

**Article IV. — MAMMALS FROM SOUTHERN MEXICO
AND CENTRAL AND SOUTH AMERICA.**

By J. A. ALLEN.

During the last three years the Museum has obtained by purchase several small collections of mammals from Mexico and Central America, the more important of which are the three which form the subject of the present paper. In working up these collections much other material previously in the Museum, including considerable from Colombia and Venezuela, has been critically examined, with the result that a number of apparently new forms have been discovered, and are here included.

In this connection I wish especially to acknowledge my indebtedness to Mr. Outram Bangs, Curator of Mammals at the Museum of Comparative Zoölogy, Cambridge, Mass., for the generous loan of types, topotypes, and other material from Chiriqui and elsewhere; to Mr. Gerrit S. Miller, Jr., in charge of the collection of mammals at the U. S. National Museum, for the use of specimens from Mexico and Costa Rica; and to Dr. C. Hart Merriam, Chief of the Biological Survey, U. S. Department of Agriculture, for the loan of specimens, and for aid in determining some of the smaller rodents in the Vera Cruz collection.

I. — SOUTHERN VERA CRUZ, MEXICO.

A collection of about 150 specimens of mammals was made for the Museum by Mr. E. A. Colburn, in the State of Vera Cruz, during March and April, 1901. The collection, however, contained no bats. The locality given for the specimens is "Pasa Nueva," situated a short distance from Tlacotalpan, about 60 miles south of the city of Vera Cruz, in the low tropical coast belt.

1. **Marmosa murina mexicana** Merriam. Two specimens, male and female, March 11.

2. ***Metachirus fuscogriseus pallidus* Allen.** One specimen, adult male, April 6. Total length, 581; tail vertebræ, 301; hind foot, 40.

3. ***Didelphis mesamericana tabascensis* Allen.** Two specimens, male and female, March 3 and 11.

4. ***Tamandua tetradactyla* (Linn.).** Six specimens — 1 young male, 5 adult females — March 16–19, April 2–12.

5. ***Tayassu angulatum humerale* Merriam.** Three specimens, March 15 and April 5 and 15.

6. ***Odocoileus toltecus* (Saussure).** Four specimens, 3 males (2 young) and 1 female, March 14 and April 10 and 12.

7. ***Sciurus aureogaster hypopyrrhus* (Wagler).** Eighteen specimens, March and April. Four are in the usual red phase, 8 are uniform intense black, and 5 are intermediate, but approach the black phase more than the red phase, most of them having merely a little red on the ventral surface, the rest of the pelage being intense black.

8. ***Peromyscus affinis* (Allen).** Twenty-two specimens, March 10–April 12.

Young adults are darker than old adults, with the median dorsal area blackish. About half the specimens have a small area of chestnut on the breast, varying in size and distinctness from a mere trace to a well-defined and strongly colored patch, the rest being without even a trace of this marking. Adults range in total length from 170 to 190, averaging about 180; tail vertebræ, 70 to 81, averaging 75; hind foot, 20 to 20.4, averaging 20.2.

9. ***Peromyscus mexicanus* (Saussure).** Eight specimens, March 10–13, and April 6; 4 old adults, 3 young adults, and 1 two thirds-grown young. The adults range in total length from 220 to 240 (av. 230); in length of tail vertebræ from 110 to 120 (av. 114); hind foot, av. 20.5.

10. ***Oryzomys rostratus* Merriam.** Six specimens, 4 of which are adult, March 11–17 and April 4. Length of adults

221-240 (av. 233); tail vertebræ, 110-121 (av. 118); hind foot, 20.7.

11. *Oryzomys jalapæ rufinus Merriam.* One adult male, April 9. Total length, 260; tail, 140.5; hind foot, 20.9.

12. *Sigmodon toltecus (Saussure).* Four specimens, April 5-13.

13. *Liomys pictus rostratus Merriam.* Twelve specimens, March and April. Five adult males: Total length, 257 (250-260); tail vertebræ, 130 (123-140); hind foot, 29.6 (29-30).

14. *Lepus (Sylvilagus) russatus, sp. nov.*

FIGURES 1, 4, AND 7.

Type, No. 17203, ♂ ad., Pasa Nueva, Vera Cruz, Mexico, April 10, 1901; A. E. Colburn.

Pelage coarse and harsh. General coloration above, including upper surface of head, whole dorsal region, and upper surface of tail, pale brownish russet, varied with dark brown; sides and hips varied with creamy white; nape patch, anterior surface of fore limbs, and outer surface of hind limbs, ferruginous; cheeks and sides of neck like back but strongly varied with black; ventral surface yellowish white, the darker color of the sides encroaching on the sides of the abdomen; prepectoral band clay color; upper surface of hind feet creamy white; ears externally grayish brown, slightly tinged with pale rusty, and gradually darkening on the apical third to blackish.

Measurements. — Total length, 450; tail vertebræ, 42; hind foot, 80; ear from crown (in dry skin), 62. Skull, occipito-nasal length, 78.5; basal length (inner base of incisors to posterior border of occipital condyles), 63; greatest zygomatic breadth, 35.2; interorbital breadth, 17; mastoid breadth, 28; width of braincase, 25; length of nasals, 36; width at posterior border, 17; length of palatal bridge, 7.5 (10 to tip of frontal spine); length of malar, 33.5; upper toothrow (crown surface), 6.5; palatal foramina, 19, by 7 at posterior border; length of lower jaw (front base of incisors to angle), 55; height at condyle, 35.

The skull is narrow for its length; the occipital portion only moderately depressed, audital bullæ very large for the size of the skull, nearly twice as large as in skulls of *Lepus aztecus* of practically the same size.

Lepus russatus is distinguished from its nearest geographical allies, *L. aztecus* (Figs. 2, 5, 8) and *veræ-crucis*, by the russet

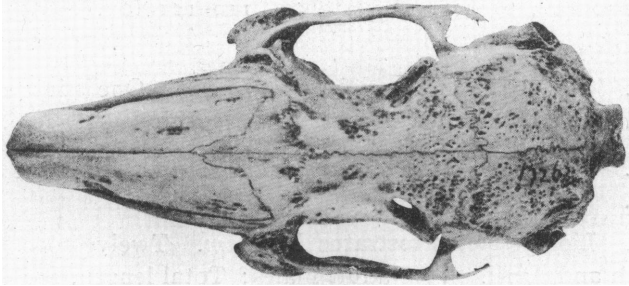


Fig. 1. *Lepus russatus*. No. 17203. ♂ ad. Type. Nat. size.

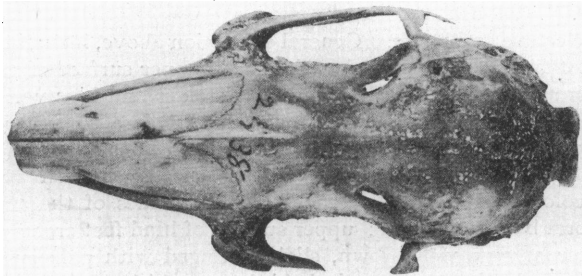


Fig. 2. *Lepus aztecus*. No. 35. ♂ ad., Tehuantepec, Mexico. Type. Nat. size.

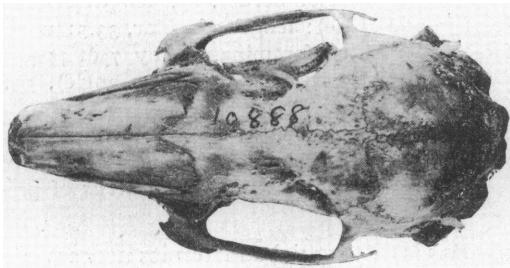


Fig. 3. *Lepus parvulus*. No. 9888. adult. Type. Nat. size.

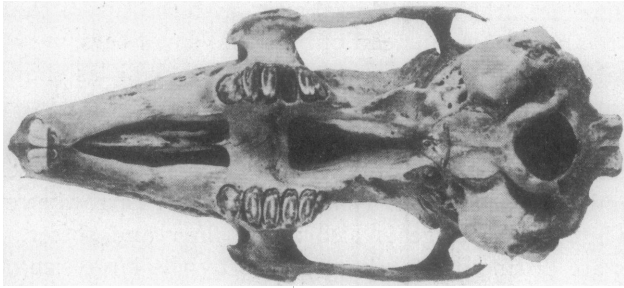


Fig. 4. *Lepus russatus*. From same skull as Fig. 1. Nat. size.

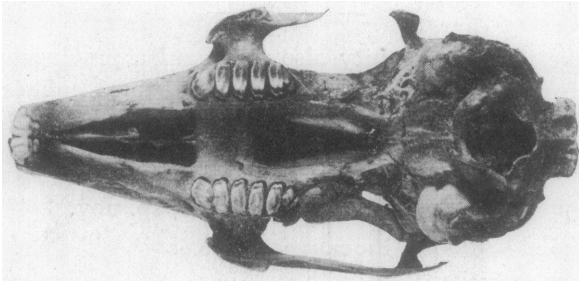


Fig. 5. *Lepus astecus*. Same skull as Fig. 2. Nat. size.

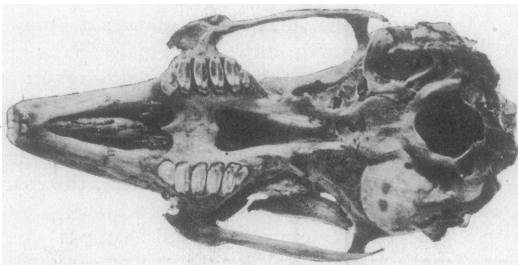


Fig. 6. *Lepus parvulus*. Same skull as Fig. 3. Nat. size.

brown color of the whole dorsal area, with the tips of the hairs dark reddish brown instead of blackish, small ears, very large audital bullæ, and the narrowness of the skull, as shown by the interorbital measurement. In coloration *L. aztecus* is not so dark brown on the middle dorsal region, and the cheeks and sides of the body are gray instead of like the back, and the under surface is broadly white instead of narrowly yellowish white; the pelage is also much finer and softer. The skulls are distinguishable at a glance by the large size of the bullæ in *L. russatus*, the much narrower basioccipital, and by other less obvious differences. Although represented by a single specimen (fortunately in excellent pelage), the differences which distinguish it from the nearest known allied species are too strongly marked to be easily overlooked.

I take this opportunity also to record a previously undescribed very small *Sylvilagus* from the arid tablelands of southern Hidalgo, collected at Apam, by Mr. Frank M. Chapman in March, 1897.

***Lepus (Sylvilagus) parvulus*, sp. nov.**

FIGURES 3, 6, AND 9.

Type, No. $\frac{18878}{10888}$, Apam (altitude about 8000 feet), southern Hidalgo, Mexico, March 19, 1897; Frank M. Chapman.

General color above pale buff, strongly varied with black, the hairs being subapically buff, with conspicuously long black tips, the prevailing color over the posterior half of the dorsal surface being blackish, indistinctly lighter and slightly grayish on the rump; chin, throat, and middle ventral surface yellowish white, the color of the sides extending well down upon the sides of the abdomen; prepectoral area very broad, pale rusty brown; nape patch pale ferrugineous; upper surface of fore feet pale rusty, of the hind feet still lighter or deep buff; eyering deep buff; sides of head buffy brown, varied with black-tipped hairs; ears externally buffy gray brown, darker, almost black on the outer edge and at the tip; ears internally pale yellowish brown with a deep buffy edging; upper surface of tail blackish, the extreme tips of the hairs buffy gray.

Total length, 390; tail vertebræ, —; hind foot, 75; ear, 65. Skull, occipito-nasal length, 65; basal length, 54.5; greatest zygomatic breadth, 33; interorbital breadth, 18.4; mastoid breadth, 27; width

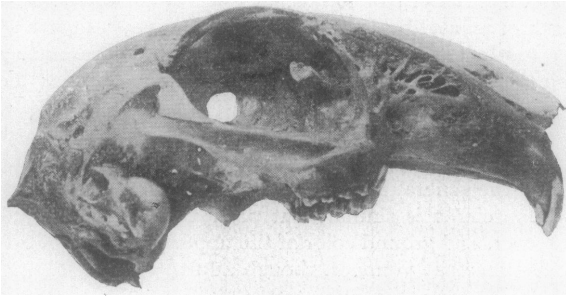


Fig. 7. *Lepus russatus*. Same skull as Fig. 1. Nat. size.

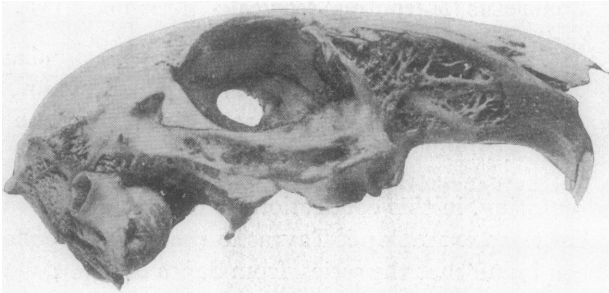


Fig. 8. *Lepus astecus*. Same skull as Fig. 2. Nat. size.



Fig. 9. *Lepus parvulus*. Same skull as Fig. 3. Nat. size.

of braincase, 25; length of nasals, 25; width of nasals, posteriorly, 13.5; length of palatal bridge, 5.2 (with spines, 8.5); length of malar, 28; upper tooththrow (crown surface), 10; palatal foramina, 14.5, by 5.2 at point of greatest width; length of lower jaw, 43; height at angle, 25.5.

Skull rather broad, upper contour strongly arched posteriorly; bullæ very large for the size of the skull, much larger than in *L. aztecus*, although the general size of the skull is nearly one half less.

A second specimen is similar, but paler throughout, including the nape patch, feet, and ground color of the upper parts; it is also slightly smaller and somewhat younger, though adult.

In general size *L. parvulus* is similar to *L. bachmani* and *L. cinerascens*, but it differs too widely from them in cranial characters to need further comparison. In skull structure it seems to be a diminutive member of the *Sylvilagus* group, from all other forms of which its small size will distinguish it.

15. ***Conepatus (Marputius) tropicalis* Merriam.** Two specimens, April 6.

16. ***Tayra barbara senex* (Thomas).** One specimen, adult female, March 18. Total length, 1000; tail vertebræ, 375; hind foot, 115.

