

**Article XII.—MAMMALS FROM THE STATES OF SINALOA
AND JALISCO, MEXICO, COLLECTED BY J. H. BATTY
DURING 1904 AND 1905.**

By J. A. ALLEN.

PLATES XX.-XXXIII.

The collections which form the basis of the present paper were made by Mr. J. H. Batty in 1904 and 1905, in continuation of his work in Mexico begun in Durango in 1903. During his three years' work in Mexico as a collector for this Museum Mr. Batty¹ has sent in large collections of mammals and birds, and many reptiles and other natural history specimens, mainly from the States of Durango, Sinaloa, and Jalisco, but including mammals and birds collected in Lower California in October, 1903. Reports upon some of these collections have already appeared in this Bulletin,² and others will follow as his work proceeds.

In this connection, I wish to acknowledge my indebtedness to Dr. C. Hart Merriam, Chief of the Biological Survey, U. S. Department of Agriculture, and to the authorities of the U. S. National Museum, for the loan of specimens for use in the present connection; to Mr. Gerrit S. Miller, Jr., Assistant Curator of Mammals, U. S. National Museum, for assistance in identifying various species of Bats; to Mr. A. H. Howell, Assistant, Biological Survey, for similar aid in respect to species of *Reithrodontomys*; and to Mr. Wilfred H.

¹As this paper is passing through the press a telegram has reached the Museum, sent by his assistant, Mr. Sterling Rohlfis, announcing that on May 27, 1906, Mr. Batty was instantly killed by the accidental discharge of his gun while collecting for this Museum at Pijijiapam, Chiapas, Mexico. Mr. Batty was a collector of wide experience in tropical America, and was especially successful in securing the larger Carnivores. He was a man of great energy and determination, an enthusiastic collector and hunter, fearless almost to a fault. He was under engagement with this Museum to continue his work across Guatemala, and afterward to visit the Cauca region of southwestern Colombia. His tragic death is thus a serious loss.

Mr. Batty was born at Springfield, Mass., about 60 years ago, but apparently retained his remarkable physical vigor unabated to the end. He fitted for college, but early abandoned his college course for, to him doubtless, more attractive pursuits, and spent his life as a taxidermist and natural history collector. He was the author of a work on taxidermy, and published one or two other books.

²1. List of Mammals collected by Mr. J. H. Batty in New Mexico and Durango, with Descriptions of New Species and Subspecies. By J. A. Allen. This Bulletin, Vol. XIX, 1903, pp. 587-612. Published Nov. 12, 1903.—Donna Ana Co., New Mexico, 7 species, 123 specimens; northwestern Durango, 34 species, 485 specimens. Seven species and 7 subspecies described as new.

2. Further Notes on Mammals from Northwestern Durango. By J. A. Allen. *Ibid.*, Vol. XX, 1904, pp. 205-210. Published May 28, 1904. Sixty specimens, 17 species, adding 6 to the former list (2 new), making a total of 40 species.

3. List of Birds collected in Southern Sinaloa, Mexico, by J. H. Batty, during 1903-1904. By Waldron De Witt Miller. *Ibid.*, Vol. XXI, pp. 339-369. Published Nov. 24, 1905. Number of specimens, 1164, representing 160 species, 1 new subspecies.

4. List of Birds collected in Northwestern Durango, Mexico, by J. H. Batty, during 1903. By Waldron De Witt Miller. *Ibid.*, Vol. XXII, pp. 161-183. Published June 2, 1906. Number of specimens, 829, representing 132 species.

Osgood, Assistant, Biological Survey, for kindly determining the specimens of *Peromyscus*, nearly all of which have passed through his hands in connection with his monographic revision of the group, now nearly ready for the press.

I. — MAMMALS FROM SOUTHERN SINALOA.

The Sinaloa collection was made in the extreme southern part of that State, mostly within a radius of about a dozen miles from Escuinapa (spelled Escuinada on some maps), which point was the collector's headquarters and base of supplies. Most of the specimens are hence labeled simply Escuinapa. His work was thus mainly confined to a narrow coast strip extending from Rosario southward to the Tepic boundary, some fifteen miles south of Escuinapa. This low strip of coast country "is covered with lagoons and rivers. It has a heavy growth of mangroves, and is sparsely interspersed with sandy knolls and flat patches of higher ground covered with other vegetation. East of the lagoons, for the five miles to Escuinapa, and thence to the foothills of the Sierra Madre, is a long flat plain covered mostly with thorny bushes, yuccas, and patches of high grass. On this tract are scattered occasional ranches. Northwest of Escuinapa the country is the same for several hundred miles. The same character of country continues also southeast for seventy miles. . . . East of Escuinapa rise small bushy hills, sparsely covered with chapparal, mesquite, and other thorny bushes and trees. Twenty miles directly east, the altitude is about 3000 feet, at sixty miles 5000-6000 feet, and at the boundary of Durango about 8000 feet. . . . At 4000 feet, oaks first appear; at 5000 or 6000 feet there are grassy hills, the valleys between being wooded, principally with large oaks. Still higher, the oaks are mostly replaced by scattered groves of large pines."¹

During nearly a year (December 19, 1903, to November 9, 1904) spent in this region, Mr. Batty exhaustively explored the immediate vicinity of Escuinapa, from the coast lagoons and small islands (Hacienda Island and Los Cabras Island) on the coast to the dry plains and knolls to the eastward of the adjoining low coast plain, the altitude ranging from sea level to 100 feet. Excursions were made northward to Rosario (the type locality of a number of small mammals collected by Mr. P. O. Simons in 1897), about twenty

¹ Compiled by Mr. W. De W. Miller from the collector's notes: see this Bulletin, Vol. XXI, pp. 339, 340.

miles north of Escuinapa at an altitude of about 500 feet; and to Papachal (altitude 600 feet) and Elota (altitude 800 feet, and about one hundred miles north of Escuinapa). Very few mammals, however, appear to have been taken at either of these points. In the spring of 1904 (March 15 to May 20) an expedition was made to the foothills of the Sierra Madre, nearly to the Durango-Sinaloa boundary, during which 66 mammals were collected, as follows: Lavanilla, altitude 3000 feet, 2 specimens; Los Pielas, altitude 3500 feet, 14 specimens; Arroyo de Limones, 30 specimens; Arroyo de Taquaco, altitude 4000 feet, 1 specimen; Juan Lisiarraga Mountain, altitude 5500 feet, 19 specimens.

The bulk of the mammal collection from southern Sinaloa is thus from a very circumscribed locality, and probably includes about all the species found there, with the probable exception of a number of species of Bats. It is thus of special interest as thoroughly representing the mammal fauna of a definite area, which thus becomes available for comparison with other well-worked localities, as the limited district in northwestern Durango explored by Batty in 1903, and the nearer localities in northwestern Jalisco carefully worked by him in 1905. A comparison of results shows that of the 40 species (or 37, excluding the introduced species of *Mus*) obtained in northwestern Durango only one, the Gray Fox (*Urocyon cinereoargenteus scottii*), is found in either southern Sinaloa or northwestern Jalisco, and possibly a *Nyctinomus*. It is also shown that of the 41 species and subspecies (39, excluding *Mus*) found in southern Sinaloa only 16 are included in the 60 species and subspecies taken in Jalisco, although 3 others have representative subspecies in the two regions, notwithstanding that the Sinaloa and northern Jalisco localities are separated geographically by a distance of rather less than 200 miles.

The Sinaloa collection is perhaps most remarkable in what it lacks, since it contains no Spermophiles, no species of Wood Rat (genus *Neotoma*), only one species of Skunk (genus *Conepatus*, *Mephitis* and *Spilogale* being both absent), and no species of the family Geomyidæ. None of these could well have been overlooked had they been present. Species of *Neotoma* and *Thomomys* are, however, well known to occur not far to the northward of Escuinapa.

Mr. Batty evidently gave special attention to the larger mammals, these being represented in large series, and are especially welcome as giving unusual opportunity for the study of individual, seasonal, and age variations in a number of species. There are, for example, about 100 specimens of *Nasua*, nearly 50 of *Procyon*, 15 of *Conepatus*,

44 of *Didelphis*, 20 of *Tatu*, 23 of *Tayassu*, over 100 of *Odocoileus*, 14 of *Lynx*, 24 Ocelots, 5 Jaguars, and corresponding series of the common Rodents and Bats. The collection numbers altogether 825 specimens, representing 41 species.

As in his previous collections, Mr. Batty has usually taken four measurements of most of the specimens, namely: (1) Head and body; (2) tail vertebræ; (3) hind foot (measured to the end of the longest toe, and hence not including the claws); (4) ear, measured from the notch, and in some cases also from the crown. The total length, as given in the following pages, is made up (for convenience in comparison with the usual 'total length') by adding the collector's first two measurements. He was obliged to take his measurements in inches and fractions (usually 16ths), owing to the early loss in the field of his metric rule, so that it has been necessary to reduce them to the metric system. In the case of the larger species, such additional measurements were taken as would be required by the taxidermist in mounting the specimen, but they are here omitted as being not especially useful.

In the following measurements of skulls, total length is the greatest length of the skull (=condylo-basal length of Thomas); basal length is the distance from the inferior border of the foramen magnum to the inner base of the middle incisor (=basilar length of Hensel and Thomas); occipito-nasal length, used only for the species of *Lepus*, is to be taken in its literal sense¹ — occipital crest to front border of nasals; palatal length, from inner base of incisors to palatal notch (=palatilar length of Thomas). Other measurements, when requiring explanation, are explained as used.

The measurements are, of course, always in millimeters, unless otherwise stated.

1. *Marmosa sinaloæ* Allen.

Nine specimens, Escuinapa, Jan. 8 and 28, Feb. 5 and 6, June 24, July 3, 4, 15, and 17.

¹ Occipito-nasal length has been used for "the greatest length of the skull," or for the "length on median line from occipital crest to front of nasals," by the same authors on different occasions. "Basal length" and "basilar length" have been defined by one and the same author, in different connections, to mean: Basilar length, (1) occipital condyle to incisor, or more explicitly, from one of the occipital condyles to the posterior edge of the alveolus of the middle incisor of the same side; (2) from condyle to front border of premaxilla. Basal length, from basion (anterior margin of foramen magnum) to gnathion (front edge of premaxilla); greatest basal length, condyle to front of premaxilla. In cases (which are many) where these terms are used without definition, there is always uncertainty of meaning. I find I have myself, in common with many other writers, used the same terms in slightly different senses in papers published at different times. Mr. Oldfield Thomas's recent 'Suggestions for the Nomenclature of the Cranial Length Measurements and of the Cheek-teeth of Mammals' (Proc. Biol. Soc. Washington, Vol. XVIII, pp. 191-196, Sept. 2, 1905), are therefore especially welcome, and should lead speedily to the use of a definite and uniform system of terms among all mammalogists. That Thomas's terms are not adopted in this paper is due to the fact that most of the measurements had been taken and a large part of the manuscript prepared before his excellent paper appeared.

Measurements: An adult female, total length, 247; head and body, 114; tail, 133; hind foot, 18; ear from notch, 22 mm. Two adult males average, total length, 269; head and body, 127; tail, 142; hind foot, 19.8; ear, 23.

2. *Didelphis mesamericana mesamericana* (Oken).

Thirty-six skins and skulls, and 8 additional skulls, all from Escuinapa, Jan. 1-Feb. 2 (adults), June 26, July 5 (2 nurslings). The series includes 15 adult males, 11 adult females, 3 young adults, and 7 young apparently only a few weeks old (length of head and body, 140-160 mm.). Of the adults 16 represent the black phase, and 12 the gray phase, divided about equally as to sex, while the 8 young ones are all of the black type. The series, excluding the nurslings, consists almost wholly of middle-aged adults, with a few very old specimens and a few in which the dentition is not quite mature.

The measurements of this series, both external and cranial, fall considerably below those of specimens from central and eastern Mexico (*D. mesamericana tabasensis*), but agree in this respect with specimens from Jalisco and Colima.

Twelve adult males give the following: Total length, 805 (767-845); head and body, 418 (394-445); tail vertebræ, 387 (373-406); hind foot without claws, 56.5 (54-60); ear from notch, 51.3 (45-54). Skulls of same: Total length, 112 (106-119); zygomatic breadth, 53.5 (49-55).

Nine females: Total length, 747 (711-788); head and body, 376 (356-394); tail vertebræ, 341 (328-390); hind foot, 52 (48-56); ear, 50 (48-52). Skulls: total length, 100.6 (93-110); zygomatic breadth, 47 (42-52).

A similar series of specimens from the State of Jalisco give practically the same measurements, the average total length of the skull being exactly the same, and the external measurements average practically the same, while a similar number of specimens from the States of Vera Cruz, Tabasco, and Chiapas are much larger, as follows: Total length (11 males), 887; head and body 468; tail vertebræ, 415; total length of skull, 121; zygomatic breadth, 61.5; 9 females, total length, 798; head and body, 412; tail vertebræ, 387; total length of skull, 104; zygomatic breadth, 51. The difference in total length is 82 mm. in the males and 51 in the females, and in total length of skull in the males, 9 mm., and in zygomatic breadth, 8 mm., with corresponding differences in the females.

3. *Tatu novemcinctum mexicanum* (Peters).

Twenty specimens, all from the immediate vicinity of Escuinapa, Dec. 28-Jan. 7, and one each Feb. 9 and March 5. Only 4 have fully acquired the permanent dentition, and only one has merely the milk dentition; in all the others the milk dentition is being replaced by the permanent teeth, every stage of the change being represented in different specimens.

As is well known, the change occurs relatively late in life, nearly all the specimens in the present series which show the change having nearly or quite attained adult size. The sexes are about equally represented.

The females are considerably smaller than the males, as shown by the following measurements:

Eight males; Total length, 825 (744-903); head and body, 431 (386-483); tail, 381 (356-419); hind foot (with claws, from skin), 83 (80-85); ear, 37 (32-40).

