33.5 mm. (1.32 in.); height of ear from occiput, 37.3 mm. (.47 in.); breadth of ear at base, 37.3 mm. (.47 in.). Ears large, rather high, very broad, and broadly rounded at the tip, instead of pointed as in several of the allied forms; dull rusty within and on the anterior external border nearly to the tip; posterior external border grayish (sometimes fulvous) white, passing forward so as to broadly margin the whole top of the ear; between these two bands, at the base of the ear, is a broad triangle of black, the apex of the triangle reaching as far as the distal third of the ear, the exterior surface of the ear being thus sharply tricolored. Top of the

* Named for Mr. Audley Buller, in recognition of his intelligent and important field work in gathering the material forming the basis of the present paper.

† He says: "They live in hollow trees, but come down to the ground to feed." He has seen none of these Squirrels south of Sierra de Valparaiso, which he thinks forms their southern limit.

head grayish brown with a slight admixture of rusty. Behind the ear an oblong, broad, conspicuous patch of grayish white, about two-thirds as large, but not so clear white, as in *T. macrorhabdotes* Merriam. Whole sides of the body, buttocks, and upper surface of the tail pale olivaceous gray, a little more mixed with black on the tail, and slightly more fulvous on the sides of the body in front of the hind quarters, and more whitish on the sides of the neck. Dorsal region with five dark and four light stripes; the three median dark bands deep black, very slightly mixed with rufous at their edges; the two outer dark stripes (one on each side) much shorter (extending only from the shoulders to the hips) dark rufous brown, often bordered sharply with black on their upper border, and usually not trenchantly defined below, but shading gradually into the pale olivaceous fulvous of the sides. The two middle light stripes are gray, mixed with rusty on the edges; the two outer light stripes grayish white, or nearly pure white. The median black stripe begins at the anterior border of the crown and runs to the base of the tail; the black stripe on either side of this begins at the shoulder and reaches a point a little behind the hips. Sides of the nose, cheeks, under parts, and the upper surface of fore and hind feet soiled white, or olivaceous grayish white, this color extending on to the fore-arm, and running back on the inner edge of the hind feet to the heel; posterior upper surface and outer edge of the heel dusky gray or blackish. Lower surface of the tail dull yellow in the middle, bordered on either side and at the tip narrowly with black, with the tips of the hairs olivaceous gray. The tail itself is very narrow and thin. The facial markings are as follows: a broad superciliary stripe of white, running from the nose to the anterior base of the ear; above this and immediately bordering it is a narrower but sharp line of black, of similar extent, this line joining its fellow at the nose, where they form a conspicuous V-shaped mark. Below the superciliary stripe is a broad ocular stripe of black, forming behind the eye a broad oblong patch of black, more or less mixed with rusty at its posterior border. This post-ocular spot, 6.4 mm. (.25 in.) by 10 mm. (.40 in.) in area, is a strikingly distinctive feature. Below the black ocular stripe is a very distinct subocular stripe of white, which runs from the sides

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of the nose posteriorly, joining without break the large white spot behind the ear. Below this subocular white band is a narrow but well-defined streak of deep rusty brown mixed with black, the amount of black varying somewhat in different specimens.

The skull shows no distinctive features by which *T. a. bulleri* can be separated readily from any of its near allies, except *macrorhabdotes*.

Types, Nos. 1972 and 1973, Am. Mus. Nat. Hist., ♀ ♀ ad., Sierra de Valparaiso, Zacatecas, August 2, 1889. Coll. Audley Buller.

Several of the skins are those of adult females; others are rather young, but nearly or quite full grown, the distinctness of the skull sutures indicating juvenility. The skulls give an average length of 36.6 mm. (1.44 in.), and an average greatest breadth of 23 mm. (.83 in.), the length ranging from 35.6 mm. (1.40 in.) to 37.6 mm. (1.48 in.). Probably a series of fully adult skulls would average about 38 mm. (1.50 in.). The form is thus decidedly larger than *T. quadrivittatus*, and distinctly smaller than either *dorsalis* or *townsendi*.

In markings and tone of coloration the series is remarkably uniform. In the younger specimens the pelage is softer and fuller, with slightly more rufous on the sides of the body and edges of the dorsal and facial streaks.