In attempting, in this connection, to determine the various South American examples of Tayras in the Museum collection it has been found that the series from Santa Marta, Colombia, represents a well-marked, undescribed form, which may be characterized as follows:

***Tayra barbara irara*,¹ subsp. nov.**

Type, No. 15469, ♂ ad., Bonda, Santa Marta District, Colombia, June 6, 1899; Herbert H. Smith Collection.

Top and sides of head and neck grayish brown; throat and foreneck dark brown, with a small pale yellowish spot on lower neck; whole body and limbs very dark brown, darker or nearly black along the middle of the back, forming an indistinct dorsal band, continued on the tail; tail rather darker than the body, brownish black, becoming nearly black apically. The yellow throat patch varies, in different individuals, in color from cream to ochraceous, and in size from a small oblong spot less than 20 mm. long and about 6 mm. wide to a large

¹ *Irara*, the native local name.

triangular area 50 mm. wide and 75 mm. long, the apex pointing backward; but the outline is often more or less irregular.

Measurements. — Type, total length, 1016; tail, 381; hind foot, 114. In 8 adult specimens, all from the vicinity of Bonda, the external measurements are as follows:

| | |
|---------------|---|
| 14860, ♂, | Total length, 1133; tail vertebræ, 356; hind foot, 102. |
| 14630, ♂, | “ “ 1080; “ “ 449; “ “ 92. |
| 15472, ♂, | “ “ 1044; “ “ —; “ “ —. |
| 15471, ♂, | “ “ 1016; “ “ 446; “ “ 89. |
| 14629, ♂ juv. | “ “ 991; “ “ 394; “ “ 102. |
| 14861, ♀, | “ “ 953; “ “ 381; “ “ —. |
| 15469, ♀, | “ “ 1016; “ “ 381; “ “ 104. |
| 14631, ♀?, | “ “ 750; “ “ 330; “ “ 89. |

The skull of the type measures: Occipito-nasal length, 111; basal length, 106.5; zygomatic breadth, 59; width of braincase, 47; post-orbital constriction, 21.5; interorbital breadth, 25.5; upper toothrow, — (imperfect). Another old male skull, with practically the same dimensions (about a millimeter less), has the upper toothrow 22. The females are somewhat smaller.

Represented by 10 specimens, 8 of which are adult and 2 rather young, all collected at or in the immediate vicinity of Bonda (altitude 250 feet), Santa Marta district, during the months of February, March, April, June, August, and November, all seasons being thus represented. They vary but little in general color, but one or two are rather darker than the others. Singularly enough, 7 of the 10 specimens have a whitish patch on the ‘withers,’ but it varies greatly in size, from a mere trace to a large spot, as follows:

No. 14861, ♀, an oval spot on the left side of the median line, 20 mm. long by 5 mm. wide.

No. 14629, ♂, a diamond-shaped spot, 40 x 40 mm.

No. 15471, ♂, a triangular spot, with the apex directed backward, 46 mm. across the front, and 45 in length.

No. 14630, ♂?, a triangular spot, as in the last, 40 x 45 mm.

No. 14860, ♂?, a subtriangular spot, with the right anterior angle lengthened, 38 x 49 mm.

No. 14631, ♀?, a patch of very irregular form, 50 mm. wide by 75 mm. long.

No. 15470, ♂, a crescentic patch, opening forward, 95 mm. across from point to point, and 125 mm. long, measured from a transverse line

across the points of the crescent to the point of greatest convexity, the greatest width of the light band being 55 mm.

This feature is of interest in connection with Mr. Thomas's remarks (*Ann. and Mag. Nat. Hist.* (7), V, Jan., 1900, pp. 147, 148) in reference to three specimens from widely separated localities showing this "spasmodic variation," found by him in the British Museum collection. In the present subspecies it amounts to almost as constant a character as the gular patch. It is not present, however, in a single specimen in an equal number of examples in this Museum from other localities.

Tayra barbara irara differs from typical *barbara*, from Venezuela and Brazil, in being very much smaller, apparently scarcely exceeding *Tayra barbara trinitatis* (Thomas) from the island of Trinidad, and dark chocolate brown instead of deep black. Two old males from Suapure, Venezuela, and other examples from Brazil, are intensely black throughout, except for the head and neck, and greatly exceed the Santa Marta specimens in size, the occipito-nasal length of the skull ranging from 118 to 126 mm., the basal length from 115 to 118, the zygomatic breadth from 70 to 79, and the upper toothrow from 24 to 26, against, respectively, 111, 106.9, 69, and 21.5 in *irara*.

Various names have been applied to the South American Tayras, but, as Mr. Thomas has noted (*Ann. and Mag. Nat. Hist.* (7), VII, Feb., 1901, p. 180), most of them are strict synonyms of *Mustela barbara* Linn. (1758), from "Brasilia." Apparently Linnæus described the animal from a specimen. He cites 'Ac. Holmens.', and Brown's 'History of Jamaica,' the last with a query. The former I am unable to consult. Brown's "Galera . . . The Guinea Fox," is based on an animal "often brought to Jamaica from the coasts of Guinea, where it is a native." In the 12th edition of the 'Syst. Nat.' only Brown is cited. As "Brasilia" is probably used in a general sense, it seems proper to consider the type region of *Tayra barbara* as Guiana. *Mustela gulina* Schinz (1821), and *Gulo canescens* Lichtenstein (1823, ex Illiger MS.) are merely new names for *Mustela barbara* Linn.; *Viverra* [sic] *poliocephalus*

[sic] Traill (1821) was based on a specimen "brought to England from Demerara," and is therefore also a synonym of *M. barbara* Linn.; the *Mustela barbara* var. *laira* F. Cuvier was also from Guiana. *Eira ilya* H. Smith (Nat. Libr., XV, 1842, 203) was based on a crude drawing, by Prince John of Nassau, in the Berlin Library, of an animal from Guiana, and hence requires no further consideration.

The forms of the group heretofore recognized are:

Tayra barbara barbara (Linn.). Guiana, Venezuela, and Brazil.

Tayra barbara peruana (Tschudi).¹ Peru, east of the Andes.

Tayra barbara senex (Thomas). Mexico.

Tayra barbara biologica (Thomas). Central America.

Tayra barbara trinitatis (Thomas). Trinidad.

Tayra barbara brunnea (Thomas). Western Bolivia.

Tayra barbara irara Allen (as above). Northeastern Colombia.

17. *Nasua narica* (Linn.). Seven specimens, March 11-16 and April 16. They are mostly only about two thirds grown, but two are young adults. These, male and female, measure, respectively: Total length, ♂ 1143, ♀ 980; tail vertebræ, ♂ 550, ♀ 475; hind foot, ♂ 105, ♀ 100. Skulls: Total length, ♂ 128, ♀ 122; zygomatic breadth, ♂ 60, ♀ 58. Old specimens would be much larger, especially in the cranial measurements, and particularly in zygomatic breadth.

¹ *Galictis barbara* TSCHUDI, Fauna Peruana, 1844-46, 107. Description based on a Peruvian specimen in captivity.

Galictis barbara var. *peruana* TSCHUDI, Wieg. Arch., 1844, i, 248. Based on the description in 'Fauna Peruana.'

In this description Tschudi states that, like many other mammals and birds common to Peru and Brazil, the Peruvian representatives are not quite the same as the Brazilian; although the color pattern is the same, the Peruvian animals are much more intensely colored; but he considers such differences local and climatic, and not really of specific value. He notes further that his description of what he here designates *Galictis barbara* does not agree altogether with Brazilian examples. In his 'Mammalium conspectus quæ in Republica Peruana reperiuntur et pleraque observata vel collecta sunt in itinere a Dr. J. J. de Tschudi' (Wieg. Arch., 1844, i, pp. 244-255, dated Dec., 1843), he appears to have decided to recognize the Peruvian form of this animal as a variety, referring to the 'Fauna Peruana' as the basis for the name. As no page or plate reference is given, in this as in other cases in the 'Conspectus' where new names appear, it is probable that the 'Fauna,' although in press, had not at that time appeared, and that the new names (17 in number) employed in the 'Conspectus' were nomina nuda until Volume I of the Fauna was published. This ('Therologie,' half-title, following p. xxx) is dated 1844; but there is internal evidence that it could not have appeared prior to July, 1845 (see p. 262, footnote). As in the interval between the publication of the 'Conspectus' and the mammal part of the 'Fauna' no other name was proposed for the Peruvian *Tayra*, it seems admissible to adopt *peruana* from Tschudi, as was done by Dr. Nehring in 1866 (Zool. Jahrb., 1886, i, p. 206).

All of the other new names in the 'Conspectus' appear also in the 'Fauna,' and their status is thus without question. This includes Tschudi's *Cervus nemoriwagus* var. *peruana* (Conspectus, l. c., p. 255), which, while not adopted in the text (Fauna, p. 240), appears in the 'Systematische Zusammenstellung' on p. 20. This antedates by about ten years Wagner's *Cervus tschudii* (Schreber's Säugth., Suppl. V, 1855, pp. 386, 387), based wholly on Tschudi's description. The Peruvian Brocket will thus stand as *Mazama peruana* (TSCHUDI).

18. ***Alouatta palliata mexicana* Merriam.** Nineteen specimens, 16 adult and 3 nursing young, March 15 and April 8-19.

Four adult males and 6 adult females have external measurements as follows:

| | | | | | |
|------------------|-------|---------------|------|------------|------|
| ♂, Total length, | 1142; | tailvertebræ, | 585; | hind foot, | 145. |
| ♂, " " " | 1140; | " " " | 620; | " " " | 153. |
| ♂, " " " | 1212; | " " " | 635; | " " " | 152. |
| ♂, " " " | 1115; | " " " | 604; | " " " | 153. |
| ♀, " " " | 1189; | " " " | 661; | " " " | 150. |
| ♀, " " " | 1123; | " " " | 630; | " " " | 148. |
| ♀, " " " | 1119; | " " " | 605; | " " " | 148. |
| ♀, " " " | 1110; | " " " | 620; | " " " | 146. |
| ♀, " " " | 1107; | " " " | 618; | " " " | 152. |
| ♀, " " " | 1100; | " " " | 625; | " " " | 148. |

Eight adult skulls, 3 males and 5 females, measure: Basal length, (inner base of incisors to posterior border of occipital condyles), 3 males, 92.5 (90-96); zygomatic breadth, 80.5 (78.5-83): 5 females, basal length, 83.4 (81-87); zygomatic breadth, 70 (68-72).

Dr. Merriam, in separating this form (Proc. Biol. Soc. Wash., XV, p. 67; March 22, 1902), indicated the distinctive cranial features, but said nothing of the external differences, which prove to be equally striking. Compared with a series of seven specimens from Chiriqui, collected by Mr. Batty, the Mexican form proves to be much duller colored, with the flanks in the brightest specimens as obscurely colored as in the very palest of the Chiriqui examples, none of them presenting the golden rufous so characteristic of the latter. (See below, p. 80.) The sides of the back are yellowish gray washed with blackish, with the long hairs at the lower edge of the flanks dull yellowish gray with dull brownish tips, instead of rich golden with the tips almost golden chestnut.

The young in first pelage are dull, dingy gray, varied slightly with a wash of blackish, especially on the head, middle of the back, limbs, and tail.

19. ***Ateles pan* Schlegel.** Represented by 22 specimens, mostly adult, but including a few young adults, and one in first pelage, collected March 5-April 19.

Similar to *A. vellerosus*, but with little or no white on the sides of the head, and the inside of the arms and legs mostly black.

In *Ateles vellerosus* the inside of the arms down to the hands, and the whole inside of the thighs and the legs to the feet are broadly yellowish white. In *A. pan* there is a narrow whitish stripe on the inside of the shoulder, rapidly narrowing distally and rarely extending more than half-way to the elbow, the fore arm being black all around. The light color of the underparts extends down the inside of the thighs and hind legs, rapidly narrowing distally, usually about to the knees, but sometimes as a very narrow, indistinct light line to the feet, consisting often merely of scattered grayish hairs, but never forming a broad band as in *velerosus*.

The whitish patch on the sides of the face is either almost wholly absent, or is represented by an indistinct cluster of whitish hairs opposite the angle of the mouth, but not extending up to the sides of the forehead, as in *velerosus*.

Measurements.—The 7 largest males and the 7 largest females which have measurements (for several they are not given) measure as follows:

| | | | | | |
|------------------|-------|----------------|------|------------|------|
| ♂, Total length, | 1310; | tail vertebræ, | 832; | hind foot, | 183. |
| ♂, " " " | 1275; | " " " | 815; | " " " | 191. |
| ♂, " " " | 1210; | " " " | 670; | " " " | 161. |
| ♂, " " " | 1197; | " " " | 721; | " " " | 172. |
| ♂, " " " | 1148; | " " " | 820; | " " " | 175. |
| ♂, " " " | 1142; | " " " | 605; | " " " | 175. |
| ♂, " " " | 1109; | " " " | 706; | " " " | 165. |
| ♀, " " " | 1250; | " " " | 822; | " " " | 180. |
| ♀, " " " | 1235; | " " " | 820; | " " " | 175. |
| ♀, " " " | 1232; | " " " | 791; | " " " | 174. |
| ♀, " " " | 1231; | " " " | 792; | " " " | 179. |
| ♀, " " " | 1160; | " " " | 740; | " " " | 170. |
| ♀, " " " | 1152; | " " " | 770; | " " " | 170. |
| ♀, " " " | 1150; | " " " | 630; | " " " | 163. |

While the teeth show that these specimens are fully adult, the sutures and slight development of the temporal ridges indicate that the greater part are comparatively young or middle-aged adults. One male has the teeth greatly worn, and one female has them considerably worn. These measure, respectively, basal length, ♂ 88, ♀ 81; zygomatic breadth, ♂ 72, ♀ 62. The others grade smaller, according to age. A fully adult but not 'old' skull gives the following: Total length, 108; basal length (inner base of incisors to posterior border of occipital condyles), 77; zygomatic breadth, 64; mastoid breadth, 59; orbital breadth, 55; length of palate, 29; length of nasals (following curvature), 18; width of nasals, 8, at front margin, tapering to a point posteriorly; upper premolar-molar series, 25; length of lower jaw

(front of incisors to posterior border of condyles), 69; height at condyle, 38; height at coronoid process, same as at condyle; length of lower premolar-molar series, 27.5.