Seven females: Total length, 728 (679-762); head and body, 367 (330-419); tail, 361 (330-394); hind foot (from dry skin), 82 (75-86); ear, 35.4 (32-38).

Unfortunately the front border of the nasals is defective in most of the skulls, but in 4 complete male skulls the total length of the skull ranges from 91-101.5, averaging 97.4; two female skulls have a total length, respectively, of 85 and 89. Zygomatic breadth, 8 males, 38.5 (36-42); 6 females, 37.5 (35-40). Mastoid breadth, 8 males, 27.5 (26-28.5); 6 females, 26.5 (25.5-27).

The number of teeth varies from $7\frac{1}{8}$ to $8\frac{3}{8}$, as follows: 5 skulls, $7\frac{1}{8}$; 11 skulls, $8\frac{1}{8}$; 2 skulls, $8\frac{3}{8}$; 1 skull, $7\frac{3}{8}$; 1 skull, $8\frac{5}{8}$. The skull varies greatly in different specimens independently of sex or age, particularly in the relative length and breadth of the rostrum, and in other individual elements, as notably the lachrymal bone. The nasals vary in width (at the narrowest part) from 4.5 to 7 mm., and also vary in relative length. The lachrymal varies greatly in size, and also in form, from triangular to quadrate. Generally it is triangular, with the apex forming a sharp angle at the antero-superior border, the upper border being straight and horizontal, and the anterior border a straight obliquely descending line; the lower border and also the posterior border are sometimes approximately straight, although the former more commonly rounds upward to meet the front border without forming a distinct angle. The lachrymal is thus usually three-sided, with the upper and posterior margins straight

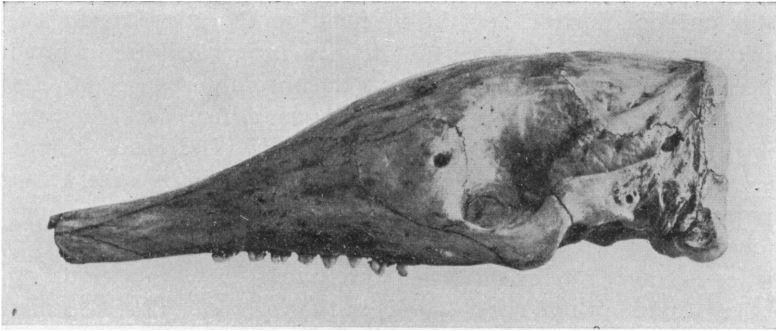


Fig. 1. *Tatu novemcinctum mexicanum*. No. 24054, ♀, Escuinapa, Sinaloa, Jan. 7, 1904, J. H. Batty. Nat. size. (Tip of nose broken off.)

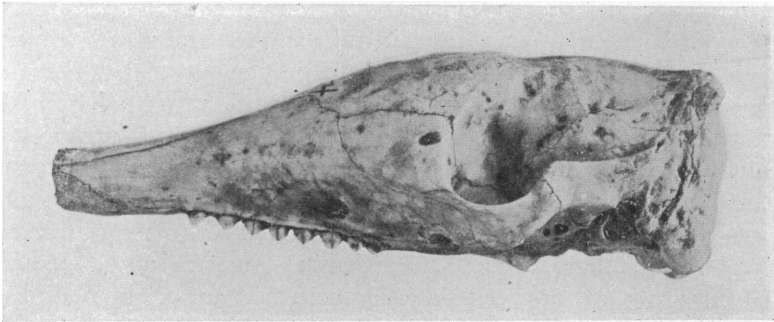


Fig. 2. *Tatu novemcinctum mexicanum*. No. 24063, ♂, Escuinapa, Sinaloa, J. H. Batty. Nat. size. (Tip of nose broken off.)

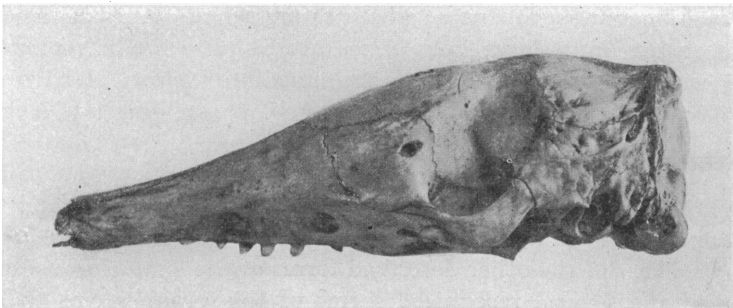


Fig. 3. *Tatu novemcinctum mexicanum*. No. 24732, ♂, Escuinapa, Sinaloa, March 5, 1904, J. H. Batty. Nat. size. (Tip of nose broken off.)

and the antero-inferior convex. More rarely it is practically quadrate, or the anterior portion may be rounded on the upper as well as on the lower margin. It varies not less in proportions than in form: in perhaps the larger number of cases the antero-posterior and vertical diameters are nearly or exactly equal; in other cases the vertical greatly exceeds the antero-posterior, and in other cases it may be less. Six skulls selected to show variation in this respect have the antero-posterior length and the vertical length of the lachrymal as follows: 14.5×11 , 14×14 , 15×13 , 13.5×11 , 15×14 , 14×12 mm. Figures 1-3 illustrate examples of purely individual variation.

The number of free dorsal bands in the carapace, along the median line, is 8 in 18 specimens out of 19, the other having 9, or 9 and 10 bands respectively in all. Four Texas specimens also have 8, while one from Trinidad, B. W. I., 4 from Santa Marta, Colombia, and 3 from Chiriqui, Panama, have each 9 free bands, or 10 in all.

In regard to the relationship of the nine-banded armadillos of Texas and Mexico to those of Central America and South America, little can here be said, owing to lack of proper material. These animals are subject everywhere to such a wide range of individual variation that large series of specimens are necessary from many localities in Central and South America for comparison with those now in hand from Mexico before satisfactory conclusions can be reached. It appears evident, however, that the Mexican form is subspecifically separable from those occurring in Central America and southward, but I fail to see any appreciable differences that are of any importance between specimens from Texas¹ and western Mexico.

4. *Tayassu angulatum sonoriense* (Mearns).

(PLATE XX.)

Twenty-four specimens, of which 14 are fully adult, and the others more or less immature; both sexes are about equally represented. They were all collected at or in the immediate vicinity of Escuinapa, as follows: Dec. 24-26, Jan. 3-10, 19, Feb. 17-23, March 4, April 19 22, May 3, 23.

As shown below, this series of specimens presents a wide range of individual variation, both in coloration and cranial characters, but the animal from southern Sinaloa seems better referable to *sonoriense* than to either of the other described forms of the *T. angulatum* group. None of the several recognized forms of this group seems to be at

¹ Recently separated by Mr. Vernon Bailey as *Tatu novemcinctum texanum*. (N. Amer. Fauna No. 25, p. 52, figs. 5 and 6. Oct. 1905.)

all sharply differentiated, the average differences being more or less obscured by the large amount of individual variation found in every large series of specimens. True *T. angulatum*, from the Lower Rio Grande and eastern Texas, is darker, with a more massive skull, broader postpalatal region, and rather heavier dentition than *sonoriense*, as represented by Arizona specimens, which are, on the other hand, rather lighter and grayer than the Escuinapa series, with also a relatively broader skull. The Arizona specimens are, however, much older than any of the specimens from Escuinapa, and the slightly more massive character of the skull may be due to the greater age of the specimens.

"Most common along the Pacific coast, especially in the lowlands. They follow up cañons and beds of streams, in small bands or singly, often to an altitude of 5,500 feet, but few are found higher than 2,000 feet. Those found at the higher elevations are larger and shyer, and have longer and coarser bristles. I have never seen any more than ninety miles (air line) from the Pacific coast.

"The Peccary interbreeds freely with domestic pigs, and associates with them on apparently as good terms as with its own kind. It feeds on many things, like the bear, but principally on the leaves of various shrubs, the blossoms of flowering trees, wild figs, berries, and the fruit of the coporno.

"During many years' observations, I have never seen a female with more than two young, though it is said by the natives about Escuinapa that as many as seven young have been found, on several occasions, with one female.

"The hearing of the Peccary is acute, and it has a keen sense of smell. Both sexes are hard fighters. An old male generally leads the band, and at a signal from him the others will scatter and hide, or attack, as the case may be. Many dogs are killed by Peccaries, being torn open or gashed by their long, sharp-edged canine teeth. When about to attack, the Peccary lowers its head, champs its teeth, and advances sideways with its mouth open and under jaw turned to one side, ready for an upward lunge to rip up its enemy. When a band is attacked by many dogs, the Peccaries immediately close up in a bunch, forming a ring with heads outward, which position they stubbornly maintain, fighting until the dogs leave them, the dogs knowing that they cannot break the circle without being killed or badly cut by the Peccaries' tusks."—J. H. B.

The collector's measurements are as follows: 9 adult males (m¹ slightly worn in the youngest, and the teeth not greatly worn in any),

total length, 895 (812-970); tail, 30 (25-37); hind foot — measurements not available; ear, 93 (89-110): 5 adult females (teeth only slightly worn, the wear except in one specimen limited to m^1), total length, 913 (889-939). The females average slightly larger than the males, in both external and cranial measurements, as shown by the subjoined table of measurements of the skulls.

There is much variation in respect to coloration. Taking the series as a whole, two color phases are fairly recognizable, a yellowish phase and a gray phase, the latter predominating in the ratio of about 6 gray specimens to 1 yellow. In the yellow phase the yellowish tint is most pronounced on the 'collar,' or oblique shoulder stripes, and on the sides of the head and neck. In several specimens these parts, but especially the 'collar,' are strong yellowish buff, as in *T. a. humerale*, and the sides of the body are also strongly suffused with buff. In the gray phase, in extreme specimens, the collar is white, as is the ground color of the sides, but generally there is a more or less decided suffusion of pale buff. The shoulder stripes are a pronounced feature in only about half the specimens; in some they are entirely obsolete; in a few they are strongly developed, but in most of the specimens they are not conspicuously prominent. The amount of black in the dorsal area is also variable, depending upon the amount of black tipping the bristles.

There are several noteworthy cases of individual variation in cranial characters, especially in the length of the upper molariform series, the breadth of the skull as compared to its length, breadth of the posterior nares, relative size of the bullæ, etc. In one adult male skull with a basal length of 192 mm. the zygomatic breadth is 104 mm.; in another adult male skull of exactly corresponding age, but having a basal length of only 183 mm., the zygomatic breadth is 120 mm. This skull is not exceptionally broad in other measurements, and only in this respect forms a striking variant from the rest of the series. A female skull, the largest and slightly the oldest of the series of females, also departs widely from the normal in the great length of the palatal region and of the upper molariform series, which each have a length of 6 mm. above the average, combined with a zygomatic breadth 2 mm. below the average. There is great individual variation in both the form and size of the audital bullæ, the breadth sometimes nearly equalling the length (24×26 mm.) or being much less (20×25 mm. or 18×22 mm. etc.).

The length of the upper molariform series ($pm^1 - m^3$) varies in the males from 61 to 67 mm., and in the females from 54 to 69

mm.! In the females the range, with one exception, is from 61.5 to 69 mm., with various intermediate stages in both series, as shown in the subjoined table of measurements.

There is, further, a striking variation in the structure of the middle region of the ventral aspect of the skull. This consists in the presence or absence of an elongated bulbous expansion outside of the walls of the narial passage. This expansion is due apparently to the development of a large sinus between the two plates of the orbitosphenoid. It is convex externally, with a transverse diameter of 10 to 15 mm., a vertical diameter of 15 to 20 mm., and a length of 35 to 40 mm., or more, it extending posteriorly to or slightly beyond the plane of the palatal notch, and anteriorly about to a plane passing between m^1 and m^2 . Its external wall is thin, papery, and generally very fragile; the enclosed cavity may be entirely hollow or more or less filled with inosculating bony lamellæ. This bulbous expansion of the orbitosphenoid is present in rather more than half of the Escuinapa series of skulls (in 12 out of 21), and also in about the same proportion in the Peccary skulls from other Mexican and United States localities; it is developed symmetrically in both orbitosphenoids, but varies more or less in size, according to the extent to which it may be developed in different specimens. It is also present in both sexes, and in young specimens which still retain the entire milk dentition as well as in adults.

Associated with this striking modification of the orbitosphenoids is an abnormal inflation of the maxillary arm of the zygoma and of the lower part of the lachrymal which become often enormously expanded, with thick walls enclosing a sinus, contributing still further to greatly modify this portion of the skull. (See Plate XX, and accompanying descriptive matter.) It is evident that this strange modification of the orbitosphenoids and adjacent parts is pathological in character, due probably to the presence of parasites, that can readily find their way from the sinuses of the posterior nares into the maxilla and adjoining parts of the skull.

In this connection an examination has been made of nearly 50 skulls of Peccaries in the Museum collection from various parts of South America, with the following results: In a series of 17 skulls of *T. pecari* from the Santa Marta district of Colombia, all were found diseased in the manner above described, so that this condition might readily be mistaken for the normal. In 20 skulls of *T. torvum* about 80 per cent. show the diseased condition strongly, and others show traces. Of 9 skulls of *T. tajacu* from Chapada, Matto Grosso, Brazil,

MEASUREMENTS OF 13 SKULLS OF *Tayassu angulatum sonoriense*.