The broad, sharply contrasting light and dark facial markings, particularly the large black patch between eye and ear, and the almost entire absence of fulvous or rufous on the sides of the body, and the distinctly tricolored convex surface of the ear, are the strong distinctive marks of *T. a. bulleri*. In its narrow terete tail, and in the general character and color of the dorsal streaks, it most resembles *T. quadrivittatus*, from which in other respects it differs strongly. In its large ears, large postauricular spot of white, and small amount of rufous on the sides it somewhat resembles *T. macrorhabdotes*, from which, however, it differs in its narrow tail, blacker and less rufous dorsal and facial stripes, etc. *T. a. bulleri* more nearly resembles an unnamed form from the San Bernardino Mountains in Southern California, which I propose to call *T. merriami* (see below), in the tone of the ground colors of the body and in the facial markings. Thus No. 1967, a young male from Zacatecas, is in most respects similar to No. 1150, a 1889.]

female, from the San Bernardino Mountains, the two differing, however, on close comparison, in various important points. Another (No. 1311) from Donner, Cal., is also quite similar. Yet the San Bernardino series as a whole is very different from the Zacatecas series, and presents a wide range of variation in respect to the coloration of the dorsal surface, one phase shading strongly toward *T. macrorhabdotes*, the other in the direction of *T. dorsalis*. Another series from Donner, Placer Co., Cal., seems to be intermediate between *macrorhabdotes* and *quadrivittatus*, not only in general coloration, but in the form of the ears and the distinctness of the postauricular spot.

The pale San Bernardino form may be diagnosed as follows :

***Tamias asiaticus merriami*,* subsp. nov.**

Size large ; colors pale ; the facial and dorsal markings not strongly contrasted ; the ears high, pointed, and narrow ; the postauricular spot small, gray, and comparatively inconspicuous. The gray of the sides, buttocks, and middle pair of light dorsal stripes has a pale olivaceous cast instead of rufous. The lower surface of the middle of the tail is deep rusty red.

Type, No. 1157, ♀ ad., San Bernardino Mts., Cal., June 10, 1887. Coll. F. Stephens.

The general color above is dull yellowish gray, mixed slightly on the middle of the sides of the body and in the dark dorsal and facial streaks with fulvous. The dorsal streaks are all very pale, the lower dark streak on each side being pale yellowish brown, but little darker than the general ground color of the dorsal surface ; the lower (outer) light band (on each side) is pale gray, and thus quite distinctly outlined against the darker color on either side. The submedian dark streaks are pale fulvous brown, slightly mixed with blackish posteriorly, and clearly defined only between the shoulders and hips. The median light streaks are pale yellowish gray like the general surface above. The median dorsal streak runs from the crown to the base of the tail, rather indistinct and of a pale yellowish brown as far as the posterior border of the scapular region, and thence posteriorly more distinct, being

* In honor of Dr. C. Hart Merriam, so well known for his excellent work in North American Mammalogy.

much mixed with blackish. The dark facial streaks are pale brown, with only a very slight admixture of blackish. No. 1158, ♀ ad, is similar, except in being slightly paler.

Three young specimens, one-half to two-thirds grown, agree essentially in coloration with the adults. The pelage is of course much softer, and the facial and dorsal markings a little sharper.

The two adults measured in the flesh, according to the collector's notes, as follows: No. 1158, ♀ ad., head and body, 5.40 in.; tail vertebræ, 4.40 in.; tail to end of hairs, 5.60 in. No. 1157, ♀ ad., head and body, 5.50 in.; tail vertebræ, 4.80 in.; tail to end of hairs, 6.00 in. The height of the ear is 12 to 12.7 mm. (.47 in. to .50 in.); the length of the hind foot, 33 mm. (1.30 in.).

All of the specimens were collected in the San Bernardino Mountains, Cal., June 10 to 14, 1887, by Mr. F. Stephens.

T. a. merriami may best be compared with *T. a. townsendi*, with which it nearly agrees in size and general style of markings, differing from it greatly, however, in its excessively pallid tints, and higher, narrower, more pointed ears. In its pale tints and tendency to obsolete markings it recalls *T. a. dorsalis*, though differing from it widely in all details. The general ground color resembles that of *T. a. bulleri*, from which it is sharply separated by the distinctness of the facial and dorsal markings of the latter, and in various minor points. It is much larger than *T. a. pallidus*, and although a pallid form, differs widely from true *pallidus* even in coloration.