Adults of the same sex present a rather wide range of variation in color, wholly independent of sex or age. In the darkest specimens the head, neck, limbs, and tail are deep black; the shoulders and dorsal region are brownish black, the black being less intense and slightly suffused with a ruddy cast, becoming still paler and lighter on the posterior half of the dorsal region, especially on the loins, where the suffusion is paler and more yellowish; a narrow lateral line of dark yellowish rufous runs from the shoulders to the thighs; ventral surface yellowish gray, which color extends in a narrow line down the inside of the upper arm to the elbow, and down the inside of the thighs to a little below the knee, narrowing distally.

In the lightest examples the head, distal half of the limbs, and tail are dull black; the nape, shoulders, and the proximal half of the limbs and tail brownish black, with a strong dull yellowish red suffusion; the dorsal area posterior to the shoulders is dingy golden yellow, brightening on the sides to brilliant golden rufous, terminating abruptly against the lighter color of the ventral surface in a sharply limited lateral line of deep golden rufous, which is prolonged posteriorly over the upper part of the thighs and down the inner side of the hind legs to below the knees; ventral surface clear yellowish white. Between these is every stage of gradation.

In the lighter-colored specimens there is a striking similarity in the tints and in the pattern of coloration to *Alouatta palliata mexicana*, which occurs abundantly with it at Pasa Nueva, but the darker under surface of the latter readily distinguishes the two species without resort to other characters.

The single very young specimen in first pelage is very thinly haired, the ventral area being practically naked. The whole dorsal area, limbs, and tail are uniform blackish.

The type of *Ateles vellerosus* Gray (P. Z. S., 1865, p. 733; Cat. Monkeys, etc., 1870, p. 44) was supposed by the describer to have come from Brazil, but later Alston (Biol. Centr.-Am., Mamm., 1879, p. 10) considered it identical with specimens from Central America. In the meantime Sclater figured under this name (P. Z. S., 1872, p. 4, pl. ii) a specimen believed to have been procured near Acapulco, Mexico, which he considered as indistinguishable from Gray's type. The authenticity of this locality was soon after questioned by Reinhardt (P. Z. S., 1872, p. 797), who, however, referred specimens to *velerosus* from Mirador, Vera Cruz, "although the yellowish

colour on the inside of the hind limbs does not extend so far down to the hands" as in Sclater's specimen, "and the whiskers offer only a faint trace of the whitish colour which encircles the face" of *vellerosus*. Reinhardt says of his Mexican specimen: "I have hitherto considered it a new species and given it a provisional name"; but he appears to have never published this provisional name. But Schlegel's *Ateles pan* (Mus. Pays-Bas, VII, 1876, p. 180), from near Coban, Guatemala, appears to have been based on specimens very similar to those of the present series from Vera Cruz. He compares his specimens with his "*Ateles fuliginosus* Kuhl" (= *A. vellerosus* Gray), and refers especially to the absence of the light color on the forearms and on the posterior extremities. The present series is therefore referred provisionally to Schlegel's *Ateles pan*, to which a single specimen collected by Dr. Buller at Chimalapa, Tehuantepec, formerly identified with *Ateles vellerosus* (this Bulletin, III, 1890, p. 176), is also referable.

II. — CENTRAL COSTA RICA.

The collection here under notice was made for the Museum by Mr. M. A. Carriker, Jr., during the period from February to July, 1902, mostly in or near the Irazu Range in central Costa Rica. The collection numbers about 120 specimens, referable to 23 species. The principal localities at which collections were made are "Mount Irazu," Feb. 23 to April 21, part of the specimens (collected Feb. 23 to March 6) being labeled simply "Mount Irazu"; a part (collected March 13-22), "Juan Viñas, Mount Irazu" (altitude 1113 meters); and others (collected April 2-21), "Rancho de R. Jimenez" (altitude about 1100 meters). Later, specimens were collected at "Poza Azul, Pirris Province" (May 14-26 and July 1-23), at San José (July 21), and at San Pedro, near San José (July 29). Poza Azul is on the Pacific slope, at an altitude of about 200 meters.

1. *Caluromys laniger pallidus* (Thomas). One specimen, female, San José, July 21.

This specimen is gray, with a pale brownish tinge over the shoulders and on the middle of the back, but wholly lacks the usual gray shoulder stripe of the *laniger* group. It therefore agrees very closely with what may be regarded as the average condition of *C. l. pallidus*, judging from Mr. Thomas's description. The specimen is a full-grown female, and measures as follows: Total length, 665; tail vertebræ, 405; hind foot, 40.5.

2. ***Metachirus fuscogriseus* Allen.** Four skins and skulls of two-thirds grown specimens, and an adult skull, from Juan Viñas, March 14-16.

3. ***Didelphis marsupialis etensis* Allen.** One skin, without skull, Pozo Azul, May 26.

4. ***Mazama satorii* (Saussure).** One specimen, a young male, Pozo Azul, July.

5. ***Sciurus (Echinosciurus) thomasi* Nelson.** One specimen, an old male, Pozo Azul, March 14. Total length, 460; tail vertebræ, 230; hind foot, 59.

6. ***Sciurus (Guerlinguetus) hoffmanni* (Peters).** Ten specimens, all adult, collected as follows: Volcan de Irazu, 5, Feb. 24 and March 2-5; Rancho de R. Jimenez, 3, April 5-8; Pozo Azul, 2, June 18.

These specimens vary greatly in color, especially the ventral surface, and are fairly separable into two series, those with orange-yellow bellies and those with reddish orange bellies, there being four of the former and six of the latter. As, however, specimens of each were taken the same day at the same locality, and each series includes both sexes, the variation is evidently purely individual. The upper surface varies correspondingly, as does the tail, in which the color of the fringe varies from yellow (one specimen) to deep reddish orange.

These specimens, taken collectively as a series, do not differ appreciably from a series of 14 examples from Chiriqui, Panama, or from specimens from other localities in Costa Rica, in which pale-bellied specimens are also more or less frequent.

The collector's measurements of 4 males and 3 females are as follows:

| | | | | | |
|------------------|------|----------------|------|------------|-----|
| ♂, Total length, | 420; | tail vertebræ, | 215; | hind foot, | 55. |
| ♂, " " " | 393; | " " " | 190; | " " " | 55. |
| ♂, " " " | 382; | " " " | 180; | " " " | 55. |
| ♂, " " " | 375; | " " " | 167; | " " " | 51. |
| ♀, " " " | 405; | " " " | 198; | " " " | 57. |
| ♀, " " " | 380; | " " " | 173; | " " " | 51. |
| ♀, " " " | 385; | " " " | 172; | " " " | 55. |

7. **Mus musculus** *Linnæus*. Three specimens, Volcan de Irazu, Feb. 23 and March 3.

8. **Mus rattus** *Linnæus*. Three specimens, Juan Viñas, March 14-16.

9. **Peromyscus nudipes** (*Allen*). Nineteen specimens, Rancho de R. Jimenez, Juan Viñas, and other neighboring points in the Irazu Range, Feb. 25-April 4. (For measurements, etc., see below, p. 68.)

10. **Oryzomys devius** *Bangs*. Two old adults, Volcan de Irazu, March 4.

These specimens are in heavier pelage and rather more deeply colored than topotypes of *O. devius* from Boquete, Chiriqui, and are also older, but on the whole agree so well with them, especially in cranial characters, that they are provisionally referred here.

11. **Oryzomys couesi** (*Alston*). One specimen, adult female, Rancho de R. Jimenez, Volcan de Irazu, April 13.

12. **Reithrodontomys costaricensis** *Allen*. Ten specimens, 6 adults and 4 young, San Pedro, June 29. The adults measure: Total length, 189 (182-205); tail vertebræ, 112 (103-121); hind foot, 20.3 (19.5-20.5). The young specimens, two-thirds grown, resemble in coloration an average example of *Mus musculus*, excepting a tinge of bright rufous on the head, shoulders, and flanks, due to the incoming of the adult coloration.

13. **Reithrodontomys australis** *Allen*. Twenty-five speci-

mens (topotypes), Volcan de Irazu, Feb. 23 and 24, and March 1-6.

Nine adult males: Total length, 163 (155-174); tail vertebræ, 86 (83-96); hind foot, 19 (18-20). The largest specimen of the series is a female, the collector's measurements being: 185, 96, 20. As this species was described from a single skin and skull from Volcan de Irazu, this series of topotypes with flesh measurements helps to complete the description. The type proves to represent the adult condition of the species.

14. *Akodon irazu*, sp. nov.

Type, No. 18128, ♀ ad., Volcan de Irazu, Feb. 23, 1902; M. A. Carriker, Jr.

Smaller, with relatively smaller ears, than either *Akodon teguina* or *A. xerampelinus* Bangs, with the upper parts lighter and more yellowish brown, and the under parts buffy brown instead of cinnamon brown. *A. teguina* is even darker and more blackish than *A. t. apricus*.

Total length (type), 125; tail vertebræ, 50; hind foot, 17. The type is an old female with the teeth much worn. Six adult topotypes: Total length, 132 (121-140); tail vertebræ, 51 (50-53); hind foot, 17.3 (17-19).

Skull (type), occipito-nasal length, 22; basal length of Hensel, 17; zygomatic breadth, 11.5; mastoid breadth, 10; interorbital breadth, 4; length of nasals, 8.3; palatal length, 8; upper toothrow, 4; lower jaw, condyle to base of incisors, 11.

Represented by 8 specimens, collected on the Volcan de Irazu, Feb. 23 and 24, and March 3-6.

This species is readily distinguished from its nearest allies by its smaller size and paler coloration, as indicated above.

15. *Macrogeomys heterodus* (Peters). One specimen, Sabanilla, near San José, July 2.

Total length, 228; tail vertebræ, 58; hind foot, 37. General coloration above, very dark seal brown, with scattered, long, bristly, whitish hairs, most numerous and rather conspicuous on the sides; no white mark on the head; lower parts soiled grayish white, sharply defined against the dark color of the dorsal surface; tail short, naked; feet nearly naked, apparently brownish flesh color in life; claws short and weak, in comparison with those of *M. cherriei* and allied forms.

16. *Lepus (Tapeti) gabbi* (Allen). Three specimens,—two

from Rancho de R. Jimenez, April 21, and one from Juan Viñas, March 22.

17. *Felis carrikeri*, sp. nov.

Type, No. 19211, ♀ ad., Pozo Azul, Pirris Province, Costa Rica, May 14, 1902; A. M. Carriker, Jr., for whom the species is named.

A small, short-tailed cat, with full, soft pelage. Above, from the nose to the end of the tail, brownish black, quite black over the whole dorsal area, lighter and browner on the lower border of the sides, passing gradually into the very dark chocolate brown of the ventral surface; outside of limbs very dark chocolate brown, irregularly and rather indistinctly clouded with blackish brown; inside of limbs like the ventral surface, indistinctly blotched with darker spots; ears externally blackish brown, like the top of the head; lips and cheeks uniform blackish, like the rest of the head; tail above uniform brownish black, like the middle of the back, lighter and slightly clouded with darker on the sides and below.

Measurements. — Total length, 970; tail vertebræ, 276; hind foot, 101. Skull, total length, 86; basal length of Hensel, 73; zygomatic breadth, 55; least interorbital breadth, 16; intertemporal breadth, 28; width of braincase above meatus auditorius, 38; length of nasal bones, 18; breadth of nasal bones across anterior border, 11; do. opposite nasal process of frontals, 6.2; audital bulla, 18 x 10; breadth at posterior end of carnassials, 30.5; front of canine to posterior border of carnassial, 25; length of upper carnassial, 10; length of lower carnassial, 7.5; length of lower jaw (front base of incisors to end of angular process), 55; height of jaw at condyle, 11.5; do. at coronoid, 21.5.

Contour and proportions of the skull as in *Felis apache* and *Felis fossata* Mearns (Proc. Biol. Soc. Wash., XIV, pp. 149-151, August 9, 1901), but smaller and lacking the nasal fossa of the latter, in this respect agreeing with *F. apache*. The skull here described is that of an adult (middle-aged) female.

The dark coloration of the type specimen and the obscure spotting on the limbs suggests a melanism of some form of the *F. pardalis* group, or that it may be, normally, a short-tailed spotted cat. Its small size, as affirmed by the size and age conditions of the skull, renders it, however, impracticable to refer it to any of the known forms of the *pardalis* group, the smallest of which enormously exceeds in size the type of *Felis carrikeri*. On the other hand, the skull agrees very closely in size with the smallest of the small-headed, long-tailed spotted cats of South America, but the shortness of the

tail separates it from this group and allies it, in proportions, with the *Felis eyra* group, of which it appears to be a small, dark form.

18. ***Urocyon guatemalæ* Miller.** Two specimens, an adult female and a two-thirds grown male, from Pozo Azul, July 17.

The adult female agrees very closely in size, cranial characters, and coloration with topotypes of Mr. Miller's *U. guatemalæ*, except that the whole dorsal area is much blacker, and the ears, sides of the neck, outer edges of the limbs, and under surface of the tail are darker, being ochraceous brown instead of "tawny ochraceous." On the back the black tips of the hairs are so long and abundant that the prevailing color of the middle portion of the back is black. The auditory bullæ are also less inflated. Probably additional material would show the desirability of recognizing the Costa Rican animal as sub-specifically separable from *U. guatemalæ*.

19. ***Conepatus (Marputius) marpurito* (Gmelin).** Two specimens, an adult female from Pozo Azul, June 6, and a young male from Rancho de R. Jimenez, April 21. Female, total length, 610; tail vertebræ, 175; hind foot, 49.

These specimens are very different from *C. tropicalis*, from the eastern coast of Mexico, both in coloration and in the form of the skull. In the absence of Colombian specimens of true *C. marpurito*, they are provisionally referred to it on the basis of Mr. Thomas's statement (Ann. and Mag. Nat. Hist. (7), V, June, 1900, p. 500) that "true *C. marpurito* . . . occurs at Bogota and north-westwards into Central America."

20. ***Nasua narica bullata*, subsp. nov.**

FIGURE 10.

Type, No. 19210, ♂ ad., Pozo Azul, Pirris Province, Costa Rica, June 23, 1902; A. M. Carriker, Jr.

General color very dark throughout, much darker than in any of the Mexican forms, with large, greatly inflated bullæ, and small teeth in comparison with *N. n. molaris* Merriam.