Mus. No.	Sex	Total length.	Basal length.	Palatal length.	Breadth of rostrum.	Zygomatic breadth.	Breadth at postorbital processes.	Breadth of braincase.	Breadth of palate at m ² .	Breadth of basioccipital.	Length of upper molar-form series.	M ³ , length × breadth.	Condition of teeth.
24593	♂	228	181	134	28.5	106	70	52	21	16.5	63	13 × 11	M ¹ slightly worn.
24587	♂	246	192	135	32.5	104	80	58	21	17	67	14.5 × 13	Only m ¹ worn.
24584	♂	231	176	129	29	106	75	57	20	17	62.3	13 × 12	M ¹ much worn and other teeth slightly worn.
23865	♂	223	175	124	29	99	70	51	15.5	15	66	13 × 14	All more or less worn.
23873	♂	223	172	123	28.5	93	69	58	19	15	61	13 × 10.5	M ¹ slightly worn.
23866	♂	219	172	125	28	91	66	54	20	17	61.5	13 × 11	M ¹ slightly worn.
23867	♂	234	184	135	29.5	—	70	53	19	16	66	13 × 12	M ¹ slightly worn.
23864	♂	239	183	135	31	120	78	57	20.5	—	66	13 × 11	M ¹ much worn.
Average	8♂	238	179	130	29.5	101.5	72.3	55	19.5	16.2	64.1	13.2 × 11.8	
23876	♀	235	183	134	30.5	105	76	57	20	16	66	13 × 11.5	M ¹ much worn.
24585	♀	234	183	132	31	100	68	52	19	16	54	13 × 11	M ¹ slightly worn.
24586	♀	241	186	136	33	105	70	53.5	20.5	17	64	13 × 11	M ¹ slightly worn.
24588	♀	234	182	129	30	97	69.3	54	20	17	61.5	13 × 11	M ¹ slightly worn.
23874	♀	247	190	140	30	99	73	56	20	16	69	15 × 12	M ¹ and m ² much worn.
Average	5♀	238	185	134	30.9	101	73.3	54.5	19.9	16.5	62.9	13.5 × 11.3	

Note to Table of Measurements.—Total length = front border of premaxillaries to posterior border of occipital crest; basal length = inner base of incisors (not from between the incisors) to anterior border of foramen magnum; palatal length = inner base of incisors to palatal notch; breadth of rostrum = greatest width of rostrum in front of canines; breadth of basioccipital = between carotid foramina; last molar = length of crown surface on median line, and greatest width of front half.

2 only are normal. The inflation of the bones forming the antero-inferior wall of the orbit, through the invasion of these parts by some parasite, is so general in the whole group of Peccaries that the absence of such conditions seems to be almost exceptional.

An enlargement of the frontal region in the skull of certain species of the Mustelidæ, especially in the Skunks, due also to a parasite, is well known, but it is apparently less general than is this still more striking pathological modification of the skull in the Peccaries, which may also be well known, but to which I have thus far seen no reference.

Three skulls from different localities in the State of Jalisco (see below, under next article) average the same as the Escuinapa series, and each can be exactly matched by skulls in that series. Four skulls from Arizona, each much older than any in the Escuinapa series, have the same average length but are much broader in nearly all of the transverse measurements, due apparently to their greater age. Old skulls from eastern Texas are slightly larger in all measurements than even the old Arizona skulls, with decidedly heavier dentition and greater postpalatal and basioccipital breadth.

5. *Odocoileus sinaloæ* Allen.

(PLATES XXI-XXVI.)

One hundred and seven specimens, topotypes of the species, of which about 70 are carefully prepared skins, mostly with good skulls, and 35 are hunters' skins,¹ more or less imperfect. They represent adults of both sexes, and young from six to eight months old and upward to young adults. They were collected as follows: In January, 22 specimens; in February, 39 specimens; in March, 15 specimens; in May, 8 specimens (3 are skulls without skins); in December, 2 specimens. The remainder are mostly hunters' pelts, generally without date of collecting; the greater part of them are winter specimens, but several are in summer pelage.

"Ranges from the coast eastward to the second range of the Sierra Madre. Most numerous in the wet season (July to November, inclusive) in the mountains, returning in large numbers to the lowlands and foothills of the coast region during the dry season. The females have one and sometimes two fawns in June and July. This species is a jumper, clearing high fences when in search of squashes or bean vines, which they greedily devour." — J. H. B.

¹ The large series, especially of hunters' skins, is due to the fact that many deer were killed to supply the camp, and also the natives of the vicinity, with meat, and the collector utilized the pelts as specimens.

As many of the deer which were saved for mounting were killed and brought in in a mutilated condition by native hunters, only about one-third of the specimens were measured before skinning, and of these many are immature. Only six of the measured bucks appear to have been fully adult, and of these only two or three were 'old adults.' Of the measured does eight are adult, while several of them are quite old. The collector's available external measurements are as follows:

Males, 6 adults: Total length, 1440 (1384-1461); head and body, 1217 (1168-1245); tail vertebræ, 223 (191-254); ear from notch, 141 (130-146).

Females, 8 adults: Total length, 1277 (1182-1340); head and body, 1123 (1092-1156); tail vertebræ, 191 (178-197); ear, 140 (127-146).

The pelage of the Sinaloa Deer is fine and short, and thus very unlike that of northern deer. While there are only a few summer specimens, the large series of winter specimens gives abundant opportunity for the study of individual variation in coloration. The species was originally based on two immature December specimens, which prove to represent the average winter coloration, but a fuller description, based on the present ample material, is now presented. Also many illustrations of skulls are given, to illustrate not only the cranial characters, but their wide range of variation.

In January specimens the pelage of the upper surface has a length of only about 12 to 15 mm.; the individual hairs are smoke-gray, lighter at the extreme base, with pale buffy gray tips. The general coloration is, in general effect, in average specimens, pale buffy gray, darker on the middle of the back, shoulders, and dorsal aspect of the neck, and quite blackish on the forehead and crown; the flanks are lighter and more buffy, shading into a rather ill-defined lateral line of yellowish drab; sides of face, sides of neck, and ears externally dingy gray brown; there is the usual whitish noseband, divided mesially and bordered by dark brown; the upper surface of the tail is strong fulvous, sometimes mixed with dusky, the sides and lower surface white; the throat, from the chin posteriorly, is dull white or grayish white, with the usual chin-bar of black, broken in the middle by white; on the foreneck the white of the throat passes into pale brownish gray, which shades into darker drab-brown on the chest; axillar regions fulvous; inside of fore legs white; belly white, as is the inside of the hind legs, the white extending down the inside of the legs in a narrowing band, nearly to the "knees"; legs

externally buffy gray, with a narrow whitish or pale buff line bordering the hoofs.

From this medium phase the general coloration varies on the one hand, through the suppression of the fulvous suffusion, to a pale light gray above, darkening along the median line, and without fulvous at the lower edge of the flanks, very little in the axillæ, and with pale gray instead of fulvous legs; on the other hand, through the great increase of the fulvous suffusion, to a decided fulvous cast above, with the lower edge of the flanks, axillæ, chest, and legs strong fulvous, and the upper surface of the tail bright chestnut to dark chestnut.

The summer pelage above is strongly fulvous throughout, darkest along the vertebral line, especially anteriorly, passing into deep buff, or ochraceous buff, on the flanks and legs. In the half-dozen summer skins the fulvous tint varies in different specimens from clear yellowish buff to deep ochraceous buff, the coloration of the summer pelage thus being in strong contrast with the much darker and grayer tone of average winter examples.

The antlers in individuals of the same age vary widely, as usual in deer, in form and size. Compared with those of northern forms of the *O. virginianus* group, they are of course always small. But in males of 4 years old and older, it is not always the oldest that have the largest antlers. In males of 6 to 10 months old, with m^1 just fully functional, the antlers are merely a bony process covered with skin and hair; in males 18 to 20 months old, with $m^1 - m^3$ in place and the milk premolars not yet shed, the antlers appear as spikes about 60 to 125 mm. long, sometimes slightly forked at the tip; in males about 30 to 34 months old $p^1 - m^3$ are fully developed, and the antlers may be 130 to 180 mm. long, one or both usually with a single basal tine, but sometimes forming merely a slender spike; males 4 to 5 years old begin to show wear on m^1 and sometimes on other teeth, and carry 3-tined or 4-tined antlers, or one may be 3-tined and the other 4-tined, — in other words, the antler may be forked either two or three times.

In adults the antlers at base are directed backward, outward, and more or less upward, according to the individual, and then curve sharply inward at the second fork, or a little beyond the middle of the main beam. The length of the main beam, measured along the outside convexity, varies in males of practically the same age from 240 to 340 mm., and in greatest breadth from outside to outside from 225 to 310 mm., resulting in antlers of widely different appearance.

It is of interest to note that in a series of 25 male skulls one only has a pair of well-developed upper canines, but another has a perfect canine alveolus on one side, the tooth having fallen out; in the other 23 skulls there is not a trace or suggestion of even an alveolus at this point. Still more exceptional is a single female skull, out of a series of 25, with a pair of well-developed canines.

Another erratic modification in the dentition is the reduction of the posterior column on m^3 to a rudimentary condition, while in another specimen m^3 on the left side has a well-developed supernumerary column at the posterior border of the tooth, making four columns instead of three, the corresponding tooth on the opposite side being normal. Furthermore, the molars may have a well-developed accessory column (5 mm. on m^3) or have no trace whatever of such a feature.

The following table of measurements gives the principal dimensions of 6 adult male skulls and 6 skulls of adult females, and serves to show the large amount of purely individual variation that may be expected in any large series of deer skulls. Besides the considerable range in size, the variation in certain parts is striking, especially in the form and relative size of the nasal bones, in the length of the toothrow, and in the upward extension of the premaxilla toward the nasals. There is generally a vacuity between the upper border of the premaxilla and the antero-lateral border of the nasal of the same side of from 5 to 10 mm. in extent, but in a few specimens these parts are in actual contact for a space of 2 to 15 mm. Every stage of gradation, in different specimens, from extended contact (see Pl. xxi-xxvi¹) to wide separation, is present. The differences in the form and relative size of the nasals (see same Plates), and the variation in the relation of the premaxilla and maxilla to the nasals, would be of great importance wherever occurring with constancy, but in the present series of deer (and also in other species of deer), they are so inconstant, with every stage of intergradation between the extreme conditions present, that they are obviously to be regarded as due merely to individual differentiation. With only the extreme phases of these differentiations present, as might happen in the case of a small series of specimens, and especially if the specimens came from different localities, or

¹ Plates xxi-xxvi, *Odocoileus sinaloa*,—10 skulls, dorsal and lateral views of each, $\frac{1}{2}$ natural size, as follows: 2 adult males, 4 adult females (in 4th year), and 4 young males (all in 3d year), to show individual variation in the size and shape of the nasals, in the size and shape of the lachrymal fossa, and in the relation of the nasals to the maxilla and premaxilla. See also Plate xxxi for further illustration of these variations in 8 young male skulls.

MEASUREMENTS OF 12 SKULLS OF *Odocoileus sinaloæ* FROM ESCUINAPA, SINALOA, MEXICO.

	25554 ♂	24808 ♂	24528 ♂	23884 ♂	24850 ♂	24809 ♂	Av'ge. 6 ♂♂	23878 ♀	23800 ♀	24550 ♀	23915 ♀	23916 ♀	24555 ♀	Av'ge. 6 ♀♀
Condyllo-basal length	236	230	216	227	245	—	231	217	217	229	212	218	221	219
Palatal length	156	151	141	145	157	141	148	140	142	149	142	132	137	140
Interorbital breadth	52	56	59	55	61	60	57	57	56	52	54.5	52.5	51	54
Postorbital breadth	82	80	83	78	82	—	81	60	62	60	61.5	55	57	60
Breadth at lower edge of orbits	105	102	106	101	106	—	104	98	96.5	96	91	92	89	94
Palatal breadth at m ₁	41	41	40	38	42	40	40	40	39	39	40	37	35	38
Distance between premaxilla and nasal	6	2	5	10	0	0	40	5	6.5	4	4	0	8	4.6
Nasals, length	75	77	63	68	81	72	73	75	71.5	76	69	66	74	60
Nasals, breadth anteriorly	22	20	18	22	22	19	20.5	16	17	16	16	18	15.5	16.4
Nasals, breadth posteriorly	24	21	21	19	24	25	22	25	20	19	21	21	20	21
Length of upper toothrow	70	70	65	69	64	66.5	67.4	66	72	70.5	65	63	65	67
Length of lower toothrow	73	74	63	73	70	72	71	70	79	74	71	67	68	71.5
Antlers, along external curvature	340	255	240	290	—	250	71	—	—	—	—	—	—	—
Number of points	4-4	3-4	3-3	4-4	—	3-4	—	—	—	—	—	—	—	—
Condition of teeth	m. w.	s. w.	m. w.	m. w.	m. w.	s. w.	—	m. w.	s. w.	s. w.	m. w.	<m. w.	m. w.	—

Note to Table of Measurements. — Condyllo-basal length (of Thomas) = posterior border of occipital condyles to front border of premaxillæ; palatal length = posterior palatal notch to front border of premaxillæ; length of upper toothrow = at crown surface; length of lower toothrow = at alveolar border. Condition of teeth: m. w. = much worn; s. w. = slightly worn.

occurred in a fossil state, they might prove extremely misleading and be easily mistaken for characters of specific importance, or even of generic value in the case of the premaxilla-maxilla-nasal modifications. I have on various occasions called attention to the wide range of individual variation shown in cranial and other characters in a large number of species of mammals, but generally without giving graphic illustrations of them, and therefore take the present occasion to illustrate by photography a few of the individually divergent specimens in the present series of Escuinapa deer.

6 *Sciurus sinaloensis* Nelson.

Nineteen specimens: Escuinapa and vicinity, 10 specimens, Jan. 11, Feb. 18-27, March 1, 18; Los Pieses, 6 specimens, April 4-19; Juan Lisiarraga Mountain. (alt. 5500 ft.), 3 specimens, April 29-30, May 5.

"Found in the lowlands and foothills west of the Sierra Madre. Not very common."—J. H. B.

Escuinapa, 8 males: Total length, 514 (502-537); head and body, 249 (235-254); tail vertebræ, 265 (254-283); hind foot without claws, 59 (57-60); ear from notch, 31 (29-32).