Other specimens from the San Bernardino Mountains, collected by Mr. Stephens at the same time and place with those above described, are very different, being almost exactly intermediate between *T. a. macrorhabdotes* and *T. a. quadrivittatus*, some of them making a strong approach to the former, with which I at first identified them before receiving specimens of true *macrorhabdotes*. They are much larger than *quadrivittatus*, with ears three times as large, the dorsal stripes not continued so far posteriorly, and the shade of rufous on the sides and back of a very different tint. Specimens from Donner, Placer Co., Cal., collected by Mr. C. A. Allen, are exactly similar. This seems a well-marked form, nearer to *macrorhabdotes* than to any other, which eventually may require recognition by name.

1889.]

As Dr. Merriam has remarked: "That this genus [*Tamias*] is peculiarly susceptible to environmental influences is amply attested by the number and perplexing characteristics of the incipient species already known from the United States."* In 1877† I considered the various North American forms of the *T. quadrivittatus* group as subspecies of *Tamias asiaticus* of Siberia, of which I then recognized five American subspecies, as follows: (1) *borealis*, (2) *quadrivittatus*, (3) *pallidus*, (4) *townsendi*, and (5) *dorsalis*, to which have been since added (6) *macrorhabdotes*, (7) *bulleri*, and (8) *merriami*. That these are all offshoots of a single circumpolar species seems to be beyond question. While we may not have now at hand all of the connecting links, it seems highly probable that they still exist, and that it is only a question of time and the further accumulation of material when we shall know the number of these forms desirable to name, their exact distribution, and their relationship. Many well-marked and easily definable forms will be found confined to very limited regions, and to peculiar environmental conditions. Years since, when working with a large but very inadequate amount of material, I was much puzzled by local forms, which I was then reluctant to name, but which now it seems to me would be a progressive step to recognize in our nomenclature.

The so-called *townsendi* of Northern California is a very different animal, for example, from the true *townsendi* of the coast region of British Columbia and the adjoining coast region of Washington and Oregon, whence came the original specimens on which *townsendi* was based. The *Tamias* from the coast region of Northern California seems to be already provided with a name, in the *hindsii* of the late Dr. J. E. Gray, who kept it separate from *townsendi* in his review of the genus in 1867, with apparently good reason. This form may thus well stand as

***Tamias asiaticus hindsii*, (Gray).**

Tamias hindei (err. typ.) GRAY, Am. Mag. Nat. Hist., X, 1842, p. 264.

Tamias hindsii GRAY, Zoöl. Voy. Sulphur, 1844, p. 34, pl. xii, fig. 1; Ann. and Mag. Nat. Hist., 3d ser., XX, 1867, p. 435.

* Proc. Biol. Soc. Washington, Vol. III, p. 28.

† Mon. N. Am. Rod., pp. 779-809.

It differs from true *townsendi* in much smaller size, the much redder brown of the dorsal surface (dark reddish brown instead of pale yellowish brown), a larger and whiter postauricular spot, and the greater whiteness of the lower light-dorsal bands.

There are thus at least three, if not four, well-marked forms in the State of California alone,—*hindsii* from the northern coast region, *macrorhabdotes* from the Sierra Nevada Mountains, *merriami* from the San Bernardino Mountains, and a form between *macrorhabdotes* and *quadrivittatus* along the eastern border of the State. The Black Hills of Dakota, the Unitah and Bitterroot Mountains, and the plains of British Columbia each furnish peculiar forms, while the so-called *pallidus* and *quadrivittatus* inosculate in distribution over a wide area. The *dorsalis* type, of the arid regions of the southwest, presents an extreme phase, in its gray color, long, pointed ears, heavy, broad tail, its single well-defined dorsal stripe, broad fulvous subterminal zone of the pelage of the upper surface of the body, and in certain cranial characters. Probably the geographically far-removed *bulleri* will not prove to be wholly isolated from the others in habitat, nor from some of its allies in details of structure and coloration.

12. *Mus rattus* Linn.—A single specimen, about one-third grown, from Zapotlan, Jalisco, April 27.

13. *Hesperomys mexicanus* De Sauss.—One specimen, ♂ adult, from Sierra de Valparaiso, Zacatecas, collected July 27, I confidently refer to De Saussure's *H. mexicanus*, with which *H. melanophrys* Coues is probably identical, as he has himself suggested.