General color dark brown. In the type the whole head, except the ears and usual light facial areas, is brownish black, the feet deep black,

the middle of the dorsal region deep brownish black, with the hairs tipped yellowish, the sides dark brown, and the ventral surface dark brown with the tips of the hairs lighter; throat and chest soiled whitish; tail dark brown above, lighter on the sides and below, darkening

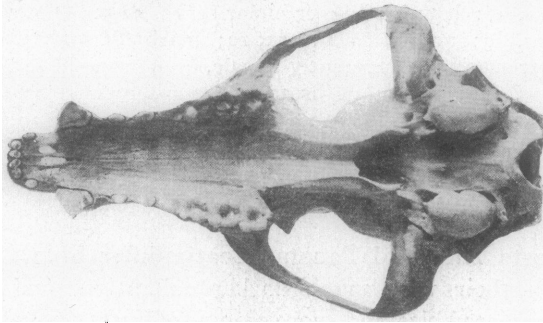


Fig. 10. *Nasua narica bullata*. No. 19210, ♂ ad. Type. $\frac{1}{2}$ nat. size.

to nearly black towards the tip. The type is in rather worn pelage, with the new coat coming in. Another specimen (U. S. Nat. Mus. No. 141134, Talamanca) in full fresh pelage is less dark, the head being dark yellowish brown, the feet dark brown, and the long hair over the shoul-

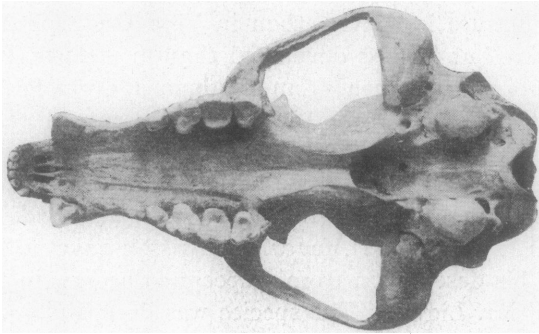


Fig. 11. *Nasua narica molaris*. No. 6676, ♂ ad. San Felipe de Hijas, Jalisco, Mexico. $\frac{1}{2}$ nat. size. For comparison with Fig. 10.

ders and anterior part of the dorsal region with long, rich, yellowish brown tips; chin yellowish white; chest with the basal half of the pelage rusty brown and the tips of the hairs pale yellowish.

Measurements. — Total length (type, ♂), 1119; tail vertebrae, 587; hind foot, 133. Skull, occipito-nasal length, 140; basal length of
February, 1904.]

Hensel, 123; zygomatic breadth, 78; interorbital breadth, 28; width of braincase, 45; length of upper molar series, 21.5; length of lower molar series, 26; audital bulla, 17 x 11; height of sagittal crest, 6. Another specimen, probably male, occipito-nasal length, 146; basal length, 128; zygomatic breadth, 81; interorbital breadth, 31; width of braincase, 47; length of upper molar series, 22.5; length of lower molar series, 25; audital bulla, 17 x 12; height of sagittal crest, 8. Still another specimen, apparently female, occipito-nasal length, 137; basal length, 120; zygomatic breadth, 82; interorbital breadth, 33; width of braincase, 49; length of upper molar series, 22; audital bulla, 16 x 12; height of sagittal crest, 5. These skulls, while apparently old, with closed sutures and highly developed crests, have the teeth very little worn.

The Costa Rica and Panama Coatis differ from those of Mexico in their very much darker coloration, and in the greatly increased size and more elongated form of the audital bullæ, which are one-fifth longer than in an old male of *N. n. molaris* from southern Jalisco, and nearly twice the size of those of true *N. narica* from eastern Mexico. Compared with *molaris* of equal age and the same sex, the skull is longer and narrower, the zygomatic breadth being 4 mm. less, and the zygomatic arch is much more strongly curved upward; the dental armature is heavier than in Vera Cruz specimens of true *narica*, but far less developed than in *molaris* (Fig. 11). Two additional specimens from Talamanca, Costa Rica (U. S. Nat. Mus. Nos. $\frac{121183}{11183}$ and $\frac{121184}{11184}$) agree in cranial characters with the type.

Apparently Linnæus based (Syst. Nat., 1766, I, p. 64) his *Viverra nasua* wholly on Brisson's *Le Coati-Mondi* (Règne Animal, 1, 1756, p. 262), for which Brisson gave no locality, but took his description from a specimen he saw in the possession of Mr. Lievre. The species was described by Buffon in 1760 as *Le Coati brun*, from a specimen he had alive, but he gave no indication of its original source. Linnæus gave the habitat as "America."¹ There is no doubt, however, that both Brisson's and Buffon's specimens came from eastern

¹ In my paper 'On the Coatis (Genus *Nasua*, Storr),' published in 1879 (Bull. U. S. Geogr. and Geolog. Surv. Territories, V, No. 2, Sept., 1879, pp. 153-174), I inadvertently stated (*l. c.*, pp. 162, 166) that *Viverra nasua* Linn. was based entirely on Buffon, Buffon being a lapsus for Brisson.

Mexico, and the State of Vera Cruz may be considered as the type region of the species.¹

The later names given to the Mexican species must be treated as synonyms of *N. narica*, none of them being distinguishable from it by any of the assigned characters or localities.

The material available for examination shows that the Coatis from widely separated localities in Mexico and Central America vary greatly in general coloration and size, in the relative size of the teeth, and in the size and shape of the audital bullæ, which variations form a basis for the separation of the group into a considerable number of geographical forms, in addition to those already recognized.² Several are here indicated, as follows:

***Nasua narica panamensis*, subsp. nov.**

FIGURE 12.

Type, No. 18901, ♀ ad., Boqueron, Chiriqui, Oct. 29, 1901; J. H. Batty.

In coloration not readily distinguishable from *N. narica bullata*, being very dark and highly colored, but much smaller, and with the bullæ of the usual size for the *narica* group. Top of head, nape, and

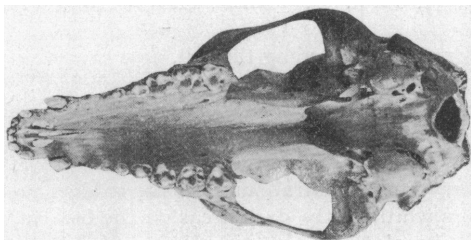


Fig. 12. *Nasua narica panamensis*. No. 18901, ♀ ad. Type. $\frac{1}{4}$ nat. size.

shoulders rusty brown; anterior half of back yellowish gray brown, darkening on the posterior half of the back and rump to dusky brown, the hairs tipped with yellowish gray; ears and sides of shoulders yellowish white; feet and tail dark brown, the latter darkening apically.

¹ For a discussion of the synonymy and geographical distribution of the species of *Nasua* see the paper cited in the preceding footnote.

² *Nasua nelsoni* Merriam. Cozumel Island, Yucatan.

Nasua narica (Linn.). Southeastern Mexico.

Nasua narica molaris Merriam. Southwestern Mexico.

Nasua narica bullata Allen (as above). Costa Rica.

Measurements. — Total length (type, ♀), 1080; head and body, 540; tail vertebræ, 540; hind foot, 116; ear, 40. Skull, occipito-nasal length, 122; basal length of Hensel, 108; zygomatic breadth, 60; interorbital breadth, 25; width of braincase, 44.5; length of upper molar series, 21; audital bulla, 13 x 9.5. Another female (No. 10125, Bangs Coll.), from Boquete, is slightly smaller. Both are middle-aged adults, with undeveloped crests, and the sutures of the rostral portion of the skull still well-defined. Another specimen (No. 10123, Bangs Coll.), sex not indicated, but apparently a male, very old, with closed sutures and well developed sagittal and occipital crests, is rather larger than the type, the occipito-nasal length being 130; the basal length, 112; the zygomatic breadth, 77; the audital bulla, 13 x 9.5; sagittal crest, 6.

N. narica panamensis probably differs very little in average coloration from *N. n. bullata*, both forms presenting the usual wide individual range of color-variation seen in all the forms of *Nasua*, but it is apparently very much smaller, with the audital bullæ nearly one half less. From *N. narica* it differs markedly through its much darker general coloration, and still more so in this respect from the forms of the more arid portions of Mexico.

Nasua narica yucatanica, subsp. nov.

Type, No. ~~11911~~, ♂ ad., Chichenitza, Yucatan, March 11, 1896; Frank M. Chapman.

General color above, including the tail, pale brownish yellow; hairs of the upper surface, individually, ochraceous buff, with the tips slightly brownish over the hinder portion of the dorsal region, and yellowish white on the shoulders; sides of shoulders, sides of neck, and proximal two-thirds of fore limbs pale cream color, the light tips of the hairs very long; ventral surface pale reddish brown, with the tips of the hairs whitish; the dark areas on the face and the fore and hind feet dark chocolate brown; tail all around pale buff, darker and slightly browner at the tip.

Measurements. — Total length, 1150; tail vertebræ, 550; hind foot, 100. Skull (very old male), occipito-nasal length, 130; basal length (inner base of incisors to posterior border of condyles), 120; zygomatic breadth, 77; interorbital breadth, 29; width of braincase, 43; length of upper molar series, 18; length of lower molar series, 23.3; height of sagittal crest, 6.5; audital bulla, 14.6 x 10.

Nasua narica yucatanica is a small, pale form, from the arid districts of Yucatan. While it considerably exceeds in size the

very small *Nasua nelsoni* from Cozumel Island, it is much smaller than *N. narica* from eastern Mexico, and much paler, more yellow even, than specimens from southern Chihuahua. At first sight the type looks like a bleached specimen, but proves on examination to be in excellent, unworn pelage. The skull shows that the specimen was very old (the upper teeth are more or less defective from caries, but are not greatly worn). The general form of the skull is narrow, and the teeth are very small even for the small size of the skull, the three posterior upper molariform teeth having a length of 18 mm. against 21 mm. in *N. narica* from the State of Vera Cruz, and they are even more reduced in general size, the last upper molar having a transverse diameter of 6 mm. against 7.6 mm. in *narica*. The palatal region is very narrow, especially the portion posterior to the molars, where the least width is 15.5 mm. as compared with 19 mm. for the same measurement in *narica*.

Since writing the above I have received, through Mr. Gerrit S. Miller, Jr., in charge of mammals at the U. S. National Museum, a specimen of Coati from Brownsville, Texas, collected by the late Dr. J. C. Merrill, that agrees strikingly in coloration and small size with the specimen from Yucatan, it having the same dull, yellowish underfur, rusty yellow head, the long, yellowish gray tips to the hairs of the dorsal surface, and the very light underparts. Without further material it would be rash to attempt to separate subspecifically the Rio Grande and Yucatan Coatis.

In my paper on the genus *Nasua*, published in 1879 (*l. c.*, p. 163), I referred at length to this Brownsville specimen, in commenting on the wide range of geographical variation in the Coatis of Mexico and Central America, "the Mexican specimens being much lighter-colored than those from Guatemala and Costa Rica," etc.

***Nasua narica pallida*, subsp. nov.**

Type, No. 7125, adult, skin without skull, Sierra Nevada (vicinity of Guadalupe y Calva), Chihuahua, Mexico; Dr. Carl Lumholtz.

General color above pale brown, the hairs for their basal three-

fourths pale buff or buffy white, then broadly ringed with dark brown and broadly tipped with pale yellowish; top of head and nape pale yellowish brown; inner surface of ears, the light facial markings, sides of neck, sides of shoulders, and proximal two-thirds of fore limbs white; tail very pale brownish yellow, a little darker on the terminal fifth; ventral surface and flanks lighter than the back; feet dark brown; dark facial markings pale chocolate brown.

Measurements. — Total length (approximate, from a flat skin, probably stretched), 1200; tail vertebræ, 515. (There is no skull.)

Based on 5 flat skins (hunter's pelts), obtained by Dr. Lumholtz in the vicinity of Guadalupe y Calva, southeastern Chihuahua, in 1892. While very unsatisfactory material, they suffice to show the existence of a pallid form of Coati in this arid region. These five skins vary considerably in color, individually, as Coatis usually do, but agree in the essential feature of excessive pallor, as compared with specimens from southern Sinaloa, Jalisco, and eastern Mexico. The general character of the coloration, however, is quite different from that of the pallid form from Yucatan and Brownsville, Texas.

21. *Ateles geoffroyi* (*Kuhl*). Five specimens (2 males, 3 females, all adult), Pozo Azul, June 13-15 and July 5.

The color of the upper parts varies from deep chestnut rufous to pale brownish rufous, more or less suffused with yellow, especially over the shoulders and anterior half of the back; the lower surface is deep rich rufous in all, varying somewhat in intensity in different specimens.

The collector's measurements are as follows:

| | | | | | | | |
|------------|---------------|-------|----------------|------|------------|------|------|
| ♂, | Total length, | 1520; | tail vertebræ, | 950; | hind foot, | 170. | |
| ♂, yg. ad. | " | 1160; | " | " | 675; | " | 165. |
| ♀, | " | 1320; | " | " | 824; | " | —. |
| ♀, | " | 1250; | " | " | 785; | " | 172. |
| ♀, | " | 1207; | " | " | 737; | " | 178. |

The two oldest skulls measure, respectively: Basal length, ♂ 81, ♀ 82; zygomatic breadth, ♂ 67, ♀ 67.5.

22. *Cebus hypoleucus* (*Humboldt*). Five specimens, 2 males and 3 females, all adult, Pozo Azul, June 15 and July 4.

One of the females has elongated brownish hairs on the frontal region (*Cebus imitator* Thomas), while in other cases the males and females are alike in having the hairs of this region of the same length and color in both sexes.

23. *Saimiri oerstedii* (Reinhardt). Five specimens, Pozo Azul, Perris Province, May 31 and July 3, adult and young. In the young the cap is gray washed with black, the middle dorsal region is dull yellowish with a wash of dusky gray, and the feet are yellowish gray. In the young adults the middle of the back is more or less strongly varied with black, and the cap is blackish instead of deep black as in the adults.

III. — CHIRIQUI, REPUBLIC OF PANAMA.

This collection was made by Mr. J. H. Batty, during the years 1900 and 1901, mainly at or near Boqueron and Boquete, in the Province of Chiriqui, but it also includes specimens from Coiba and other islands off the coast. The collection originally included over one thousand specimens, and contained very large series of all the more common species, such as the Monkeys (three species), Sloths, Anteaters, the large Opossum (*Didelphis*), Spiny Rat, Agoutis, Squirrels, etc., all of which I had an opportunity carefully to examine. Owing to the small amount of funds available for the purchase of such material, care was taken to select from the larger series such specimens as would best show the range of seasonal and individual variation.