Los Pieses (alt. 3500 feet) and Juan Lisiarraga Mountain (alt. 5500 feet), 8 specimens, nearly all males: total length, 513 (502-540); head and body, 249 (235-254); tail vertebræ, 264 (254-286); hind foot, 59 (54-63); ear, 29 (25-32).

The range of this species is thus shown to extend from the low arid coast region of southern Sinaloa eastward into the eastern foothills of the Sierra Madre, to altitudes of 3500 and 5500 feet. The specimens from the Sierra Madre foothills do not differ appreciably in size (see above measurements) or color from those of the coast region.

7. *Mus alexandrinus* Geoffroy.

Six specimens, Escuinapa, Dec. 27, Jan. 1, 8, and Feb. 3, 5, 18. "Found common in mangroves."—J. H. B.

8. *Mus musculus* Linn.

Six specimens, Escuinapa, Jan. 23, Feb. 3 and 19.

9. *Peromyscus spicilegus spicilegus* (Allen).

Twenty-three specimens, Escuinapa, Jan. 13, April 24-May 5. Five of the 6 January specimens and one April specimen are in the

gray first pelage; nearly all of the others are adult. Three of the specimens are in formalin, the others being skins with skulls.

10. *Peromyscus (Baiomys) musculus musculus* (Merriam).

Nine specimens, Escuinapa, Jan. 5-8, May 27, and July 7 (the latter four specimens in formalin). Not appreciably different from Tepic and Jalisco specimens.

11. *Sigmodon hispidus colimæ* Allen.

Sigmodon hispidus mascotensis BAILEY, Proc. Biol. Soc. Wash. XV, p. 108, June 2, 1902; not *Sigmodon mascotensis* Allen, 1897.

Seventy specimens, vicinity of Escuinapa: Dec. 25-Feb. 18, 63 specimens; May 26, 27, 2 specimens; July 4-8, 5 specimens.

About two-thirds of the specimens are old adults, 5 are very young (only a few days old), a few are one-third to two-thirds grown, and the remainder are young adults. The males preponderate, there being 42 males to 26 females. Of the 5 young in first pelage, 4 were taken Jan. 8 and 1 Feb. 6.

The 10 largest adult males measure as follows: Total length, 299 (267-365); head and body, 156.4 (140-178; tail vertebræ, 136.7 (122-159); hind foot, without claws, 33.4 (32-34); hind foot with claws, about 2.5 to 4 mm. more, or about 37. The 7 largest females: 312 (285-337); 169.6 (152-184); 136.7 (122-159); 33.4 (32-34). About three specimens in each series greatly exceed the others in size, and help to raise the average above the normal. The skulls show these specimens to have been much the oldest as well as the largest specimens of the series.

Mr. Vernon Bailey, in his 'Synopsis of the North American Species of *Sigmodon*' (Proc. Biol. Soc. Wash., XV, pp. 101-116, June 2, 1902), mistakenly adopted the name *mascotensis* for this species, and renamed my *S. colimæ*. *S. colimæ*, however, is the soft-haired reddish brown species he has named *S. alleni*. A reëxamination of my original material on which the two species, *S. mascotensis* and *S. colimæ*, were based (4 specimens of each), and topotypes of *alleni*, shows that all of the present Sinaloa examples represent *S. colimæ*, there being no specimens of *mascotensis* (= *alleni* Bailey) among them. Mr. Bailey says: "It is this species [*alleni*] Dr. Allen had in mind in writing his description of *mascotensis* from which he intended to separate the Colima form, but, as his two specimens of the species here named *alleni* were not fully adult, he unfortunately selected as his type another specimen that proves to be the same as the form

to which on the following page he gave the name *colimæ*." On a casual consideration of the case with Mr. Bailey in Washington just before the publication of his paper, I assented that his interpretation of the matter was probably correct, but now on reëxamination of the subject, in the light of 70 specimens of *colimæ* before me and 4 of *mascotensis*, I find the type of the latter is not referable to *colimæ* but to the species he has kindly named in my honor, so that *S. alleni* is beyond question a synonym of *mascotensis*. My original descriptions, as well as the types and cotypes, show clearly the strongly marked differences between these two unusually distinct forms, for members of this genus.

The largest specimens of the present series (they are also very old, as shown by the condition of the skull and teeth) equal or slightly exceed in size *Sigmodon hispidus major* Bailey (type locality, Sierra de Choix, 50 miles northeast of Choix, Sinaloa), the range of which is given as "West coast of Mexico from Tepic to southern Sinaloa." I can look upon these large specimens of the present series, however, as merely old, very large examples.

12. ***Oryzomys mexicanus mexicanus* Allen.**

Thirty-eight specimens, 34 taken in the vicinity of Escuinapa, Jan. 30, Feb. 4 and 19, and 4 from Los Limones, April 22-26.

They are nearly all middle-aged or rather young, only two having the teeth much worn. The 9 largest specimens, all males, measure: Total length, 286 (257-305); head and body, 136 (127-146); tail vertebræ, 148 (140-160); hind foot without claws, 28.5 (26-30.5); ear from notch, 14.5 (12.7-16).

13. ***Oryzomys melanotis* Thomas.**

One specimen, Los Limones, altitude 3500 feet, April 24.

14. ***Reithrodontomys tenuis* Allen.**

Twenty-four specimens: Escuinapa, 22 specimens (8 are in formalin), Jan. 12, 30, Feb. 5, 6, 15, May 27, 30, July 7, 20; Los Limones, 1 specimen, April 25; Juan Lisiarraga Mountain, 1 specimen, April 30 (the last two are skins without skulls). Only 4 of the skulls have worn teeth; in all the others the tubercles of the crowns are wholly unworn, and the pelage is softer, grayer, and less fulvous than in the old adults with worn teeth. A litter of five quarter-grown young are labelled as taken Jan. 12.

Four old adults: Total length, 178 (175-181); tail vertebræ, 91 (86-98); hind foot without claws, 19; ear from notch, 14. The series from Escuinapa (13 specimens): Total length, 162 (153-181); tail vertebræ, 90 (83-98); hind foot, 17; ear, 14.

The Escuinapa specimens are practically topotypes, the species having been based on specimens from Rosario, about twenty miles north of Escuinapa.

15. *Perognathus pernix pernix* Allen.

Seventeen skins and skulls and 36 specimens in formalin, all collected in the immediate vicinity of Escuinapa, as follows: Jan. 6, 7, Feb. 3, 5, May 27, June 2, 15, July 7, 11, 15, 21, 22. Most of the specimens in formalin were collected on Hacienda Island, a few miles west of Escuinapa.

16. *Heteromys pictus escuinapæ* subsp. nov.

Type, No. 24502, Escuinapa, Sinaloa, Feb. 3, 1904; J. H. Batty.

Similar to *H. pictus* Thomas, but somewhat paler and grayer, with the posterior border of the nasals emarginate instead of truncate. Differs similarly in coloration from *H. plantinarenensis* (Merriam), and also in smaller size, but agrees with *plantinarenensis* in having the posterior border of the nasals emarginate instead of truncate.

In winter pelage this form is similar to true *pictus*, with a series of topotypes of which it has been compared, differing from it only in having the fulvous of the upper parts of a paler shade, and the gray rather more pronounced. When compared in series the two forms are very appreciably different. The same is true when compared with *plantinarenensis*, but in either case it would be difficult to distinguish satisfactorily between single specimens by coloration. But *pictus* and *escuinapæ* are immediately distinguished by the skulls, through the markedly different form of the posterior end of the nasals, which are squarely truncate in *pictus* and V-shaped or emarginate in *escuinapæ*. This character proves constant in a large series of both forms, a glance at the nasals being sufficient to positively separate them.

H. p. escuinapæ, and probably all the forms of the *pictus* group, present two well-marked seasonal phases of pelage, so that in comparing specimens only those taken at corresponding seasons should be compared. The winter pelage, represented by 10 specimens taken in January and February, is paler and more fulvous than the summer pelage, represented by 16 specimens taken in April and May, the

summer pelage being much darker and redder, in strong contrast with the winter pelage.

The collector's measurements of the type, an adult male, are: Total length, 216; head and body, 108; tail vertebræ, 108; hind foot (without claws), 24; ear from notch, 13. Nine adult males: Total length, 223 (203-235); head and body, 108 (101.6-114); tail vertebræ, 114.8 (105-123); hind foot without claws, 24.6 (23.8-25.4); ear from notch, 14 (12.7-15.9). Eight adult females: Total length, 211.3 (197-228); head and body, 103 (95-108); tail vertebræ, 109 (95-120); hind foot, 23.4 (22-25.4); ear from notch, 13.2 (11-14). About 2 mm. should be added to the length of the foot for the additional length of the claws. Measured dry, the hind foot, with claws runs from 26 to 29 mm.

Seven adult male skulls: Total length, 31 (29.5-32); greatest (or zygomatic) breadth, 14.6 (14-15.2). Four adult female skulls: Total length, 30.6 (30-31); greatest breadth, 13.8 (13.6-14.4). Five adult topotype skulls of *H. pictus*, 3 males and 2 females: Total length, 31.2 (30.3-32.5); greatest breadth, 14.4 (14-14.8). In these latter the largest and smallest skulls are both those of females.

17. *Lepus insolitus* Allen.

Thirty-six specimens (skins with skulls), and several additional separate skulls: Escuinapa, 35 specimens, Dec. 27, 30, Jan. 4, 14, 30, April 27, May 28, June 1-4, Oct. 10, 31; Arroyo de Taquaco (altitude 4000 feet), 1 specimen, May 10.

Collector's measurements of Escuinapa specimens: 10 adult males, total length, 479 (445-510); head and body, 443 (394-482); tail vertebræ, 46 (37-51); hind foot without claws, 87 (83-89); ear from notch, 73.5 (69-79): 10 females, total length, 475 (451-497); head and body, 429 (400-457); tail vertebræ, 47 (44-51); hind foot, 88.5 (82-92); ear from notch, 73.4 (70-77).

The single specimen from Arroyo de Taquaco (at 4000 feet altitude) is larger than any of the Escuinapa specimens, though nearly equalled in size by some of them. It measures, total length, 534; head and body, 483; hind foot, 89; ear, 73. Possibly further material would show that the form inhabiting the western foothills of the Sierra Madre is separable as a large race of *L. insolitus*.

Skull, 8 adult males from Escuinapa: occipito-nasal length, 81.6 (79-84); greatest zygomatic breadth, 37.5 (37-38.5); interorbital breadth, 19.4 (18-25); mastoid breadth, 31.6 (29.5-32); length of nasals, 36.6 (35-38): 6 females, occipito-nasal length, 81.3 (79-83);

zygomatic breadth, 37.9 (37.5-38); interorbital breadth, 19.7 (18.5-21); mastoid breadth, 30.4 (29-32); length of nasals, 36.3 (35-38). There is very little sexual difference in size, either in the external measurements or in the skull.

The series consists almost wholly of old adults, the only young specimens being three suckling young taken at Escuinapa the last of December and the first week in January, and three others taken as the same place Oct. 10. The series also represents both the winter and summer pelages. The latter does not materially differ from the former except in being rather more worn and somewhat faded.

This large Escuinapa series agrees perfectly with the type and topotype of the species from the Plains of Colima.

18. *Lepus alleni palitans* Bangs.

Twenty-one specimens, 11 males, 7 females, and 3 without indication of sex, all adult, December 18-27; vicinity of Escuinapa and Rosario.

"Found singly and in pairs, in the low open grassy lands, and in the open grassy foothills with patches of low bushes, to an altitude of 3500 feet. Most numerous on the foothills near the coast. The young appear usually in June. This 'Jack' is probable the most fleet of its genus. In running it will easily clear bushes four feet high."—J. H. B.

This Jack-rabbit belongs to the *Lepus alleni* group but differs so strongly from *L. alleni* that it probably will be found entitled to specific separation. These winter specimens, compared with winter specimens of *L. alleni* from southern Arizona, have the whole dorsal region very much darker and stronger yellowish brown, the sides are clearer, darker gray, the pelage much shorter, thinner, and less woolly, the feet and ears much less heavily clothed, and the yellowish white fringe bordering the ears much less developed. The limbs hence look slenderer and longer.

This species was described by Mr. Bangs (Proc. N. Eng. Zool. Soc., I, 85, Feb. 23, 1900) from two specimens collected by Mr. P. O. Simons at Aguacaliente, Sinaloa, a locality within the area in which the present series was collected. Mr. Batty's specimens are therefore practically topotypes of *palitans*. As Mr. Bangs's measurements were from dried skins, and relate only to the ear and hind foot, the following measurements, from fresh specimens, are of importance:

Eleven males: Total length, 613 (597-637); head and body, 559

(533-584); tail vertebræ, 55.5 (51-66); hind foot without claws, 128 (121-133); ear from notch, 149 (140-156). Seven females: Total length, 617 (587-648); head and body, 558 (533-584); tail vertebræ, 59.6 (51-70); hind foot without claws, 126.6 (121-133); ear from notch, 146.6 (140-156). These measurements are rather less than the corresponding measurements of *L. alleni*. In one specimen the expanse of the ears, distended laterally, is given as $14\frac{3}{4}$ inches (349 mm.).

Six skulls have an occipito-nasal length of 104 (103-107), and a zygomatic breadth of 46 (45-47). An old female gives a maximum for the series of 120 by 46.5.

I refer provisionally to this subspecies three additional specimens from Los Limones (altitude, 3500 feet), taken April 27. They are in worn and somewhat bleached pelage, and are thus not seasonally comparable to the Escuinapa series taken in December. They are paler and less varied with black above, and are considerably smaller, the collector's external measurements being as follows: Total length (3 specimens, all males), 557 (541-571); head and body, 506 (490-520); tail vertebræ, 51; hind foot, 123 (121-127); ear, 143 (140-146). The *largest* of these three specimens falls far below the *smallest* of the Escuinapa series of males, while the average is much less. There is less difference in the size of the skulls, which average 101 mm. in occipito-nasal length against 104 in the Escuinapa series. This indicates a somewhat smaller and perhaps separable race in the western foothills of the Sierra Madre, but further material is necessary to satisfactorily settle the question.