14. *Hesperomys aztecus* De Sauss.—Two specimens, both adult males, collected in the Sierra Nayarit, Jalisco, July 15, seem unquestionably referable to this species, agreeing perfectly with De Saussure's description. Whether Dr. Coues's series from Cape Saint Lucas, Lower California (Mon. N. Am. Rod., pp. 101, 102) are the same seems open to question, both geographically and on various obvious points of difference, particularly of coloration. The tail in *aztecus* is distinctly bicolor, not dull grayish, unicolor, as in the Cape Saint Lucas specimens.

1889.]

15. *Hesperomys leucopus sonoriensis* (Le Conte).—A single mummified specimen, in very bad condition, agrees with *H. leucopus sonoriensis*, so far as the characters can be distinctly made out. It was collected at Zapotlan, Sierra Nevada de Colima, Jalisco, at an altitude of 13,500 feet, April 6, 1889.

16. *Sigmodon fulviventor*, sp. nov.

Type (and only specimen), No. 1975, Am. Mus. Nat. Mus., ♂ ad., Zacatecas, Mex., Aug. 17, 1889. Coll. Audley Buller.

Size of *S. hispidus*, but lighter and browner above, and ochraceous buff below instead of white; tail unicolor and, with the ears externally, well covered with hair, instead of naked. Pelage heavy, long, and very coarse, rather rigid, distinctly bristly on the sides of the neck and cheeks. Above strong yellowish brown, varied with lighter and slightly mixed with black, the general color being bright yellowish brown, a little darker on the middle of the back, and passing gradually on the sides into the strong ochraceous buff of the whole lower surface. Ears densely covered externally with short hairs, sharply bicolor vertically, the anterior half yellowish gray, the posterior half blackish or sooty. Fore and hind limbs strong buffy, feet above yellowish gray. Tail unicolor, blackish, slightly mixed with yellowish gray, the hairs dense and wholly concealing the annulations.

Head and body, 162.6 mm. (6.40 in.); tail, 108 mm. (4.25 in.); hairs at tip extending 7.5 mm. (.30 in.) beyond vertebræ; height of ear, 12.7 mm. (.50 in.); length of hind foot, 33 mm. (1.30 in.).

Compared with *S. hispidus*, the dusky basal portion of the under pelage of the dorsal surface is narrower, and the subterminal yellowish zone broader and more strongly yellowish brown. On the ventral surface the hairs are ochraceous nearly to the base, only the extreme base being pale plumbeous, and entirely concealed,—not seen through the surface, as in *S. hispidus*.

S. hispidus berlandieri, from Corpus Christi, Texas (Mr. Sennett's Coll.), differs from *S. hispidus* proper in being a little paler and grayer, with the tail and ears quite as naked as in *S. hispidus*. There is thus no approach in *S. h. berlandieri* to *S. fulviventor*, which differs from all other described forms of *Sigmodon* in its

[October,

more hispid pelage, strongly yellowish brown upper parts, ochraceous lower parts, and the densely clothed ears and tail.

The skull is imperfect, lacking the basal portion of the cranium and the angular portion of the rami. The dentition shows the specimen to have been fully adult. No appreciable differences are noticeable between the portions of the skull intact and the corresponding parts in the skull of *S. hispidus*.

S. hispidus (i. e., *berlandieri* et *toltecus*) has been reported from various points in Mexico, and southward to Veragua and Dueñas. Dr. Coues admitted both *berlandieri* and *toltecus* as possibly tenable subspecies, but his diagnoses of them show clearly that the specimens he had in hand from Southern Mexico and Guatemala have no near relationship with the above-described *S. fulviventer*. Neither does Mr. Alston (Biol. Centr. Am., p. 153), nor Mr. Tomes (P. Z. S., 1861, p. 281), consider their Mexican and Guatemalan specimens to differ from the so-called *berlandieri* of Baird. De Saussure's *Hesperomys* (*Dielomys*) *toltecus* (Rev. et Mag. Zool., 1860, p. 98) has clearly nothing to do with *S. fulviventer*.

Mr. Buller writes me that the present specimen was taken by Mr. W. B. Richardson. The latter states (in a recent letter to me): "The *S. berlandieri*, from Zacatecas, is quite common on the bare barren rocky pastures that surround the city, at an elevation of about 8000 feet above the sea."



Allen, J. A. and Buller, Audley Cecil. 1889. "Notes on a collection of mammals from southern Mexico, with descriptions of new species of the genera *Sciurus*, *Tamias* and *Sigmodon*." *Bulletin of the American Museum of Natural History* 2(16), 165–181.

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