It so happened that Mr. Outram Bangs's collector, Mr. W. W. Brown, and Mr. Batty were working in Chiriqui at the same time, and both collected in part at the same localities, but Mr. Brown covered a wider field and did some collecting at much higher altitudes than were visited by Mr. Batty. Mr. Batty, however, had not completed his work, and on leaving for a short visit to New York, the disturbed state of the country prevented his returning to resume it, so that he had to abandon a large number of specimens collected by his native assistants after he left.

A comparison of the present list with Mr. Bangs's excellent

report (Bull. Mus. Comp. Zoölogy, XXXIX, No. 2, April, 1902, pp. 17-51) on Mr. Brown's collection shows that Mr. Brown secured a number of species that were not obtained by Mr. Batty, but they came from altitudes far above the latter's field of work, who did not collect above 5000 feet, while Mr. Brown explored the Volcan de Chiriqui to above 10,000 feet.

Mr. Batty's collection numbers 52 species, all but four of which are from Chiriqui, the others being from Coiba Island.

1. **Marmosa murina mexicana** *Merriam*. Two specimens, Boqueron, Oct. 6 and 31.

2. **Caluromys laniger pallidus** (*Thomas*). Six specimens, all adult: Boqueron, 3, Oct. 25 and Dec. 5; La Parida Island, 3, Nov. 19 and 27.

In coloration these specimens strongly approach *C. l. derbianus*, and are very different from Mr. Thomas's description of his *C. l. pallidus*, of which he says: "General color pale grey throughout, extreme examples being almost white all over, but in other specimens the shoulders, sides of neck, and the middle dorsal region are pale rufous, with an indistinct trace of the grey stripe of *Ph. l. derbianus*." No two of the Chiriqui specimens are alike in coloration; all but one distinctly show the pale gray median stripe over the shoulders seen in *derbianus*, but with varying distinctness, from very clear and strong to subobsolete, while the sides of the neck and shoulders and the middle dorsal region are rufous, varying in different specimens from light, clear rufous to dark, almost chestnut rufous. The other specimen (one of the Parida Island series) has the whole upper parts bright, nearly uniform rufous, even to the proximal half of the fore legs and the entire hind legs, with no trace of the gray stripe on the shoulders. A Costa Rica specimen, from the Irazu Range, is gray with a tinge of rufous on sides of neck, shoulders, and mid-dorsal region, and with a gray stripe over the shoulders. A San José specimen is similar except in lacking the gray shoulder-stripe. A third Costa Rica specimen, from Boruca, has the greater part of the dorsal region light rufous, and merely a trace of the gray shoulder-stripe. None of these

specimens agrees with what I take to be true *derbianus*, represented by four specimens from the Rio Cauqueta, in the Cauca region of Colombia, which have the greater part of the dorsal aspect of the body, and also the limbs, intense light rufous, with a broad, very sharply defined gray shoulder-stripe.

While I provisionally refer the Chiriqui and Costa Rica specimens to *pallidus*, they certainly show that the form is subject to a wide range of individual variation in color, and that the supposed light color and absence of a gray shoulder-stripe fail as distinctive characters of this form.

The Chiriqui specimens are all old adults, as shown by the skull. The external measurements, taken from the collector's labels, are as follows: 3 males, total length, 763 (730-800); head and body, 300 (270-320); tail vertebræ, 463 (450-480); hind foot (without claws), 43 (40-45); ear (from notch), 41 (38-45). Three females: Total length, 740 (725-765); head and body, 285 (280-290); tail vertebræ, 458 (435-480); hind foot, 43 (40-44); ear, 39 (38-40).

The largest male skull measures 64 x 36, the average of the males being about 61 x 35, or the same as the type of *pallidus*. The external measurements, however, are greater, particularly the length of the tail, than those given by Mr. Thomas for the type.¹

There is much less sexual difference in size than occurs in the *Didelphis* group.

3. ***Metachirus fuscogriseus* Allen.** Six specimens: Boqueron, 5, Oct. 30 and 31, and Nov. 30; locality not given, 1. This latter is a small, very pale female, in worn pelage.

Two very old males (Nos. 18904 and 18907) measure as follows: Total length, 640, 640; head and body, 350, 310; tail vertebræ, 290, 330; hind foot, 47.5, 50; ear, 37.5, 35. Two very old females (Nos. 18903, 18906): 610, 540; 310, 280; 300, 260; 45, 50; 40, 31. The two old male skulls measure, respectively: Total length, 80, 75; zygomatic breadth, 41.5, 41.5; an old female skull, 78 x 40. The sagittal and occipital crests are greatly developed and the teeth are much worn in all three.

¹ Mr. Thomas gives the total length of the type as 587 mm., obviously an error for 687.

The Boqueron specimens agree well with the type of *M. fuscogriseus*, which, however, proves to have been a young adult that had not reached full size. The males have a patch (probably glandular) of pale greenish yellow on each side of the flanks just in front of the thighs; in the females the fur around the edge of the pouch, and also lining it, is bright rusty chestnut.

4. *Didelphis marsupialis etensis* Allen. Six specimens, 4 adult and 2 young, Boqueron, August to December. Selected from a large series. (For measurements see this Bulletin, XVI, 1902, p. 277.)

5. *Didelphis marsupialis battyi* Thomas. One specimen, male, Coiba Island (a topotype), May 2. (For remarks on the Coiba series of *Didelphis* see this

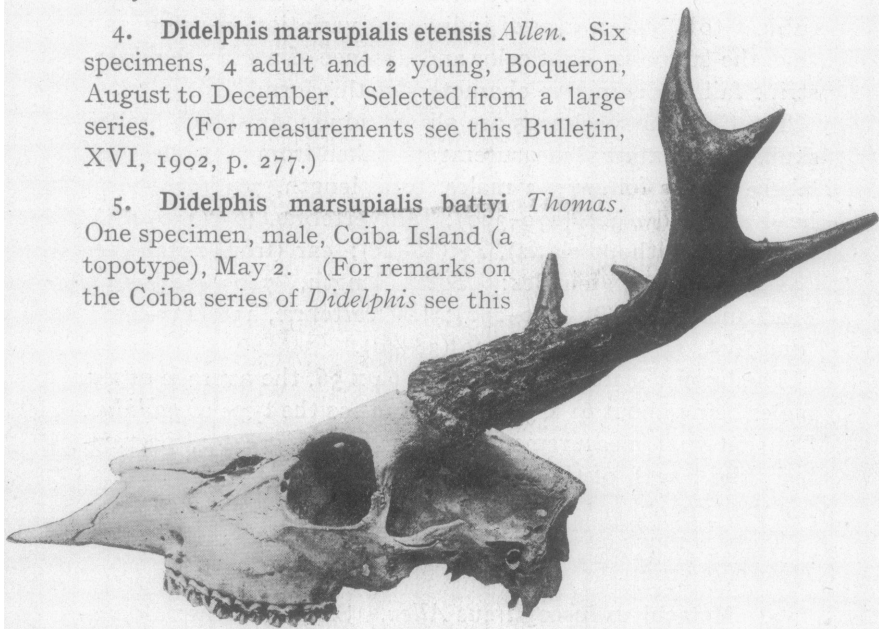


Fig. 13. *Odocoileus rothschildi*. No. 18951, ♂ old ad., Coiba Island, Panama. $\frac{1}{3}$ nat. size.

Bulletin, XVI, 1902, pp. 264, 265, and for measurements of the series see *ibid.*, p. 278.)

6. *Cholœpus hoffmanni* Peters. Five adults and 3 young, as follows, selected from a large series: Parida Island, 1 adult male, Nov. 22; Boquete, 1 adult female, Sept. 14; Boqueron, 1 adult male, 2 adult females, and 3 young, Oct. 13-24, Nov. 22, and Dec. 1.

Mr. Batty's large series of some 50 specimens shows a wide range of individual variation in color, some being much lighter

or darker than the average; some have a strong greenish tinge over the whole head and shoulders, while others show no greenish tinge whatever.

7. *Cyclopes dorsalis* (Gray). One specimen, adult female, Boqueron, Oct. 19. Total length, 422; head and body, 195; tail vertebræ, 227; hind foot, 30; ear, 15.

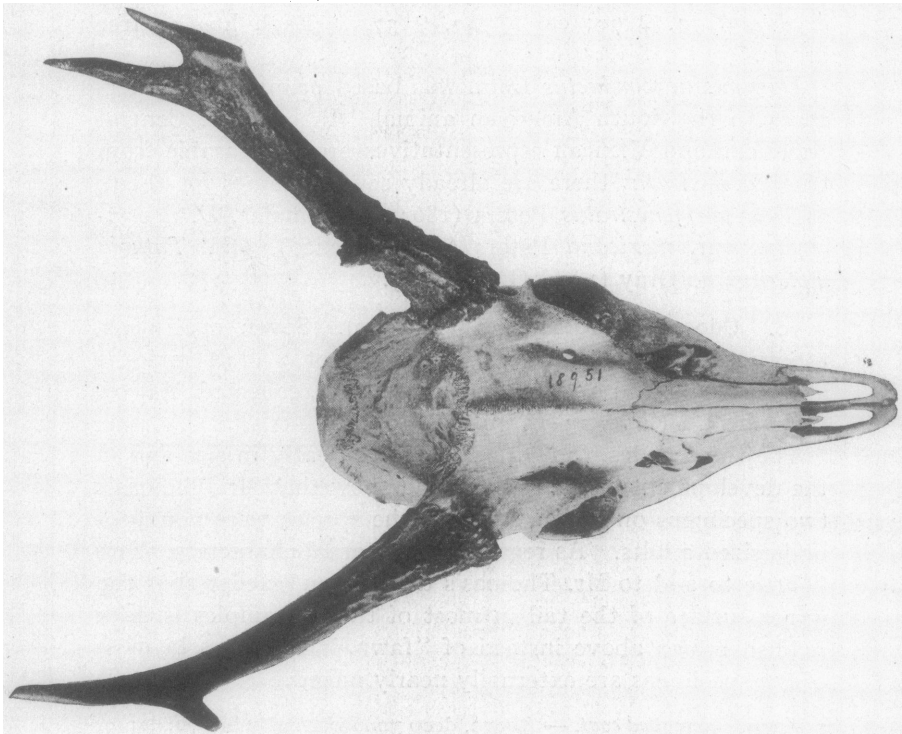


Fig. 14. *Odocoileus rothschildi*. Same skull as Fig. 13. $\frac{1}{2}$ nat. size.

8. *Tamandua tetradactyla* (Linn.). Four specimens, all females: Boqueron, 3, Oct. 16 and Nov. 26 and 27; Boquete, 1, Aug. 28. Selected from a large series, showing very wide individual variation in color. The light areas vary from nearly clear white to pale yellowish brown, and the dark areas from brown-black to deep clear black.

The three Boqueron specimens (females), measure respectively: Total length, 1165, 1240, 1120; head and body, 610, 580, 540; tail, 555, 600, 580; hind foot (without claws), 90, 100, 90; ear, 45, 50, 40.

9. *Tatu novemcinctus* (Linn.). Three specimens, Boqueron, Oct. 14-26. Total length, ♂ 735, ♀ 680; head and body, ♂ 365, ♀ 340; tail, ♂ 370, ♀ 340; hind foot (without claws), ♂ 70, ♀ 70; ear, ♂ 40, ♀ 37.5. Each has 10 free bands.

Dasypus novemcinctus Linn. was based primarily on references to the South American animal. In case the Central American and Mexican representatives prove separable from true *novemcinctus* there are already several names for them, as *Dasypus fenestratus* Peters (1864, Guatemala), *D. novemcinctus* var. *mexicana* Peters (1864, Mexico), and *Tatusia leptorhyncha* Gray (1873, Guatemala).

10. *Odocoileus rothschildi* (Thomas). Seven specimens, topotypes, from Coiba Island, consisting of 3 adult males, 2 adult females, and 2 young in spotted coat, collected May 10 to June 15. (Figs. 13-15, pp. 58, 59, 62.)

The three males, though adult, vary greatly in size and in the development of the antlers, and show that Mr. Thomas's two specimens on which he based the species were young or undersized adults. As regards the external characters, there is little to add to Mr. Thomas's description, except that the upper surface of the tail in most of these examples is dark reddish brown above instead of "fawn." The ears in most of the specimens are externally nearly naked.

Young, in spotted coat. — Above, deep yellowish rusty brown, darker along the median line, forming a well-defined dorsal stripe to a point considerably behind the middle of the back; sides lighter and more yellowish; whole dorsal surface thickly spotted with white, with a tendency to a linear arrangement of the spots; they form two distinct median parallel lines (one on each side of the middle of the back), and the spots are more or less in lines elsewhere; white of under parts and other markings as in the adults.

Mr. Batty has given me the measurements of 10 adults of this species, taken in the flesh, but owing to his omission to number some

of the specimens they cannot be satisfactorily correlated with the specimens. Of these 10 "adults," 7 are males and 3 are females, but evidently they are not of equal age, probably including young and middle-aged animals as well as some old adults.

External Measurements.

| | ♂ | ♂ | ♂ | ♂ | ♂ | ♂ | ♀ | ♀ | ♀ |
|--------------------|------|------|------|------|------|------|------|------|------|
| Head and body... | 2591 | 2438 | 2388 | 2311 | 2197 | 2159 | 2236 | 2184 | 2083 |
| Tail..... | 311 | 215 | 254 | 311 | 305 | 305 | 229 | 229 | 229 |
| Hind foot..... | 241 | 235 | — | — | — | 203 | 221 | 191 | 203 |
| Ear, from base.... | 254 | 235 | 254 | 241 | 241 | 241 | 254 | 241 | 210 |

The male skulls measure as follows, in comparison with those of the type of the species as given by Mr. Thomas.