19. *Felis hernandezii* (Gray).

Five specimens, skins and skulls, immediate vicinity of Escuinapa, Aug. 16, 26, and Oct. 10. All are adults; 2 are males, 2 are females, and for one the sex is not recorded.

These specimens vary greatly in size, and also somewhat in age as shown by the skulls. Of the two males one is much older than the other, as well as much larger (the occipital portion of the skull is unfortunately broken, so that the length cannot be given); of the two females, while one is much older than the other, it is also much *smaller*.

"Ranges through western Mexico. Most common on the lowlands between the Pacific Coast and the western Sierra Madre range. One of the most pugnacious mammals of the cat family, often killing dogs much larger than itself. It frequently kills calves, pigs, goats, and sheep when smaller wild animals are not encountered. Noctur-

nal in habits, usually hiding away in high grass or up in high trees during the day. The female has from two to four young about July and August."—J. H. B.

Collector's measurements of 2 adult males: total length, 1766, 1727; head and body, 1156, 1105; tail vertebræ, 610, 622; hind foot without claws, 229, 229; ear from notch, 83, 86.

The coloration in four of the specimens is quite similar, although two were taken in August and two in October. The ground color is pale clay color and the dark markings are more restricted than in South American specimens, in which latter also the ground color is much deeper and more ochraceous. A single specimen, an adult male, from Achotal, Vera Cruz, now before me (No. 3674, Field Columbian Museum) is practically indistinguishable from the paler Escuinapa specimens, both in coloration and cranial characters, although it should represent the alleged subspecies *Felis onca goldmani* Mearns.

An imperfect skull (lacking both zygomatic arches) from Frontera, Tabasco, Mexico, differs from all the other Mexican specimens in its much greater size, as shown (No. 18061) in the subjoined table of measurements.

Fifteen skulls from various localities in South America (Paraguay, Parana, Bolivia, Brazil, Venezuela) indicate a similar wide range in size. These localities are as follows: two from Paraguay; one from San José, Parana; one from Jaguar Lake (on the boundary of Brazil and Bolivia); two from southern Brazil (Matto Grosso); one from Santarem, on the Amazon; four from the lower Amazon; one from Maripa, Venezuela; and several from unknown South American localities. The largest of all, with a basal length of 242 mm., is from Paraguay; the other largest South American skulls range in basal length from 203–214 mm., while the two largest Mexican specimens have a basal length, respectively, of 220 and 227 mm., and others range from 188 to 217 mm.

Dr. Mearns, in a paper on 'The American Jaguars,' published in 1901 (Proc. Biol. Soc. Wash., XIV, pp. 137–143, Aug. 9, 1901), considered the South American Jaguars separable from those of Central America and Mexico, on the ground of the presence in the former of a wider postpalatal fossa, differently shaped bullæ, larger size of the premolar teeth, and larger general size of the skull. These differences are mainly comparative, but for the most part are well-sustained by the present series of 24 skulls. One of the best distinctions is the width of the postpalatal fossa, which varies in the Mexican

specimens (only 6 are measurable for this feature) from 20 to 23 mm., averaging 21.4, and in the South American (11 specimens) from 20 to 29 mm., averaging 27.8, with only one below 23 mm., while only one of the Mexican skulls (the largest) reaches 23. This is therefore a very constant and appreciable character, when it is considered that it is nearly independent of the general size of the skull.

While the Jaguar is unquestionably subject to a wide range of individual variation in size and coloration (aside from the sporadic black phase), as long since recorded by Wied for the Jaguar of southern Brazil, it seems evident that were sufficient material available for examination the *Felis onca* group would prove susceptible of separation into several easily recognized geographical forms; the material for any such study is, however, at present lacking in the museums of America. Dr. Mearns, as already stated, gave a number of characters which he believed, from an examination of the specimens in the U. S. National Museum, would serve to distinguish the Mexican and Central American Jaguars from those of South America. The alleged difference in the width of the postpalatal fossa in examples from north of the Isthmus of Panama as compared with South American specimens is, as said above, fairly constant and of considerable importance, but those based on the form of the bulla, on general size, and on the relative size of the premolars prove to be too inconstant to possess much value. His paper (cited above) on the Jaguars had especial relation to those of Mexico and Central America, which he considered specifically separable from those of South America, and also susceptible of division into several species and subspecies. *Felis hernandezii* (Gray) was considered as limited to the "arid tropical areas of Mexico," while the name *Felis hernandezii goldmani* was proposed for the form inhabiting the "humid tropical areas of Mexico," with the type locality, Yohatlan, Campeche. This supposed form, however, does not seem separable from true *F. hernandezii* (type locality, Mazatlan, Sinaloa), in view of the wide range of variation shown by the Escuinapa series of true *hernandezii*. His Central American *Felis centralis*, he calls the "smallest of the Jaguars"; it is, however, quite as large as the specimens before me from Venezuela and the Lower Amazon. In southern Brazil and Paraguay the size is nearly the maximum, equalling, if not slightly exceeding, the largest known specimens from Mexico.

The subjoined table of skull measurements shows the great range in size of Jaguars from Mexico, Costa Rica, Brazil, and southern South America.

MEASUREMENTS OF SKULLS OF THE *Felis onca* GROUP.

Mus. No.	Sex and age	LOCALITY	Total length	Basal length	Zygomatic breadth	Mastoid breadth	Interorb. breadth	Foramen mag. to palate	Length of palate	Interpt. fossa, length	Interpt. fossa, width	Nasals, length	Nasals, greatest width	Distance between carnassials	Distance between upper canines at base	Width at outside base of canines	Length of upper premolar series	Length of upper carnassial	Length of pm ²	Combined length of pm ² and pm ¹
25008	♂ old	Escuinapa, Sinaloa, Mex.	—	—	175	—	52.7	—	102	36	22.4	65	41	53.5	37	67	51	26.7	17	43.7
25009	♂ ad.	"	231	187	156	95	44	89	97	38	20	63	37	51	34.5	37	53	27.5	17	44.5
25010	♂ ad.	"	240	195	159	100	45	100	96	37	22.3	57	36	51	32	63.3	52.5	27.2	17	44.2
25011	♂ old	"	208	170	142	86	41.5	68	82	25	—	—	34	46.5	32	56	48.5	24	15.3	30.3
25011	♀ ad.	"	211	181	145	96	41	85	85	30	20	53	30	48	31	57.5	50	26	16.6	42.6
25011	♀ ad.	"	211	181	145	96	41	85	85	30	20	53	30	48	31	57.5	50	26	16.6	42.6
6480N	♀ ad.	Colima, Mex.	—	—	159	95	45	90	91	28	—	—	37	53	34	61	48	24	16.2	40.2
88244N	♀ ad.	San Blas, Mex.	—	—	159	100	46	93	87	28	—	—	37	53	34	61	48	24	16.2	40.2
3674P	♂ old.	Achotal, Vera Cruz, Mex.	234	188	166	100	46	93	94.5	37	23	61	41.5	53	37	65	55	26	17	43
18061	♂ old.	Frontera, Tabasco, Mex.	280	220	115	115	55	111	112	42	21	62	43	60	36	71	55	20.5	19	48.5
103041N	♂ ad.	Palenque, Chiapas, Mex.	211	178	111	111	49	109	104	35	—	62	43	57	36	60	50	25	17	42
9132N	♂ ad.	Tehuantepec, Mex.	217	188	112	112	51	111	109	36	—	67	48	58	30	72	54	27	18	45
67402N	♂ ad.	San Andres, Vera Cruz, M.	—	227	180	113	50	115	111	33	—	60	48	58	30	72	54	27	18	45
14172N	♂ ad.	Talamancas, Costa Rica	—	200	169	102	42.5	103	98	33	—	59	48	52.5	32	65	48	25.3	17.5	43
14176N	♂ ad.	"	—	212	175	105	45	126	106	37	—	60	43	56.5	36.5	60	53.5	25.6	18	43.6
4128N	♂ old	Paraguay	302	242	195	122	55	126	118	—	29	62	45	61.5	43	74	61	31	20	49
4326N	♂ ad.	San José, Para-a	258	212	175	118	44	107	104	40	28	67	41.5	61	40	61	57	30	20	51
12206N	♂ ad.	Paraguay	247	203	179	103	45	103	101	—	28	53	41	58	36	65	52	26.5	17	43.5
4302N	old	Bolivia	260	205	179	104	51	104	103	—	20	60	44	60	30	70	55	28	18	46
4302N	old	Paraguay	268	213	181	116	46	109	105	45	25	55	44	57	38	69	54.5	28	19	47
4302N	old	Paraguay	268	213	181	116	46	109	105	45	25	55	44	57	38	69	54.5	28	19	47
3780	♂ old	Rio Belmonite, Brazil	—	—	183	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
64	♂ ad.	Brazil	224	—	153	91	40	—	92	30	20	55	39	51	—	—	50	26	17	43
6204	old	South America	270	214	187	115	50	106	108	46	27	57	48	51	45	73	56	28	19	47
11083	ad.	Lower Amazon	220	179	155	97	44	88	80	32	25	54	38	55	30	63	50	26	17	43
11084	ad.	"	226	171	153	100	42.5	81	90	—	23.5	50	38	51	20	62	52	28	19	47
11086	ad.	"	—	—	153	87	40	—	83	—	—	—	36	33	33	62	50	27	—	—
16025	ad.	Maripa, Venezuela.	216	—	142	—	37	—	83	36	23	52.5	34	46	31	57	49	26	16	42

Mexican and Cen. American

South American

Note.—In the foregoing table the Museum number followed by N (e. g., 6480 N) indicates that specimens thus indicated are in the U. S. National Museum. In like manner, 3674 F indicates that the specimen is in the Field Columbian Museum. All other numbers refer to specimens in the American Museum of Natural History. The measurements of the National Museum specimens of Mexican Jaguars are compiled from those given by Dr. Mearns (Proc. Biol. Soc. Wash., XIV, 1901, pp. 137-153). The measurements of the five National Museum specimens from South America were taken by myself, the specimens having been kindly loaned to me for examination by the authorities of the National Museum, through Mr. Gerrit S. Miller, Jr., Assistant Curator, Division of Mammals.

The method employed in taking the above measurements needs no explanation, further than to say that 'basal length' is the basal length of Hensel; and to add that 'length of palate' and 'foramen magnum to palate' are taken not from the median palatal notch, nor from the points bordering the notch, but from that portion of the posterior border between these points and the lateral wall of the interpterygoid fossa. The form of the posterior border of the palate varies individually and with age; usually there is a median V-shaped notch that penetrates more or less deeply into the border; on each side of the notch the border is produced posteriorly into a more or less long, spine-like process, between which and the lateral margin of the bony palate the border may be either slightly or deeply hollowed, and it is from this part of the border that the two above-mentioned measurements are taken. In young and middle-aged specimens, the median notch and the lateral hollows are usually deeper than in very old specimens, in which they have been filled out, more or less according to the individual, by the gradual deposition of bony matter at the posterior border of the palate with increase of age.

The basal length varies in 7 old males from Mexico from 187 to 220 mm., with 2 Costa Rica specimens at, respectively, 200 and 212; 3 Paraguay and Bolivia specimens range from 203 to 212, with a fourth at 242; other adult to old specimens (sex unknown) are somewhat smaller.

The width of the interpterygoid fossa varies in 6 Mexican specimens from 20 to 23, averaging 21.4; while the same measurement in 5 specimens from southern South America ranges from 25 to 29, averaging 27.4. The basal length of the skull in these two series is, respectively, 200 and 214,—the variation being quite out of proportion to that of the width of the interpterygoid fossa. The dentition is appreciably heavier in the South American skulls, pm^2 averaging 1 mm., and the combined length of pm^2 and pm^3 averaging about 2.5 mm. greater. These cranial and dental differences, combined with the deeper, richer colors of the South American animal, satisfactorily show that the South American *Felis onca* and the North American *F. hernandezii* may be regarded as specifically separable.

20. *Felis pardalis albescens* (Pucheran).

Felis albescens PUCHERAN (in I. Geoffroy Saint-Hilaire), Voy. de la Vénus, Zool., 1855, pp. 137-153, and atlas, pl. viii. State of Arkansas.

Felis limitis MEARNS, Proc. Biol. Soc. Wash., XIV, 1901, p. 146. Brownsville, Texas.

Felis pardalis limitis BAILEY, N. Amer. Fauna, No. 25, Oct. 24, 1905, p. 166.

"Known in Sinaloa, Tepic, and Jalisco, along the lowlands of the Pacific coast, as *Tigrio* or little tiger. A common species, widely distributed. Inhabits all kinds of country, stragglers having been taken as high as 9000 feet above sea level. Most numerous on dry hummocks and ridges about lagoons and swamps, especially in the dry season. Feeds on rabbits and other small mammals, birds, iguanas, frogs, fish, crabs, and small turtles. Hunts principally at night, though it is often met wandering about in the daytime. Has usually three or four kittens." — J. H. B.

Twenty-four specimens, 18 males and 6 females, all from the immediate vicinity of Escuinapa except 3; collected as follows: Escuinapa, Jan. 14, 16, Feb. 16-29, March 4-6, April 11 and 19, May 17, 26, 30, June 2, 21, 30, July 21, Sept. 1; Los Pielos, 2 specimens, April 11, 19; Los Limones, 1 specimen, May 17. All are adult, except one half grown and two quite young kittens. With the exception of five flat skins bought of hunters, the specimens are well prepared, with skulls, and with external measurements taken from the fresh specimens.

The series presents an excellent opportunity for the study of seasonal and individual variation. The seasonal variation, however, is quite overshadowed by individual variation, which has a wide range in respect to the general color and the size and pattern of the dark markings. Winter specimens are fresher and brighter looking than late spring and summer specimens, which have become more or less worn and faded.