Measurements of Six Skulls.

| | Type. | No. 18951 | No. 18949 | No. 18953 | No. 18955 | No. 18950 |
|---------------------------------|-------|--------------|--------------|--------------|--------------|--------------|
| | ♂ | ♂ | ♂ | ♂ | ♀ | ♀ |
| Greatest length..... | 201 | 222 | 207 | 211 | 194 | 192 |
| Basal length (bas. to gnath.) | 180 | 200 | 189 | 189 | 172 | 170 |
| Greatest breadth..... | 86.5 | 88 | 88 | 90 | 84 | 79 |
| Nasals, length..... | 64 | 65 | 65 | 70 | 59 | 64 |
| “ breadth..... | 22.5 | 23 | 24 | 23.5 | 21.3 | 18.5 |
| Muzzle to orbit..... | 103 | 112 | 109 | 111 | 102 | 104 |
| Breadth of braincase..... | 58 | 60 | 55.5 | 58.6 | 54.5 | 55.5 |
| Muzzle to anterior premolar | 61 | 65 | 62 | 62 | 55 | 56. |
| Alv. length of upper tooththrow | 57 | 66 | 62 | 64 | 58.3 | 63 |
| Crown “ “ “ “ | 60 | 65 | 63 | 65 | 61 | 65 |
| Alv. length of lower tooththrow | 65 | 71 | 68.7 | 70 | 66 | 71 |
| “ “ “ “ “ | 26 | 29 | 27.5 | 29 | 28 | 29 |

The antlers in the three males, all with fully developed dentition, vary greatly in size and form, two of them being obviously young adults (see Figs. 15-16) and the other (No. 18951 of the above table, shown in Figs. 13-14) a fully mature male with finely developed antlers. The antlers of the two young adults are about as described by Mr. Thomas; those of the old adult are not symmetrical, the right antler being much smaller and with fewer points than the left. The right may be described as a tapering spike, slightly curved outward, 185 mm. long, with a single point on the anterior face, near the tip, about 20 mm. long. The right antler is branched, with a sharp upward curve beginning at the middle; the main beam, following the outside curvature, has a length of 215 mm., with a sharp-pointed sub-base tine, 30 mm. long, branching off from the anterointernal face 50 mm. above the bur, and two other points from the posterior border of the apical third

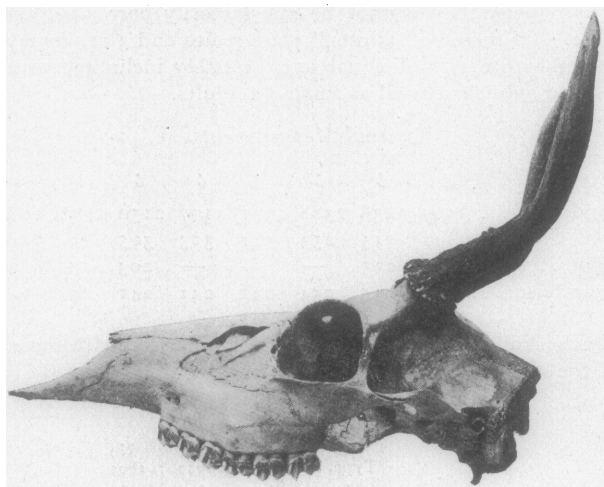


Fig. 15. *Odocoileus rothschildi*. No. 18149, ♂, young ad., Coiba Island, Panama. $\frac{1}{3}$ nat. size.

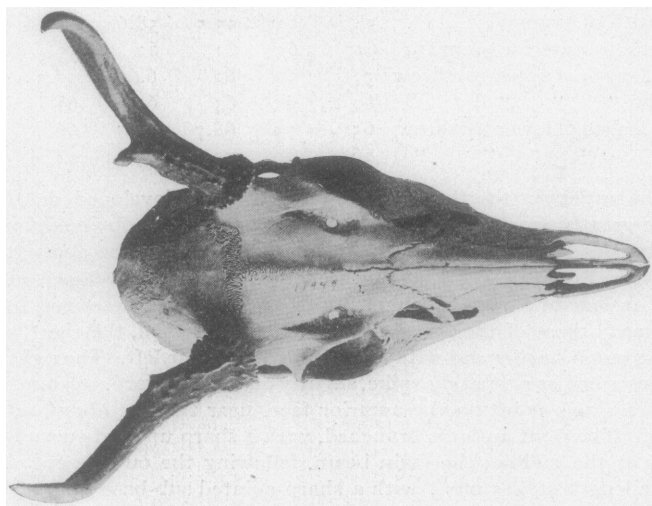


Fig. 16. *Odocoileus rothschildi*. Same skull as Fig. 15. $\frac{1}{3}$ nat. size.

of the main beam, the anterior one about 50 mm. long, and the more apical one about 20 mm. long.

O. rothschildi is much darker colored when adult than *O. costaricensis*, and the young are less conspicuously spotted with white; it is also much smaller, as stated by Mr. Thomas, than either *O. costaricensis*, *truei*, or *thomasi*, as shown by a comparison of the skull measurements given above with those of the latter as published by Miller (Proc. Biol. Soc. Wash., XIV, 1901, pp. 36, 37). Two Chiriqui skulls of females of *O. costaricensis*, slightly younger (the last molar not functional) than the two from Coiba Island of which measurements are given above, considerably exceed the latter in size, being about 5-7 mm. broader and 15-20 mm. longer, with proportional increase in bulk, less frontal convexity, and larger antorbital vacuities.

11. ***Odocoileus costaricensis* Miller.** Three skins and skulls (2 adult females and one young in spotted coat), and 9 additional pairs of antlers, Boqueron, Oct. 9 and Dec. 4 and 15.

As said above, *O. costaricensis* is larger and paler, and the young are less conspicuously spotted, than *O. rothschildi*.

The nine pairs of antlers vary greatly in size and massiveness, but with two exceptions are very symmetrical in form. In color they are dark reddish brown, except one pair which is much lighter and was probably taken soon after the shedding of the velvet.

This series is instructive as showing the variation of the antlers in size and form with age, and also the individual variation. Although the antlers vary so greatly in development there is very little variation in the diameter of the brain cavity, which ranges in transverse width from 53 to 56 mm., the youngest specimens having slightly the greatest width of brain cavity. With the advance of age the walls of the skull thicken, so that the breadth of the skull at the postorbital constriction (between orbits and base of horn pedicles) increases from 78 mm. in the two youngest skulls to 88 in the normal adult, and to 99 in the exceptionally heavy pair (No. 21566, Fig. 17 g and g').

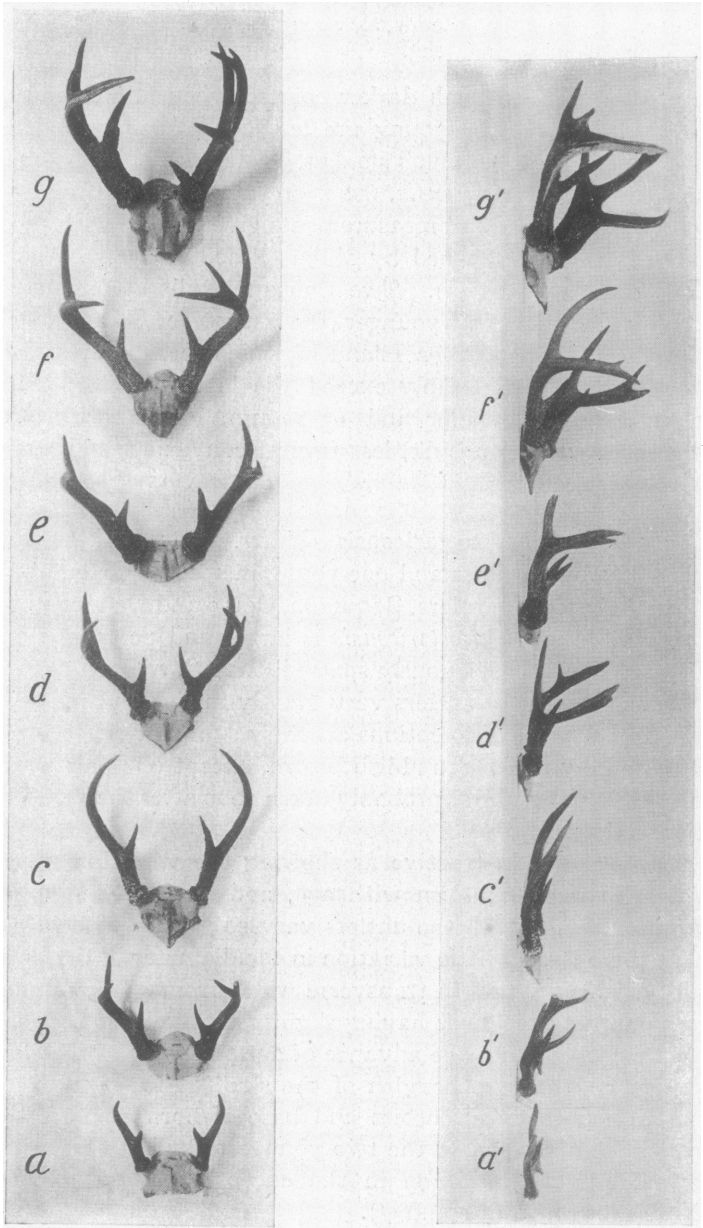


Fig. 17. *Odocoileus costaricensis*. Series of antlers illustrating variation with age. *a-g*, front view; *a'-g'*, same, side view. About $\frac{1}{10}$ nat. size.

In the youngest pair (No. 21572) the main beam has a length¹ of only 117 mm., is curved inward at the tip, and carries a single point, 27 mm. long, the top of the fork being 44 mm. above the edge of the bur; circumference at base (just above bur), 65. (Fig. 17, *a* and *a'*.)

The next in size (No. 21573) has three points instead of two, the main beam in both antlers being forked at the tip. Length of main beam, 182; of basal tine, 47; of upper tine, 55; circumference at base, 83. (Fig. 17, *b* and *b'*.)

The third pair (No. 21567) is much longer, with a long, slender main beam and only the basal tine. Length of main beam, 280; basal tine, 60; circumference at base, 80. (Fig. 17, *c* and *c'*.)

The fourth pair (No. 21568) is less massive and shorter, but is more forked, the right antler having three points and the left antler four. Length of main beam, 237; circumference at base, 93. (Fig. 17, *d* and *d'*.)

The fifth pair (No. 21569) is thick and heavy but symmetrical, each antler having three points. Length of main beam, 260; circumference at base (just above bur), 112. (Fig. 17, *e* and *e'*.)

The sixth pair (No. 21570, apparently prematurely stripped of the



Fig. 18. *Odocoileus costaricensis*. Malformed antlers. ♂ nat. size.

velvet) has the antlers long and slender, each with four points, but the upper one much less developed on the right than on the left. Length of main beam, 315; circumference at base, 100. (Fig. 17, *f* and *f'*.)

The seventh pair (No. 21566) is extraordinarily massive and otherwise evidently somewhat abnormal. Each antler has five points, but

¹ Measurement taken along outside curvature, in all cases. If the two antlers of a pair vary in size, the larger antler is the one measured.

the fifth on the right antler comes off at the inner base of the basal tine, and in the left is produced by the slight forking of the main branch of the antler, which is not, however, homologically the main beam. (Fig. 17, *g* and *g'*.) Length of main beam, 336; circumference at base, 120 (right antler) and 150 (left antler). In the left antler the basal prong is situated close to the bur, in the left at the usual point (about one third the length of the main beam above the bur). The animal that carried these antlers was doubtless very old, as well as very large, the portion of the cranium attached to the antlers being very heavily ossified, giving great breadth to the frontal processes supporting the antlers, while the diameter of the brain cavity is slightly less than in the youngest specimens of the series.

The eighth pair (No. 21571) is curiously malformed, as shown by the photograph reproduced in figure 18. The left antler, the longer of the pair, has a length of only 150 mm., and is abnormally developed throughout, the part that may be homologized as the basal tine starting from the bur, and being one half as long and nearly as massive as the main beam. The left frontal bone at the base of the antler shows exostosis and other unnatural conditions. The chief interest of the specimen is pathological, although it strongly recalls the specimen figured long ago by Pennant, which later became the basis of *Cervus mexicanus* of some of the earlier systematists.

12. **Sciurus (Echinosciurus) melania** (*Gray*). Ten specimens, Boqueron, Sept. 4–Dec. 29; selected from a large series, to show seasonal variation in color and pelage, already well described by Mr. Bangs (*l. c.*, p. 22). His specimens were from Divala, Bogaba, and Boquete, — from sea level to 2000 feet altitude.

13. **Sciurus (Echinosciurus) adolphei dorsalis** (*Gray*). A single specimen from Remedios (collected by D'Arce), of the 'rigidus' type.

14. **Sciurus (Guerlinguetus) hoffmanni** (*Peters*).

Sciurus (Guerlinguetus) estuans chiriquensis BANGS, Bull. Mus. Comp. Zool., XXXIX, No. 2, April, 1902, 22.

Fourteen specimens: Boquete, 7, Aug. 22–Sept. 8; Boqueron, 7, Oct. 9–Nov. 25. Selected from a large series, to show seasonal and individual variation.

It appears to me that the Chiriqui animal is indistinguishable from Costa Rica specimens of true *S. hoffmanni*. The

palest specimens of the former (*chiriquensis* Bangs) are not paler than the palest of the *hoffmanni* series, and the brightest have the upper parts as red, and the tail fringe and ventral surface as deeply reddish orange, as any examples from Costa Rica. (On individual variation in this species see *antea*, p. 44.)

I also refer to *S. hoffmanni* a series of 12 specimens from the upper Cauca Valley, Colombia, showing that the form has an extended range to the southward of Costa Rica.

As stated by me five years since (this Bulletin, XII, p. 17, March 17, 1899), "true *æstuans* and *hoffmanni* should be recognized as distinct species," an opinion that seems to be shared by Mr. Bangs (*l. c.*, p. 23).

15. **Mus rattus** Linn. Seven specimens, Boqueron, Oct. 4, 23, and 29, and Nov. 23-30. Very abundant, with the habits of a wild species, being found remote from towns or the dwellings of man.

16. **Megadontomys flavidus** Bangs. Five specimens, Boquete (hence topotypes of the species), August 19-27.

17. **Peromyscus nudipes** (Allen).

Hesperomys (*Vesperimus*?) *nudipes* ALLEN, Bull. Am. Mus. Nat. Hist., III, No. 2, 1891, p. 213. La Carpintera, Costa Rica.

Peromyscus cacabatus BANGS, Bull. Mus. Comp. Zoöl., XXXIX, No. 2, p. 29, April, 1902.

Ten specimens, Boquete, Chiriqui, Aug. 21-25, mostly young adults.

Peromyscus nudipes was described in 1891 from a single specimen, preserved in alcohol, collected by Mr. George K. Cherrie at La Carpintera, Costa Rica. Later other specimens (skins in poor condition) were received from Messrs. Cherrie and Alfaro, collected at Jimenez, Isla Nueva (Irazu Range), Santa Clara, and near San José. Recently the Museum has received a series of 19 excellent specimens, collected mostly at the Rancho de R. Jimenez, Volcan de Irazu, by M. A. Carriker, Jr., in March and April, 1902. This series is apparently indistinguishable in coloration from Mr. Batty's

specimens collected at Boquete, and hence topotypes of Mr. Bangs's *Peromyscus cacabatus*, or from the type and 4 topotypes kindly sent me for comparison by Mr. Bangs. Nine adult skulls from Irazu and vicinity (practically topotypes of *P. nudipes*) do not differ appreciably in measurements or otherwise from the 5 adult skulls of *P. cacabatus* received from Mr. Bangs, the average difference in occipito-nasal length being only .4 of a millimeter. The external measurements of 10 adults from the Irazu series compared with measurements of a similar series from Boquete, recently published by Mr. Bangs (Bull. Mus. Comp. Zoöl., XXXIX, 1902, p. 30), shows that the total length is practically the same in the two series (varying only about 1 mm.), but the Irazu specimens show a greater tail length (by about 8 mm.), and a larger hind foot (by about 2 mm.) than the Boquete specimens. This apparent difference is doubtless due to different methods of measuring, especially as respects the relative length of the tail.

18. *Tylomys watsoni* Thomas. One specimen, adult male, Boqueron, Oct. 31.

19. *Sigmodon borucæ chiriquensis*, subsp. nov.

Type, No. 18789, ♂ ad., Boqueron, Chiriqui, Oct. 28; J. H. Batty.

Similar to *S. borucæ*, but darker and more heavily colored, the upper parts being deep yellowish brown, varied with black instead of light yellowish brown, and the underparts strongly buffy instead of white; nose and sides of upper lip broadly ochraceous buff instead of pale buff; bullæ more pyriform and postpalatal opening much broader.

Type, total length, 280; head and body, 175; tail vertebræ, 105; hind foot (in dry skin), 32; ear, 20. An adult female is a little smaller, but has a longer tail (tail vertebræ, 115).

Represented by 6 specimens, all from Boqueron, collected Oct. 12-27.

S. b. chiriquensis closely resembles in coloration *S. toltecus saturatus* Bailey from Chiapas and Vera Cruz, Mexico, but differs from it in cranial characters. It differs from *S. borucæ* in color and cranial characters, as noted above, *borucæ* being paler with a tendency to a grayish cast on the head and anterior half of the body in slight contrast with the posterior half, while in *chiriquensis* the coloration of the upper parts is

equally intense throughout. Costa Rica specimens of *boruca* present quite a range of variation in depth of coloration, and some of the darker specimens quite closely approach *chiriquensis*, but the well-marked differences in the form of the bullæ and the width of the postpalatal opening seem constant.

20. *Oryzomys costaricensis* Allen.

Oryzomys vegetus BANGS, Bull. Mus. Comp. Zoöl., XXXIX, No. 2, April, 1902, 35.

Seven specimens, Boquete (topotypes of *O. vegetus*), Aug. 19-29.

The type and 12 topotypes of *O. vegetus*, kindly sent me for examination by Mr. Bangs, do not differ appreciably from the type, 3 topotypes, and additional Costa Rica specimens of *O. costaricensis*. They also agree with the 7 Boquete specimens collected by Mr. Batty, which I unhesitatingly refer to *O. costaricensis*.

Mr. Bangs's *O. costaricensis* (*l. c.*), of which he has kindly sent me his series of 5 specimens, seems to represent merely a pale phase of *O. costaricensis*, due to individual variation. They are paler rufous above and nearly white below, but similar specimens occur in my series of 15 specimens from Costa Rica. The type of *O. vegetus* is, with one exception, the highest colored specimen of Mr. Bangs's series, but it is not very appreciably brighter than the type of *O. costaricensis*. Mr. Bangs informs me that he inadvertently placed the name *vegetus* on the dark form (= *costaricensis* vera) instead of on the light form, after having returned the specimens of *O. costaricensis* borrowed from this Museum, so that *vegetus* = *costaricensis* and the light form was left unnamed. As said above, it does not appear to be separable from true *costaricensis*; it is represented by 5 pale specimens selected from his series (= 13 'vegetus' + 5 'costaricensis'), all taken at the same locality, and some of each on the same dates.

21. *Zygodontomys cherriei* Allen. Eleven specimens, Boqueron, Oct. 12 and 25-31, and Nov. 20 and 25.

22. *Zygodontomys* (?), sp. One specimen, skin without skull, Boqueron, Oct. 28. Without the skull it is impossible to determine whether this specimen should be referred to *Sigmodon* or to *Zygodontomys*. In either case the species is apparently undescribed.

23. *Reithrodontomys costaricensis* Allen. Six specimens, Boquete, Aug. 20-29.

24. *Macrogeomys cavator* Bangs. Two specimens (topotypes), adult male and female, Boquete, altitude 5000 feet.

25. *Heteromys repens* Bangs. Two specimens, — adult female, Boqueron, Oct. 31; young in slaty pelage, Boquete, without date.

26. *Proechimys centralis chiriquinus* Thomas. Twelve specimens, selected from a large series, Boqueron, Oct. 21- Dec. 1.

27. *Coendou lænatus* Thomas. Four specimens, Boqueron, Oct. 25, Nov. 27, and Dec. 4.

28. *Dasyprocta coibæ* Thomas. Four specimens (topotypes), skins and skulls, and 2 additional skulls, Coiba Island, May 14-19 and June 19.

Mr. Batty has kindly given me his measurements, taken in the flesh, of 9 specimens, 3 males and 6 females; some of the latter are obviously not fully grown. The males measure respectively: Total length, 495, 555, 465; head and body, 465, 520, 435; tail, 30, 35, 30; hind foot, 120, 120, 115; ear, 40, 40, 35. The largest 3 females: Total length, 505, 510, 530¹; head and body, 465, 470, 500; tail, 40, 40, 30; hind foot, 110, 117, 115; ear, 40, 40, 40.

29. *Lepus (Tapeti) gabbi* (Allen). Six specimens, including 4 adults and 2 very young examples, Boqueron, October and December, except one, taken in April, and without definite locality.

30. *Felis bangsi costaricensis* Merriam. One skin, without

¹ The last of these three females is the type of the species. Collector's No. 129. Mr. Thomas's measurements were taken from the skin and naturally differ from the above.

skull, an adult female, Boqueron, Jan. 6. This specimen agrees well with Dr. Merriam's description of the type, from Boquete. The sides are bright reddish fulvous; the median dorsal region is much darker — or dark reddish chestnut — as is also the dorsal area of the tail; the tail darkens apically, so that the apical half is decidedly blackish, the tip being wholly black for the terminal two inches. The inguinal region is pure white, a small pectoral area whitish, and the intervening region is like the flanks but much paler. Fur between toe pads black; ears almost wholly black, the usual lighter areas being brownish black and the rest deep black.

31. *Felis mearnsi*, nom. nov.

Felis costaricensis MEARN'S, Proc. U. S. Nat. Mus., XXV, 245, Sept. 17, 1902. Talamanca, Costa Rica. Not *Felis bangsi costaricensis* Merriam, Dec. 11, 1901.

One specimen, young male, skin and skull, Boqueron, Aug. 28.

32. *Felis panamensis*, sp. nov.

Type, No. 14946, ♀ (young adult), Boqueron, Chiriqui, Panama, Oct. 30; J. H. Batty.

General color above dusky gray, the dorsal region posteriorly, tail, inner surface of limbs and feet strongly blackish; sides and front of limbs lighter, the hairs broadly tipped with whitish, giving a dark gray effect; whole head, including ears, nape, and sides of neck, much lighter than body, rusty brownish gray varied minutely with black; top of shoulders and posterior third of the median dorsal region deep black, sparsely and irregularly varied with whitish tipped hairs; tail black above, sides and undersurface lighter, strongly varied with whitish gray hairs and gray-brown underfur; general color of ventral surface dark gray, strongly blackish on the chest; fore neck and throat rusty brown, varied slightly with dusky.

Measurements. — Total length, 985; head and body, 595; tail vertebrae, 390; hind foot (in dry skin), 128; ear, 40. Skull, total length, 96; basal length of Hensel, 80; zygomatic breadth, 62; least interorbital breadth, 15.5; least postorbital breadth, 32; width of braincase, 46; length of nasals, 24; width of nasals at front border, 12; do. at end of frontals, 5.3; length of palate, 33; auditory bulla, 18 x 12; breadth at posterior end of carnassials, 37; upper toothrow from front of canine, 30; length of upper carnassials, 12.5; length of lower carnassial, 9.7; length of lower jaw (front base of incisors to end of angular process), 60; height at condyle, 13; do. at coronoid, 27.

The dorsal contour of the skull is slightly and evenly convex, except that the nasals and occipital region slope abruptly downward. There is a strongly depressed sinus at the base of the nasals, as in *F. yagouaroundi*. The chief peculiarity of the dentition, aside from the small size of the teeth, is the reduction of the protocone of the upper carnassials, it being barely indicated by a slight bulging of the cingulum. In the *F. yagouaroundi* and *F. eyra* groups the protocone is strongly developed. The present skull is that of a middle-aged female, so that the general dimensions are less than would be the case in a very old skull with a highly developed occipital crest.

Felis panamensis is a member of the *yagouaroundi* group, distinguished especially by very dark coloration, the convex instead of the flat frontal region of the skull, and the practical absence of the protocone on the upper carnassial.

33. **Conepatus (Marputius) marpurito** (*Gmelin*). One specimen, male, Boqueron, Oct. 1901.

34. **Putorius (Arctogale) affinis** (*Gray*). One specimen, adult male, Boquete, altitude 5000 feet. On the right side of the head are a few white hairs, scattered singly over the whole side of the head from eye to ear; on the left is a very small oblong white spot just behind the eye, and another somewhat larger white spot in front of the lower base of the ear.

35. **Potos flavus chiriquensis**, subsp. nov.

Mr. Oldfield Thomas in his recent revision (*Ann. and Mag. Nat. Hist.*, (7) Vol. IX, April, 1902, pp. 266-270) of the Kinkajous (*Potos flavus* group, formerly *Cercoleptes caudivolvulus*), has recognized five subspecies, adopting for one of them Martin's name *megalotus*. It is to be regretted that he did not rule out both of Martin's names, as he did one of them, as unidentifiable. Martin (*P. Z. S.*, 1836, pp. 81-83) had two menagerie specimens, from unknown localities, which differed so much from each other that he thought they might "ultimately prove to be distinct species," and proceeded to describe them, naming them respectively *Cercoleptes megalotus* and *Cercoleptes brachyotus*. "In distinguishing between the two species of Kinkajous," he considered "it best to drop entirely

the specific title *caudivolvulus*, . . . the only mode in fact by which to avoid all possibility of confusion [!].”

Thomas says of these names (*l. c.*): “It is difficult to know how to deal with Martin’s *Cercoleptes megalotus* and *brachyotus*, described from menagerie specimens without localities, . . . the characters used being mainly due, according to Gray, to the ‘artifice of the preserver.’ . . . In any event the name [*brachyotus*] may be put aside for the present as indeterminate.” The other he adopts for a deep-colored form from “Costa Rica and Colombia,” mentioning an example from Medellin, Colombia, as agreeing “best with the description,” and cites others from Costa Rica, and from Valdivia and Santa Marta, Colombia, which “cannot be distinguished from it.” The five subspecies he recognized may be tabulated as follows:

Potos flavus flavus. Guiana.

Potos flavus megalotus. Costa Rica and Colombia.

Potos flavus aztecus. Mexico and Guatemala.

Potos flavus modestus. Guayas Province, Western Ecuador.

Potos flavus meridensis. Sierra Nevada, Merida, Venezuela.

Nothing is said about the range of *flavus* (typica) further than to consider “Surinam” as the type locality.

This Museum contains a series of 23 specimens of Kinkajous, of which 1 (without skull) is from Merida, Venezuela (topotype of *P. f. meridensis*); 7 from Santa Marta, Colombia; 4 from Castilla Mountains, Colombia (upper Cauca region); 4 from Chiriqui, Panama; 1 from Chapada, Matto Grosso, Brazil; and 6 menagerie specimens, without localities, and hence practically worthless. Mr. Bangs has kindly loaned me 6 others — 3 from Orizaba, Mexico, and 3 from Chiriqui.

The material from these six localities — Orizaba, Chiriqui, Merida, the Castilla Mountains, Santa Marta, and Chapada — represent six well-marked forms, three of which appear to be unnamed. The Merida specimen is, of course, Thomas’s *Potos flavus meridensis*. The Chiriqui specimens are very different from the Santa Marta specimens and must be separated from them; and in this connection comes up the difficult question of deciding on names for them, a matter which has

become complicated through Mr. Thomas's use of Martin's practically baseless name *megalotus* for "Costa Rica and Colombia" specimens collectively. I should discard *megalotus* as unidentifiable were it not that Thomas has habilitated it, and so under the 'first reviser' principle it may be conserved for a portion of the Costa Rica-Colombia combination. As most of his specimens were from Colombia, a Medellin example being particularly mentioned as agreeing "best with the description," and Valdivia and Santa Marta (Colombia) specimens "cannot be distinguished from it," it seems best to assign the name *megalotus* to the form of eastern Colombia; especially as my Santa Marta specimens agree far better with the description of *megalotus* than do those from Chiriqui.

The additional three forms may be recognized as follows:

***Potos flavus chiriquensis*, subsp. nov.**

Type, No. 18926, ♂ ad., Boqueron, Chiriqui, Panama, Oct. 22, 1901; J. H. Batty.

General color (type) above brownish yellow, the hairs individually being dull brownish yellow, tipped conspicuously and quite uniformly with blackish; middle of the back rather more blackish than the sides, but without a dark dorsal line; below dull greenish yellow (without black tips to the hairs), with a darker rusty brown streak along the middle of the abdomen; sides of neck, from shoulders to cheeks, and front of neck, yellowish rufous or golden rufous; ears colored like the surrounding pelage; tail above like the back for about four fifths of its length, becoming gradually darker or brownish black apically on the terminal fifth, the sides and below dull brownish yellow.