Independently of season, specimens vary in the tone of the ground color from pale fulvous gray to quite strong fulvous, none, however, approaching the rich, bright fulvous of Vera Cruz specimens. The markings may be small and sparse, mainly in the form of spots and half-rings, without any marked tendency to form lines, or coarser and more prominent, especially over the middle of the dorsal area, where they have in many specimens a tendency to form interrupted black lines. The variation in both the ground color and in the size

and form of the markings thus covers a wide range, but the extremes are connected by intermediate variations.

There is also great variation in size, both in the skull and in external measurements, as shown in the accompanying table of measurements. The skulls vary greatly in the length and form of the nasals, which range in length on the median line from 22 to 26 mm., and in greatest anterior breadth from 16 to 18 mm., in skulls of practically the same general size. Also the nasals may terminate posteriorly in a long narrow point or end abruptly.¹ The interpterygoid fossa varies widely in size and form, the notch in the posterior border of the palate being either shallow and broadly rounded or much deeper and more V-shaped. The pterygoid fossa is even more variable, and the lateral shelf may be very broad, with a breadth of 3 to 5 mm., or practically obsolete. These differences are so great that if the extreme specimens came from widely separated localities they might easily be taken as of considerable importance.

In the following table of measurements the specimens are arranged in the sequence of size, based on the basal length (Henselian) of the skull, the largest being placed first. The specimens are all from the vicinity of Escuinapa, and all adult, though some are much older than others; a few have well developed sagittal and occipital crests, but others with undeveloped crests exceed them in size.

Specimens from Brownsville, Texas, the type locality of *Felis limitis* Mearns, and from Arizona and Chihuahua do not differ essentially from the Escuinapa series. Unless the Ocelot formerly inhabiting Arkansas was different from the Ocelot of the Lower Rio Grande, Arizona, and northern Mexico, which is not probable, the proper name of this pale northern form of the *pardalis* group is *albescens* of Pucheran, who based the name on a male specimen "de l' état d' Arkansas, dans la Louisiane," sent by the well-known naturalist Trudau to the menagerie in Paris. His description, which is very detailed (*l. c.*, pp. 142-149), with measurements, and accompanied by a colored figure, agrees unquestionably well with the Texas animal. His belief that the Arkansas animal was specifically identical with that previously described by F. Cuvier under the name *Felis brasiliensis* — a name which is both unidentifiable and preoccupied — does not invalidate Pucheran's name, based on an Arkansas specimen

¹ The variation in the size and form of the nasals is relatively as great as in *Odocoileus sinaloa*, as shown in Plates XXI-XXVI in the present paper. The present series of Ocelot skulls furnishes, in fact, quite as impressive an illustration of individual variation in these features as that afforded by the Sinaloa, Deer.

and not at all on Cuvier's description and figure. The proper name of the northern pale form of *Felis pardalis* is therefore *Felis pardalis albescens* (Pucheran).

MEASUREMENTS OF *Felis pardalis albescens*.

Mus. No.	Sex	DATE	EXTERNAL					SKULL		
			Total length	Head and body	Tail vertebrae	Hind foot	Ear from notch	Total length	Basal length	Zygom. breadth
24060	♂	Jan. 16.	1028	660	368	152	57	131	118	92
24852	♂	June 21.	1154	779	375	159	54	138	116	92
24647	♂	Feb. 19.	1048	730	318	140	51	134	111	94
24648	♂	Feb. 29.	978	648	330	140	51	121	111	85
24661	♂	June 2.	1054	724	330	138	63	131.5	108.5	88
24660	♂	May 30.	997	673	324	137	54	129.5	108	88
24662	♂	Jan. 2.	1061	743	318	138	51	129	108	84.5
24655	♂	May 17.	965	673	292	140	63	126	103	85
24650	♂	March 6.	982	671	311	146	57	125	103	81
24659	♂	March 4.	1048	737	311	133	52	122	102	83
24068	♂	Jan. 14.	960	627	333	151	54	122	101.5	77.5
25007	♂	Sept. 1.	927	622	305	137	64	121	101	85
24663	♂	Jan. 2.	1009	698	311	137	46	120	99	84.5
24640	♂	March 4.	—	—	—	—	—	119	99	81
24653	♂	April 11.	—	—	—	—	—	119	98	84
24658	♂	May 26.	—	—	—	—	—	120	97	74
24651	♂	May 26.	924	609	315	137	61	118	97	85
24851	♂	June 9.	1002	673	329	133	54	117	96.5	82
3448(1)	♂	Jan. 21.	1130	760	370	150	58	130	118	91.5
3450(1)	♂	Jan. 27.	1115	745	370	155	60	133	113	86
3868(2)	♂	April 16.	1180	745	435	165	63	145	124	98

(1) Nos. 3448 and 3450, Field Col. Mus., Achotal, Vera Cruz, Mex.; *Felis pardalis* Linn.

(2) No. 3868, Field Col. Mus., Reforma, Oaxaca, Mex.; *Felis catenata* Ham. Smith.

21. *Felis oregonensis aztecus* (Merriam).

Three specimens: Savinella, a mining camp 20 miles east of Escuinapa, altitude about 3000 feet, young female, skin and skull, March 14; Los Pies, 2 flat skins with skulls, April 19, 21.

There are no external measurements. The female is not fully adult. The skull of an old male measures as follows: Total length, 182; basal length, 150; zygomatic breadth, 133; mastoid breadth, 75; length of upper carnassial, 22. Another adult skull, smaller and probably a female: Total length, 167; basal length, 113; zygomatic breadth, 70; upper carnassial, 21.

In general coloration the three specimens differ but little, all being pale fulvous brown on the sides, and more reddish brown along the mid-dorsal area, in one with a slight mixture of blackish. Ears black or blackish, narrowly edged with gray.

22. *Felis cacomitli* Baird.

Two skins with skulls, and an additional skull, Hacienda Island, June 2, and Escuinapa, Feb. 28 and June 30.

Only one of the specimens, an old male, has external measurements, as follows: Total length, 963; head and body, 645; tail vertebræ, 318; hind foot without claws, 147; ear from notch, 51. The 3 skulls, probably all males (of one the sex is not given), measure as follows: Total length, 91 (♂), 97, 101 (♂); basal length, 97, 90, 89; zygomatic breadth, 58, 64, 67; interorbital breadth, 28, 29, 3.15; mastoid breadth, 37, 38.5, 39.

One of the skins is in the deep reddish phase, the other is intermediate between the typical red phase and the typical gray. The red example is like specimens in the red phase from Brownsville, Texas.

The species is evidently rare or more specimens would have been secured.

23. *Lynx ruffus escuinapæ* Allen.

Fourteen specimens, all from the immediate vicinity of Escuinapa, and hence topotypes of the subspecies, taken as follows: Jan. 10, 17, Feb. 10, 17, 23, March 3, 5, April 3, Aug. 16, Sept. 5, Oct. 7. Of the 14 specimens 9 (7 males, 2 females) are adult and 5 are young. Two of the young ones, taken Aug. 16 and Sept. 5, were about a month old when killed, and the other three, taken Oct. 7, were probably about a week old.

The collector's measurements of 7 adults (2 have no measurements) are as follows: 5 males, total length, 856 (837-870); head and body, 681 (673-698); tail vertebræ, 175 (165-184); hind foot without claws, 167 (156-178); ear from notch, 71 (64-76); 2 females, total length, 813, 813; head and body, 654, 635; tail vertebræ, 159, 178; hind foot, 159, 159; ear, 67, 70.

Eight adult skulls measure as follows: 4 males, total length, 127 (122-133); basal length, 104 (102-107); palatal length, 44.7 (43-47); postpalatal length, 58.3 (58-59); zygomatic breadth, 85 (83-87); mastoid breadth, 54 (52-55); length of pm2-3, 22.7 (22-23); 4 females, total length, 116 (114-120); basal length, 94.8 (93-99); palatal length, 40.8 (39-43); postpalatal length, 52.6 (51-56); zygomatic breadth, 78.2 (76-80); mastoid breadth, 51.5 (49-53); length of pm 2-3, 22.2 (21.2-23).

A series of 10 skulls from Texas (3 from Brownsville, 1 from

Rockport, 6 from San Antonio) are larger by 2 to 3 mm. in all of the above measurements, with disproportionately heavier dentition, the upper premolars in 6 adult males averaging in length on the alveolar line 24.9 as against 22.7 in the 4 adult male Sinaloa skulls, or 2 mm. more. A series of 5 adult Arizona skulls agree closely with the Texas series in general size and in the heavy dentition, pm 2-4 having a length of 24.8 mm.

Although nearly all of the ten adult specimens (including one obtained in December, 1896) were taken in winter (Jan. 10-March 5), they present a great range of color variation, four being in the gray phase, three in the red, and the others are variously intermediate. The gray specimens agree with the type, except that the soles of the hind feet vary from intense black to slightly blackish, or merely dusky as in the type. The pelage is short and coarse, quite different from that of its northern allies. The red phase is much less red than in Arizona specimens (*Lynx ruffus baileyi*).

The five young specimens are all in the soft, woolly first coat. They are all dingy grayish brown above, except one which is slightly reddish, with the dark spots and markings of the adult faintly indicated; the ventral surface is whitish, blotched with blackish.

"Known as the *Mojoquan* on the western slope of the Sierra Madre and the lowlands along the Pacific coast of Mexico. A shy, wandering species, widely distributed, and seldom encountered in the daytime, except when it is searching for water in the *varano* or dry season. Feeds principally on rabbits and other rodents, iguanas, crabs, and frogs. An expert hunter, and a hard fighter when wounded or at bay. Usually rests in high grass or thick bushes during daytime, in warm weather, and in caves and hollow trees in winter. Females have from three to five kittens."—J. H. B.

24. *Canis vigilis Merriam.*

Nine specimens, vicinity of Escuinapa, Feb. 5, 18, March 4, April 5, May 31, June 9, 15, July 30, Sept. 4. Five males and 4 females; one of the males is without measurements and another male (the September specimen) is only about two-thirds grown.

Collector's measurements: 3 males, total length, 1162, 1182, 1197; head and body, 851, 845, 889; tail vertebræ, 311, 337, 318; hind foot without claws, 194, 181, 191; ear from notch, 114, 102, 102: 4 females, total length, 1060, 1073, 1124, 1248; head and body, 749, 762, 800, 873; tail vertebræ, 311, 311, 324, 375; hind foot, 191, 181, 178, 181; ear, 114, 105, 108, 111.

The principal measurements of 4 male skulls and 3 female skulls are as follows:

Mus. No.	Sex	Total length	Basal length	Zygomatic breadth	Mastoid breadth	Upper pre-molar-molar series	Length of upper carnassial
24860	♂	192	167	95	59	70	20
24671	♂	208	178	98	62.5	75	21
24672	♂	205	175	103	65	69	20
24811	♂ old.	204	174	97	65	72	20.5
24812	♀	187	162.5	93.3	56.7	68	19
24670	♀ old.	183	160	88	60	66	19
24673	♀	191.5	166	92.6	60	69	20.2

There is another specimen collected by Mr. Batty at Escuinapa in December, 1895. The winter skins have a very full, heavy pelage, the coarse, long, black-tipped hairs of the upper surface giving a decidedly blackish appearance to the greater part of the dorsal region. The back of the ears, fore legs, and posterior surface of hind limbs are deep rusty red. In summer skins the pelage is greatly worn, the black-tipped hairs having mostly fallen out or been worn off, leaving the prevailing color strongly fulvous, with the nose, nape, and limbs rich rusty fulvous.

The contrast in coloration between this species and *C. impavidus* of northern Durango is striking at all seasons. The later species is also rather smaller than *C. vigilis*, with weaker dentition, and especially smaller carnassials.

25. *Urocyon cinereoargenteus scotti* (Mearns).

Eleven specimens: Rosario, 1 specimen, Dec. 21; Escuinapa, 9 specimens, Jan. 6, March 11, April 12, May 1, June 9; Papachal, 1 specimen, Dec. 7.

The series consists of middle-aged adults, except two very old males, one of which greatly exceeds all the other males in external measurements, and has also the largest skull.

Collector's measurements: 5 adult males, total length, 981 (927-1067); head and body, 566 (559-584); tail vertebræ, 415 (368-483); hind foot without claws, 125 (121-133); ear from notch, 71 (67-76): 4 females, 931 (927-947), 550 (546-559), 381 (368-394), 121 (114-127), 71 (70-76).

Skulls: 6 males, total length, 119 (114-125); basal length, 105 (102-108); zygomatic breadth, 64 (61.5-65); mastoid breadth, 42 (41.5-43): 3 females, 117 (116-118), 105, 43.

"Most common on uplands. Is quite tame in some localities and easy of approach. * Hunts mostly at night, occasionally uttering a hoarse bark. Feeds largely on wild figs, fruit of the coporno, and berries; also on small rodents, grasshoppers, and beetles. It is an expert climber and usually goes up a tree when hard pressed by dogs. Female has from four to six young."—J. H. B.

26. *Ursus* sp.

Represented by a single imperfect skin, purchased of a native hunter, taken in the vicinity of Escuinapa.

27. *Conepatus sonoriensis* Merriam.

Fifteen specimens, Escuinapa and immediate vicinity, Feb. 5-March 1, and one each July 5 and Nov. 4.

Collector's measurements: 5 males, total length, 729 (647-833); head and body, 416 (368-457); tail vertebræ, 313 (267-381); hind foot without claws, 72 (64-76); with claws about 8 mm. more; fore claws, 13-15; ear from notch, 26 (23-29): 7 females, total length, 634 (584-697); head and body, 374 (292-392); tail vertebræ, 279 (242-305); hind foot without claws, 69 (64-76); ear from notch, 24 (23-25).

Skull: 5 males, total length, 81.4 (76-85); basal length, 66.5 (62-71); zygomatic breadth, 48 (43-53); mastoid breadth, 41 (38-43): 4 females, total length, 78 (75-80); basal length, 63 (61-65); zygomatic breadth, 45.7 (41.5-49); mastoid breadth, 40 (38-41.5).

In the average females are decidedly smaller than males, but the range of individual variation is so great that the two sexes distinctly overlap in size, the larger females equalling the smaller males.

The measurements given above are from adult examples, but only three or four have the worn teeth and other characters of old age; the greater part are middle-aged or young adults. While not differing appreciably from the large series of Jalisco specimens of this species, they average slightly larger, due apparently to the age of the latter averaging younger.

The old specimens taken in February are in worn faded pelage, the black of the sides, limbs, and ventral surface being a dull brown black in strong contrast with the deep black of the younger examples. The black at the base of the lower surface of the tail varies in amount

from entire absence (in two specimens) to, in the average, about an inch in extent, varying to an inch and a half to two inches in extreme cases, with also in a few specimens a few short black hairs mixed with the white on the sides and lower surface of the basal third of the tail, generally quite inconspicuous.

"Probably the most common Mexican species of skunk. Most abundant on upland llaños at about three to five thousand feet altitude. Nocturnal, though on one occasion seven were observed in a band, traveling over a mountain shaded by heavy timber at midday. During the dry season they become more common near the coast, having migrated from the higher country eastward where food had become scarce. Food consists of insects, especially crickets, the parasites of which infest the bodies of the skunks by hundreds. Some individuals taken had their intestines, stomachs, and bodies so badly perforated that they were nearly dead from the effect. Breeds irregularly, probably according to age. Female has from three to six young." — J. H. Batty.

28. *Procyon hernandezii* Wagler.

Procyon lotor, variété *mexicaine* I. GEOFFR. ST. HILAIRE, Zoöl. Voy. de la Venus, V, Pt. I, 1855, 125, atlas, pl. vi. Mazatlan, Mexico.

Procyon hernandezii var. *mexicana* BAIRD, Mam. N. Amer., 1857, 215 (at least in part); U. S. and Mex. Bound. Surv., Zoöl., Mamm., 1859, 22.

Forty-six specimens, Escuinapa and vicinity, Jan. 6–28, Feb. 17–28, April 6–19, June 8, 30.

The series includes a few old adults with worn teeth, and there are a few quite young specimens, but the larger part consists of young adult and middle-aged animals. The external measurements of a good series of adults are as follows:

Collector's measurements: 10 adult males, total length, 828 (775–889); head and body, 530 (483–559); tail vertebræ, 298 (279–330); hind foot without claws, 120 (114–127); ear from notch, 58.5 (57–64). Only 2 fall below 800 mm. in total length, only 1 below 500 in length of head and body, and only 1 below 290 in length of tail vertebræ. These are in each case rather young adults. Females, 10 adults, total length, 812 (762–869); head and body, 522 (470–546); tail vertebræ, 290 (273–323); hind foot, 114 (108–127); ear, 57.5 (51–64).

Skull.—The principal skull measurements of the same specimens and a few others are: males, total length, 117 (114–124, and 1 at 132); basal length, 104 (98–114); zygomatic breadth, 73.3 (64–83, only 1 above 79); mastoid breadth, 60.4 (54.5–68); upper molar series,

22.4 (21.5-24): 12 females, total length, 116 (110-123); basal length, 103 (94.5-114, only 1 above 105); zygomatic breadth, 75 (65-81); mastoid breadth, 60.6 (55.5-66); upper molar series, 22.3 (21.3-24.5).

Adult skulls from New York State, comparable in age with skulls from Escuinapa, measure practically the same. In the Escuinapa series none have a well-developed sagittal crest, and only four or five have the teeth decidedly worn. A series from Fort Verde, Arizona (Mearns), are slightly larger, but they are very old, with well-developed sagittal crest and much worn teeth. The difference in size is obviously due to difference in age.

Specimens in fresh pelage are of course much darker and brighter colored than those in more or less worn pelage, in which the fulvous tints have faded, and the long black-tipped hairs of the dorsal surface have been partly shed or have the tips much worn. Aside from the seasonal difference the series is quite uniform in coloration. The number of black tail rings is usually six, counting the more or less indistinct basal ones, but excluding the black tip, but quite a number of specimens have seven.

Available material from eastern Mexico is insufficient to show whether the west coast animal differs appreciably from true *P. hernandezii*.

29. *Nasua narica molaris* Merriam.

(PLATES XXVII—XXX.)

About 100 specimens, of which about 40 are fully adult, and the rest young, including 6 newly born, the others varying from about one-quarter grown to nearly full-sized young adults. The females predominate over the males, nearly as 2 to 1. All were collected at or near Escuinapa, as follows: in December, 20 specimens; in January, 19 specimens; in February, 32 specimens; in April, 16 specimens, and others in June, August, and September. The very young specimens were taken July 24.

The surprising feature of the series is the immense range of individual variation in coloration, the very wide extremes being connected by intermediate examples which fill every stage of intergradation. There is, on the other hand, only about the ordinary amount of individual variation in size and in cranial features. This large amount of material is thus valuable as serving to show what may be expected in the way of color variation in Coatis from the same locality,

and also furnishes a good basis for the study of sexual and age difference in the skull. Considerable space is here given to an exposition of these features, in the belief that some of the results will be of interest in other connections.

The Coatis of western Mexico have been separated by Dr. Merriam¹ from those of eastern Mexico on the basis of "gray of the face more restricted; tail longer; molariform teeth, particularly the upper ones, very much larger and more massive." No measurements are given of either the skull or teeth. The type locality of the western form is Manzanillo, State of Colima, and I am indebted to Dr. Merriam for the use of two topotype skulls, a fully adult male and female, for comparison with the present material. I have also a small series of specimens from the southern coast region of the State of Vera Cruz, but only four of them are sufficiently mature for satisfactory comparison. In three of these the three upper molariform teeth (pm⁴-m²) have a combined length of 21 mm., and in the other a length of 22 mm. In the old male topotype the same measurement is 24 mm., and in the female 22 mm. The same measurement in 30 adult skulls from Escuinapa averages 22 mm., the extremes of the series being 20 and 23.3 mm., none of them reaching 24 mm., but 6 reach 23 mm. Apparently the west coast animal is slightly larger than true *N. narica* of the east coast, with rather heavier dentition. The Sinaloa series averages somewhat lighter in coloration in comparison with a dozen eastern specimens. But color is such a variable feature in this group that little weight can be given to it in discriminating races unless the material for comparison is extensive.

Specimens from various localities in the northwestern part of the State of Jalisco, from the Tepic border south to Ameca, aggregating some 50 specimens, are not distinguishable in dentition and cranial characters from the Escuinapa series.

The collector's measurements of 38 adults from Escuinapa are as follows: 14 males, total length, 1181 (1098-1264, with only 1 below 1100 and only 1 above 1200); head and body, 582 (533-629, with only 1 below 559 and only 2 above 610); tail vertebræ, 591 (496-635, with only 2 below 572, and only 2 above 610); hind foot without claws, 100 (89-108); ear from notch, 40.6 (38-44): 24 females, total length, 1103 (1041-1194, with only 3 below 1060 and only 3 above 1150); head and body, 538 (496-597); tail vertebræ, 565 (533-598, with 1 at 635, the only one above 598); hind foot without claws, 92 (81-102); ear from notch, 38 (32-44, only 4 below 38 and only 1 above 41).

¹ Merriam, Proc. Biol. Soc. Vol. XV, 1902, p. 68.

Add to the length of the hind foot, as given above, about 8–10 mm. for the length of the claws. The fore claws average about 22–24 mm. in length.

“Frequently found in bands. Sleep and breed in hollow trees. Tail carried vertically, with no curve at the end. Fight savagely with claws and teeth.” — J. H. B. A number of the very old males are entered in the collector’s catalogue as ‘Solitarios,’ implying that here as elsewhere¹ the old males separate themselves from the bands and live alone.

Individual Variation. — The skulls present an unusually small range of individual variation, although they vary greatly with age and sex in a number of important characters. The amount of individual variation in coloration, however, is rarely equalled in any wild species of mammal known to me.

A series of 32 specimens collected at or in the immediate vicinity of Escuinapa in February, and another large series obtained at the same place in April, may be taken in illustration. The gradations between the extreme types of variation are so complete that it is difficult to classify many of the specimens as belonging to any particular phase. Beginning with the darkest, which may be designated as the *black phase*, the whole animal is black or deep brownish black, except the ventral surface from the chin posteriorly to the breast, which is, as usual, white or yellowish white. In some specimens, however, there is also a broad blackish band across the upper part of the throat, but this frequently occurs in the lighter phases. The basal half of the pelage, including the underfur, is light grayish brown, lightest at the extreme base.

The opposite extreme, which may be designated as the *light phase*, has the general color of the upper parts pale yellowish brown, or pale reddish brown (in different specimens), with the basal portion of the pelage much lighter than in the black phase, and the light portion more extended apically, so that either only the tips of the hairs are light brown, or there is a narrow subapical zone of a darker tint with the tips of the hairs light gray or pale yellowish gray. In this phase only the feet are blackish, which even in the lightest specimens are usually quite black.

The most marked feature in the intermediate phases is the color of the top of the head, nape, and shoulders, which vary from blackish, with the tips of the hairs yellowish or golden, to deep ochraceous.

¹ See Allen, Bull. U. S. Geol. and Geogr. Surv. Territories (Hayden), Vol. V, No. 2, Sept. 6 1879, pp. 158–160, where the previous literature of the subject is summarized.

The extreme ochraceous-headed phase is the most striking and beautiful of all; but the color of these parts varies in different individuals from deep ochraceous to pale yellow or even very pale buff.

In what may be termed an average specimen, or better still as the *medium phase*, the general pelage is in effect brown or brownish with a superficial wash of lighter, which varies from yellowish gray to deep yellow. In such specimens the basal two-thirds of the pelage is light, usually pale yellowish white, with a more or less broad sub-apical band of dark brown or black, and the tips of the hairs light. The light tips become greatly reduced in extent by wear and exposure, but normally vary greatly in length, from a slight tipping to half an inch or more in length. In specimens approaching the 'black phase,' the light tips are yellow, and are mainly restricted to the top of the head and nape and to a narrow median band which becomes narrower posteriorly and often nearly or quite disappears behind the shoulders.

Very few specimens in a large series are near enough alike to be covered in a single detailed description. The following, however, may indicate to some extent the range of variation in the color of the head, nape, and shoulders. First is the black phase, in which, the hairs have no light tipping. Next come the blackish brown specimens, with the top of the head and most of the upper surface black or blackish, and the hairs of the nape, top of the shoulders, and a tapering band running posteriorly to about the middle of the dorsal region tipped with dull rather brownish yellow, most extensively on the nape and the mid area of the shoulders. Then come lighter specimens with the general coloration lighter and the light tips of the hairs longer — *i. e.*, brown with a slight veiling of yellowish gray, strongest on the anterior half of the body and especially intensified over the region of nape and shoulders through the greater length of the light tips. Next follow, perhaps, the major part of the specimens, in which the body coloration is nearly the same as in the last, with the light tips of the hairs generally longer. In these, however, there is a wide range of variation in the color of the tips of the hairs, which give the prevailing color to the top of the head, nape, and shoulders. In many of these specimens the top of the head is dull or pale wood brown, or dull drab, becoming lighter and more yellowish over the nape and shoulders; in others it varies from clear buff through various yellowish shades to ochraceous and 'ochraceous-rufous' (Ridgway), only a relatively small proportion of the specimens being of this last deep, intense shade of ochraceous. On the head the color,

whatever it may be, extends nearly to the base of the pelage; on the nape and posteriorly, the hairs are basally light (varying in different specimens from soiled buffy gray to strong yellowish buff), with a broad subapical band of black, and a still broader terminal band of pale yellow to ochraceous, according to the specimen. In the series of very light specimens the light basal portion of the pelage extends nearly to the surface, the subapical dark band is much narrower and less dark, and is more heavily veiled by the long light tips of the hairs, which are distinctly whitish. In such examples the top of the head is of an extremely pale shade of buff, in rare cases almost yellowish white; on the nape and shoulders the yellowish shade is somewhat stronger, and the subapical dark band is narrower and browner—brown rather than black.

The facial markings vary correspondingly in the tone of the dark areas from brown to black, and the superciliary stripes and other light markings vary more or less in width and extent, and from dingy white to clear white. In all the phases the inner surface of the ears is either clear white or yellowish white; the outer surface conforms to the color of the adjoining parts.

The tail varies with the general coloration, being blackish throughout in the 'black phase,' yellowish or buffy in the extreme light phase, and variously intermediate in other phases, according to the general coloration, but always, except in the darkest specimens, gradually darkening about the middle to the end, the apical third being much darker than the basal third. In many specimens the tail is obsoletely ringed, the dark bands being only slightly darker than the adjoining intervals; they are generally most apparent on the middle third of the tail, and so slightly developed as to be noticeable only on close inspection.

That the above-described color variations are purely individual is evident from the fact that both sexes are about equally represented in all the phases, that the half-grown young share them equally with the adults, and that all occur at one and the same locality, and that all have been taken at practically the same dates,—in the December, January, February, and April series of from 15 to 30 specimens each.

Cranial Variation due to Sex and Age.—In view of the inconstancy of the coloration in the present series of Coatis from Escuinapa, due wholly to individual variation, it is surprising to find so little variation in the cranial characters of the same specimens that is not obviously due to differences of sex and age. In regard to sexual differences, the female is much smaller than the male. In old skulls, with worn

teeth, the male exceeds the female (in the average) by about 4 to 5 mm. in the total length of the skull, while in the average, in strictly comparable middle-aged skulls of the two sexes, the male exceeds the female by about 6 mm. (about 4.4 per cent.) of the total length of the skull. In other respects, as regards size and proportions, there are, with the exception soon to be mentioned, no noteworthy differences, the middle-aged male skull exceeding that of the female in nearly all its dimensions proportionately with the difference in total length. There is no difference in the length of the upper molar series, nor in the size of the individual teeth.