Six other specimens differ scarcely appreciably from the type; in two there is a slight tendency to a dark dorsal line.

Measurements. — The collector's measurements are as follows:

| No. | Sex. | Total length. | Head and body. | Tail vertebræ. | Hind foot. | Ear. |
|--------------------|--------|---------------|----------------|----------------|------------|------|
| 18926 | ♂ type | 990 | 485 | 505 | 80 | 42 |
| 10122 ¹ | ♂ | 960 | 460 | 500 | 93 | 40 |
| 18925 | ♂ | 815 | 390 | 425 | 75 | 36 |
| 18924 | ♀ | 975 | 480 | 495 | 75 | 40 |
| 18923 | ♀ juv. | 747 | 350 | 397 | 80 | 40 |

Two adult skulls, No. 18926, male (type), and No. 18924, female, measure as follows: Occipito-nasal length, ♂ 92, ♀ 90; basal length (inner base of incisors to posterior border of condyles), ♂ 83, ♀ 82;

¹ Bangs Collection.

zygomatic breadth, ♂ 59, ♀ 58.6; interorbital breadth, ♂ 21.3, ♀ 20; width of braincase, ♂ 41, ♀ 40; length of palate (incisors to end of point), ♂ 31.5, ♀ 32.5; upper premolar-molar series, ♂ 20, ♀ 20; lower premolar-molar series, ♂ 23, ♀ 22; length of lower jaw (front base of incisors to posterior border of condyle), ♂ 61, ♀ 60.5; height at condyle, ♂ 30, ♀ 29; height at coronoid process, ♂ 43.5, ♀ 44.

The dental armature is heavy; the palate is flat (not, or only slightly, depressed at posterior border); bullæ small and flat.

Compared with Santa Marta (Colombia) specimens of *P. f. megalotus*, the general coloration is much deeper and darker throughout, the yellow of a more greenish cast, especially below, the tips of the hairs of the dorsal surface black instead of reddish brown, and the narrow dark dorsal stripe, usually well-marked in the Santa Marta specimens, is absent. As regards cranial characters, the skull is considerably larger (about 4 to 6 mm. longer and proportionately wider), and the teeth are fully one third broader and larger; the most marked difference, however, is seen in the form of the posterior part of the palatal floor, which is flat in *chiriquensis* and deeply and abruptly depressed in *megalotus*, thus greatly reducing the height of the posterior nasal opening and giving to it an entirely different contour; the pterygoids, on the other hand, are much deeper or broader in *megalotus*, and the pterygoid hamuli much longer and slenderer; the posterior nares are much broader and shallower, and the auditory bullæ are much more inflated.

Potos f. chiriquensis differs greatly in cranial characters from all the South American forms of the genus known to me, but finds a near ally in *P. f. aztecus*.

***Potos flavus caucensis*, subsp. nov.**

Type, No. 14186, ♂ ad., Castilla Mountains (altitude 6000 feet), upper Cauca region, Colombia, June 9, 1898; J. H. Batty.

General coloration above yellowish brown, with a reddish tinge and washed with black, with a very prominent black median stripe extending from the shoulders posteriorly to the end of the tail; the hairs of the back are individually brownish gray for their basal two thirds, then broadly ringed with brownish rusty yellow and broadly tipped with black; top of head blackish, as are also the sides and top of nose, and a prominent stripe above and below the eye, forming a broad, nearly

complete, blackish eye-ring; ears externally blackish and quite large; ventral surface pale yellow, suffused with pale brownish rufous over the fore neck, darkening to a rusty pale chestnut median band on the chest, and on the abdomen to dark chestnut; limbs externally like the sides of the body, darkening slightly on the toes; tail above like the back, that is reddish brown with a darker median band, which expands apically to occupy the whole upper surface; lower surface of tail dull brownish yellow.

The four specimens agree in their generally very dark (blackish) coloration above, but vary a little in the amount of reddish brown suffusing the surface of the dorsal pelage.

Measurements. — Type, ♂ ad., total length, 874; head and body, 430; tail vertebræ, 444; hind foot (without claws), 79; ear, 36. Another specimen, ♀ ad.: Total length, 843; head and body, 413; tail vertebræ, 430; hind foot, 73; ear, 35. The skulls of these specimens measure, respectively: Occipito-nasal length, ♂ 89, ♀ 86; basal length, ♂ 83.5, ♀ 78; zygomatic breadth, ♂ 60, ♀ 57.5; interorbital breadth, ♂ 17, ♀ 18; width of braincase, ♂ 40, ♀ 41; length of palate, ♂ 36, ♀ 36; upper premolar-molar series, ♂ 20, ♀ 20; lower premolar-molar series, ♂ 23, ♀ 22; length of lower jaw, ♂ 61, ♀ 58; height at condyle, ♂ 29.5, ♀ 27.5; height at coronoid, ♂ 41, ♀ 41.5. These specimens are both middle-aged adults.

This subspecies needs no comparison with *P. f. megalotus* (as represented by Santa Marta, Colombia, specimens), being so widely different in color; and it is equally distinct in coloration from *P. f. chiriquensis*, and radically distinct from it in cranial characters. It belongs to the group having the palatal floor posteriorly depressed, and with the teeth relatively small, and should be perhaps compared with *P. f. modestus*, from southwestern Ecuador, which it apparently approaches in coloration, but exceeds in size. It also has a general resemblance in coloration to *P. f. meridensis*, but the yellow of the lower parts is paler and much less suffused with orange, and it appears to be much larger.

***Potos flavus chapadensis*, subsp. nov.**

Type, No. 1413², ♂? ad., Chapada, Matto Grosso, Brazil, August, 1885; Herbert H. Smith.

Above dull yellowish brown, the tips of the hairs blackish; an indistinct and somewhat interrupted dark dorsal stripe from behind the shoulders to the rump; top of head rather darker than back, through the greater abundance of blackish-tipped hairs; ears large,

externally blackish brown, much darker than the surrounding pelage; limbs dull yellowish brown, slightly darker on the toes; tail similar in color to the back, slightly darker above toward the base and terminally, dull yellow below; ventral surface of body centrally deep ochraceous orange, lighter, clearer yellow on the sides.

Measurements. — Total length, 1123; head and body, 572; tail vertebræ, 551; hind foot (in skin), 76; ear, 45. Skull, occipito-nasal length, 92; basal length, 82; zygomatic breadth, 59; interorbital, 21; width of braincase, 39; length of palate, 37.5; upper premolar-molar series, 19; lower premolar-molar series, 20; length of lower jaw, 62; height at condyle, 28; height at coronoid, 45.5.

The palate is thinned out posteriorly, but scarcely at all depressed; teeth very small; audital bullæ large and much inflated, very much larger and much more swollen than in any of the northern forms of the genus. The specimen is old, with well-developed sagittal and occipital crests; the sex is given as "♂?", and is probably male.

The cranial characters separate this subspecies quite sharply from the northern forms, and the coloration is rather peculiar in the deep orange ochraceous tint of nearly the whole ventral surface, and the absence of the strong dorsal streak seen especially in *P. f. meridensis*, *modestus*, and *caucensis*, and, according to Thomas, in *flavus*.

36. ***Nasua narica panamensis* Allen.** One specimen, adult female, Boqueron, Oct. 29. Total length, 1080; head and body, 540; tail, 540; hind foot, 85.

I am indebted to Mr. Bangs for the opportunity to examine, in this connection, his series of 6 specimens from Boquete. While they agree in color with *bullata*, they lack the excessive development of the audital bullæ seen in that form, as already noted (*antea*, p. 51).

37. ***Procyon lotor hernandezii* (Wagler).** One specimen, female, Boqueron.

38. ***Myotis nigricans* (Wied).** Two specimens, Boqueron.

39. ***Myotis chiriquensis*, sp. nov.**

Type, No. 18736, ♀ ad., Boqueron, Chiriqui, Panama, Oct. 16, 1901; J. H. Batty. Represented by three specimens, taken at the same locality and date.

Size very small, smallest of the known American species of *Myotis*; pelage thick, soft, and rather short.

Above very dark brown; pelage beneath the surface blackish, the hairs individually very slightly tipped with gray, blending with the ground color to give a general effect of very dark brown; below basal two thirds of pelage deep plumbeous, the apical third or fourth lighter or pale brown, the ventral surface being thus decidedly paler than the dorsal; ears and membranes dark brown or blackish. Wing from base of toes; uropatagium naked above, slightly hairy at extreme base below; ears medium, rather pointed, deeply incised on the outer border.

Measurements. — Type, from dry skin: Total length, 73; head and body, 43; tail vertebrae, 30; tibia, 11.5; foot, 6.5; forearm, 26; thumb, 4; 3d finger: metacarpal, 31; 1st phalanx, 11; 2d phal., 10; 3d phal., 6.5; ear from meatus, 10; tragus, 5. Another specimen gives the same measurements, and a third is slightly larger.

Skull, total length, 13.6; mastoid breadth, 6.5.

Myotis chiriquensis is similar in coloration to *M. nigricans*, and also in the shape of the skull, from which species it is easily distinguished by its much smaller size — forearm 26 against 34 in *nigricans* from the same locality. It seems to be, in fact, a miniature of *M. nigricans*.

40. **Vespertilio fuscus miradorensis** (*H. Allen*). Three specimens, Boquete, Sept. 8 and 15.

41. **Molossus obscurus** *Geoffroy*. Six specimens: Boqueron, 2, Oct. 15 and Nov. 20; Coiba Island, 4, June 1-3.

42. **Natalus stramineus** *Gray*. One specimen, Coiba Island, June 1.

43. **Vampyrus spectrum** (*Linn.*). Two specimens, adult male and female, Boqueron, Dec. 1. Expanse, 765, 740; ear, 40, 40.

44. **Phyllostomus hastatus** (*Pallas*). Six specimens, Boqueron, Oct. 6 and 15, and Dec. 4 and 8. The measurements, given for 3 specimens only, are: Expanse, 2 males, each 650, 1 female, 630; ear, 12-12.5.

45. **Hemiderma perspicillatum** (*Linn.*). Seventeen specimens, Boqueron, Sept. 30-Oct. 6 and Nov. 11.

46. **Glossophaga soricina** (*Pallas*). Thirteen specimens, Boqueron, Sept. 30, Oct. 3, Nov. 1-19, and Dec. 1 and 16.

47. *Artibeus intermedius* ♀. A. Allen. One specimen, Boqueron, Dec. 19.

48. *Artibeus watsoni* Thomas. Six specimens, Boqueron, Oct. 4, Nov. 1, 13, and 18.

49. *Vampyrops helleri* Peters. Six specimens, Boqueron, Oct. 2, 3, 26, and 28.

50. *Desmodus rotundus* (E. Geoffr.). One specimen, Boqueron, Dec. 5.

51. *Alouatta palliata* (Gray). Seven specimens, all adult: Boqueron, 1, adult male, Dec, 2; Boquete, 6 (3 males, 3 females), Aug. 20-23. Selected from a large series.

The collector's external measurements are as follows:

| Total length. | Head and body. | Tail vertebræ. | Hind foot. | Ear. |
|---------------|----------------|----------------|------------|------|
| ♂, 1180 | 550 | 630 | 150 | 30 |
| ♂, 1020 | 520 | 500 | 140 | 25 |
| ♂, 1095 | 525 | 570 | 135 | 30 |
| ♂, 1160 | 570 | 590 | 140 | 35 |
| ♂, 1195 | 565 | 630 | 155 | 35 |
| ♀, 1090 | 530 | 560 | 135 | 25 |
| ♀, 1075 | 515 | 560 | 140 | 35 |

The skull varies greatly in size with age. The oldest male, with the teeth greatly worn and the temporal ridges united to form a low sagittal crest, has a basal length (inner base of incisors to posterior border of occipital condyles) of 103 mm. and a zygomatic breadth of 91, the same measurements in a young adult being 84 and 72. The 7 skulls measure as follows:

| |
|--|
| ♂, Basal length, 103; zygomatic breadth, 91. |
| ♂, " " 101; " " 88 |
| ♂, " " 100; " " 86.5 |
| ♂, " " 99; " " 86 |
| ♂, " " 84; " " 72 |
| ♀, " " 85; " " 74 |
| ♀, " " 85; " " 73 |

The range of individual color variation is strikingly great. Two males, strictly comparable as to age (as shown by the skulls), and representing the extremes of a large series, differ as follows: One has the whole head, shoulders, lower back,

limbs, and tail deep black, with the median area of the back dull black, lighter than the head, shoulders, and limbs, and passing gradually into the lighter color of the flanks, many of the hairs at the sides of the median area being tipped with pale, glistening yellowish; flank stripe narrow, brownish yellow on the lower edge, brighter, glistening pale yellow along the middle; ventral surface dull ruddy brown, with a decidedly rufous tinge on the breast. The other also has the head, shoulders, rump, limbs, and tail deep black, but the middle region of the back is brownish black, more or less suffused with fulvous except along the median line; flank stripe, extending from front of shoulder posteriorly to thigh, deep golden rufous (in another specimen almost golden chestnut); ventral surface rusty brown.

52. *Saimiri oerstedii* (*Reinh.*). Six specimens, Boqueron, Oct. 4–Nov. 11. Three males and two females measure as follows: Total length, 687 (670–705); head and body, 295 (290–300); tail vertebræ, 392 (380–405); hind foot, 85 (76–90); ear, 25.5 (25–27).

53. *Cebus hypoleucus* (*Humboldt*). Six specimens: 5 adults, Boqueron, Oct. 9–Dec. 10; 1 young, Boquete, Sept. 20.

The collector's measurements of the adults are as follows:

| Total length. | Head and body. | Tail vertebræ. | Hind foot. | Ear. |
|---------------|----------------|----------------|------------|------|
| ♂, 880 | 420 | 460 | 120 | 35 |
| ♂, 783 | 343 | 440 | 130 | 30 |
| ♀, 820 | 390 | 430 | 123 | 35 |
| ♀, 860 | 405 | 455 | 120 | 31 |
| ♀, 840 | 385 | 455 | 120 | 30 |

The males and females do not appear to differ in the relative elongation or color of the hair of the frontal region.