In the male, however, the upper canines are two to three times the size of these teeth in the female, with a markedly greater difference in the size of the lower canines, which in the male are about five times larger than in the female. A corresponding increase in the stoutness and breadth of the rostrum and in the development of the lower jaw is of course entailed in the male by the excessive enlargement of the canines, which strongly recall the great development of these teeth in the pigs and peccaries.

In old age, however, the male skull becomes greatly specialized as compared with that of the female of corresponding age, or with that of the middle-aged male. At the stage when the entire milk dentition is still *in situ*, and m^1 has become functional, the skulls of the two sexes are practically indistinguishable. By the time the complete permanent dentition has been acquired, the sexual difference in size has become well-marked, and the very different character of the canines leaves no question as to the sex of the specimen. Otherwise than in size and the character of the canines, the skull of the young adult or middle-aged male does not differ from that of the female. Following this middle-age stage, the development of old age characters begins to differentiate the skull of the old male from that of the young male, and still more markedly from that of the female.

These old age characters are the development of occipital and sagittal crests and postorbital processes, and a marked constriction of the postorbital region of the skull. The teeth also become greatly worn, in some cases little but the roots remaining; but this feature is, of course, common also to very old females. The beginning of the development of the sagittal crest is about coincident with, or slightly precedes the first perceptible wearing of the tubercles of the teeth, and its growth thence continues as long as the animal lives, in very old animals reaching a height of 7 to 9 mm. Coincidentally with the development of the crest the constriction behind the orbits

gradually deepens, while at the same time the interorbital breadth increases. In middle-aged male skulls the average interorbital breadth is 3.5 mm. greater than the postorbital, while in old male skulls it is 4 mm. less, resulting in a most marked change in the contour of the middle region of the skull.

The female apparently never develops even an incipient sagittal crest; the occipital crests are much less pronounced than in the male; the postorbital processes are much less prominent, and there is no decrease in the postorbital breadth of the skull, so marked in the male. The increase in the interorbital breadth is only in ratio with the general increase in the size of the skull. The modifications due to sex and age are shown in Plates XXVII-XXX, and in the subjoined table of measurements.

In preparing this table of measurements, only fully adult skulls were utilized, and they were divided into four categories, as follows: (1) old males (8 specimens) with well-developed sagittal and occipital crests and more or less worn teeth; (2) fully adult males, middle-aged (6 specimens), without crests and with unworn teeth; (3) old females (8 specimens), all with the teeth greatly worn; (4) adult females, middle-aged (6 specimens), with the teeth unworn. Younger specimens (amounting to more than half of the total series), in which the milk dentition was in most cases not wholly displaced, were discarded as unavailable for comparative measurements. The principal points thus shown may be summarized, as follows:

Old males, 9 skulls: Total length, 135.3 (131-142.5); basal length (Hensel), 118.9 (115-125); palatal length, 80.8 (77-86); postpalatal length, 38.5 (37-40.5); zygomatic breadth, 73 (65-83); interorbital breadth, 30 (26.5-33); postorbital breadth, 25.8 (23-28.5); mastoid breadth, 49.5 (47.5-51.5); audital bulla (transverse and longitudinal diameters), 11.5×14.2 ($10.5 \times 12-11 \times 15$); premolar⁴-molar² (last three molariform teeth), 22 (20.7-23); height of sagittal crest (in 7 out of 9 specimens), 6.9 (5-8.5).

Middle-aged males, 6 skulls: Total length, 130.1 (125.5-135.31); basal length, 113 (108-116); palatal length, 78.3 (75-80); post palatal length, 35.3 (33-37.5); zygomatic breadth, 63 (59-64); interorbital breadth, 26.4 (25.5-27); postorbital breadth, 29.7 (28-31.5); mastoid breadth, 46 (44-48); audital bulla, 10.2×13.2 ($10 \times 13-11 \times 15$); pm⁴-m², 22.2 (21-23.3); sagittal crest, 0.

Old females, 8 skulls: Total length, 127 (121-133); basal length, 111.3 (108-120); palatal length, 74.6 (70-78); postpalatal length, 35.3 (34-37); zygomatic breadth, 65 (60-69); interorbital breadth, 28.0

MEASUREMENTS OF 30 SKULLS OF *Nasua narica nolaris*, FROM SOUTHERN SINALOA.

Mus. No.	Sex	Total length	Basal length	Palatal length	Postpalatal length	Zygomatic breadth	Interorbital breadth	Postorbital breadth	Mastoid breadth	Audital bulla	Length of pm ⁴ -m ²	Height of crest	Condition of teeth
24600	♀	139	120	80.8	40	74.5	31	25	49	11.7 x 15	22	7	Not worn.
24604	♀	133	115	77	38	83	33	25	49.5	10.5 x 13	21.5	8.5	Much worn.
24130	♀	133	117	79	38	77	29.5	23	50.5	11 x 13	20.7	6.5	"
24138	♀	135.5	118	81	37	80	30.5	—	51.5	12 x 14	23	7	Not worn.
24596	♀	142.5	125	84.5	40.5	—	33	26	51.5	11 x 15	22	7	Slightly worn.
24631	♀	131	115.5	77	38	77	28.5	26	49	11 x 14	22	7	Much worn.
24645	♀	138.5	120	80	40	76	30	25.7	51.2	12 x 15	22.5	5	Slightly worn.
24597	♀	136	120	83	37	65	28	27	47.5	11 x 15	22	0	"
24611	♀	135	119	86	38	70	26.5	28.5	48	11 x 15	22	0	"
Average, 9 old ♂	♂	135.3	118.9	80.8	38.5	73	30	25.8	49.5	11.5 x 14.2	22	0	"
24001	♀	128	111	77	34	62	27	31	46	11 x 12	23	0	Not worn.
23991	♀	135	115.5	80	35.5	64	25.5	30	46	10 x 13	22	0	"
24629	♀	125.5	108	80	33	59	25.5	31.5	44	11 x 15	21	0	"
24610	♀	128	111	75	36	67	26.5	28	45.5	10 x 13	23.3	0	"
24646	♀	131	116	78.5	37.5	64	26	30.5	48	11.4 x 12	22	0	"
14331	♀	130	115	79.5	35.5	63	27	32	47.5	12 x 14.2	22	0	"
Average, 6 ad. ♂	♂	130.1	113	78.3	35.3	63	26.3	30.5	46	10.2 x 13.2	22.2	0	"
14332	♀	123	—	72	—	67	24	29	45	—	22	0	Much worn.
24599	♀	128	120	76	34	64.5	28	29	44	10.5 x 14	21.5	0	"
24002	♀	121	104	—	—	60	27	32	42.5	11 x 14	22	0	"
24000	♀	130	111	76.5	34.5	66	30	33	46	11 x 14	20	0	"
24603	♀	126	108	73	35	67.5	29.3	33	47	12 x 13.5	20	0	"
23089	♀	133	114	78	36	64	30	31	46	10 x 13	23	0	"
24602	♀	130.5	112	76.5	35.5	69	29.5	30	48	10 x 13	21.5	0	"
24832	♀	125	110	70	37	64.5	29	—	45.3	11 x 15	23	0	"
Average, 8 old ♀	♀	127	111.3	74.6	35.3	65.3	28.4	31	45.5	10.7 x 13.8	21.6	0	"
23977	♀	128	111	76	35	61	27	28	45	10 x 13	22	0	Not worn.
24598	♀	127	111	75	36	62	27	32	43	9 x 11	22	0	"
23988	♀	125.5	108.5	74	35	61	26	31	45	9.5 x 11.5	21.5	0	"
23981	♀	124	108	74	34	58	25	28	43	11 x 13	23	0	"
24605	♀	124	108	74	34	60	27	31.5	44	9.5 x 11.5	22	0	"
24636	♀	126	109	75	34	61	27	28.5	46	11.5 x 11.4	21.5	0	"
Average, 6 ad. ♀	♀	125.8	109.3	74.7	34.7	60.5	26.5	28	44	10.5 x 11.4	21.5	0	"

(27-30); postorbital breadth, 31 (29-33); mastoid breadth, 45.3 (42.5-48); audital bulla, 10.7×13.8 ($10 \times 13-11 \times 15$); pm^4-m^2 , 21.6 (20-23); sagittal crest, 0.

Middle-aged females, 6 skulls: Total length, 125.8 (124-128); basal length, 109.3 (108-111); palatal length, 74.7 (74-76); postpalatal length, 34.7 (34-36); zygomatic breadth, 60.5 (58-62); interorbital breadth, 26.5 (25-27); postorbital breadth, 29.9 (28-32); mastoid breadth, 44.3 (43-46); audital bulla, 10×11.9 ($9 \times 11-11 \times 13$); pm^4-m^2 , 22 (21.5-23); sagittal crest, 0.

30. *Tayra barbara senex* (Thomas).

Two young specimens, Escuinapa, Nov. 10. These specimens, apparently not more than three or four days old, are provisionally referred to this subspecies. They are in an interesting stage of growth, but of course too young for satisfactory determination. From the shoulders posteriorly the pelage is wholly deep black; at the shoulders it is mixed with rufous, passing into nearly uniform rusty brown on the head and neck. There is a small blackish spot at the posterior base of the ear, and an indistinct blackish lateral face stripe.

31. *Lutra annectens Forsyth-Major*.

One specimen, a hunter's pelt, without skull or measurements, Provisionally referred, on geographical grounds, to this species, which was based on a skull from Rio de Tepic, about one hundred miles south of Escuinapa.

32. *Myotis* sp.

One specimen, skin without skull, Escuinapa, Oct. 27. Alar extent, 260; length, 51; tail, 30; forearm (in dry skin), 35. Membranes dark brown; ears light brown.

33. *Dasypterus xanthinus* Thomas.

Four specimens, an adult female with two young, and a third young one, Escuinapa, June 26. Alar extent, 337; length, 66; tail, 51. The young ones are in formalin.

34. *Balantiopteryx plicata* Peters.

Six specimens, 1 skin, and 5 specimens in formalin, Escuinapa, July 8, 18.

35. *Molossus sinaloæ* sp. nov.

Type, No. 24524, ♀ ad., Escuinapa, Sinaloa, Feb. 15, 1904; J. H. Batty.

Size of *M. pretiosus*, but very different in the size and form of the ears and in coloration; the braincase is also much narrower and higher and the dentition heavier.

Above dull dark brown; below much lighter, approaching grayish brown; ears and membranes dark brown. Ears small, transverse width across both (in dry skin) 18 mm. against 21 mm. in *M. pretiosus*; height, 13.

Measurements.—The collector's measurements from the fresh specimen are: Alar expanse, 324; head and body, 70; tail, 38. From skin: forearm, 43; 3d finger, 1st phalanx, 46; 2d ph., 20; 3d ph., 18; thumb very short, 6; foot, 16. Skull: Total length, 20; basal length, 14; zygomatic breadth, 12; width of braincase, 10; height of sagittal crest, 1.5; mandible, 14; maxillary toothrow (including canine), 7; lower toothrow (including canine), 8.

Represented only by the type, an old female with worn teeth.

This species is intermediate in size between *M. nigricans* and *M. obscurus*, being much smaller than the former and very much larger than the latter.

36. *Nyctinomus mexicanus* Saussure.

Eight specimens (in formalin), Escuinapa, July (?).

37. *Pteronotus davyi fulvus* (Thomas).

Two specimens (in formalin), Escuinapa, July (?).

38. *Spectrellum mexicanum* (Miller).

Two specimens, Escuinapa, July 4 and 9.

39. *Leptonycteris nivalis* (Saussure).

Eight specimens, Escuinapa, Oct. 6, 7, 22, 29. Four are in the dark phase of coloration and four in the light phase, both sexes being represented in each. Alar expanse, 356–368; length of body, 73–89; ear, 16.

40. *Glossophaga mutica* (Merriam).

Twenty-nine specimens, Escuinapa, July 5–18 (18 specimens), Oct. 29 (10 specimens), Jan. 19 (1 specimen).

The collector's measurements of 10 adult (July) specimens are: Alar expanse, 266 (254–276); length, 56 (53–58). Several of the specimens are strongly reddish, between which and the dull dusky brown

phase there is every stage of gradation; the younger examples are sooty gray, the darkest of the series.

41. *Dermanura phæotis* (Miller).

Two specimens, Escuinapa, Nov. 9, July 20.

II.—MAMMALS FROM THE STATE OF JALISCO.

Mr. Batty broke camp at Escuinapa, Sinaloa, November 10, 1904, and moved south with his pack train of burros across the lagoon country, arriving at San Marcos, Jalisco, December 6. His first collecting camp was at Arroyo Gavalan, about 20 miles west of San Marcos, where collections were made from December 17–26, 1904. From January 1 to March 30, 1905, work was prosecuted from various camps at and near Amatlan de Cañas, practically on the boundary line between Jalisco and Tepic, at an altitude of about 5000 feet. Mr. Batty states in one of his letters that “Ojo de Agua, Palo Amarillo, Estancia, Llano e Casco, Rio Ameca, etc. [=Rio Sta. Maria, Garabatos, Arroyo de Plantanar], all local names not on maps, are near and about Amatlan de Cañas, Tepic.” Some of them are just over the line in Tepic, others are on the Jalisco side of the boundary. He left Llano e Casco April 13, moving southward about 30 or 40 miles to La Cienega, Jalisco, where he worked for the next ten days. This camp is “on the tableland formed by the first or eastern range of the Espirito de Santos Mountains, at an elevation of about 7000 feet.” “La Cienega,” he says, “is one of the few places that have water during the dry season. In the llano and in the arroyos are many small springs, and a small swampy pasture; hence its name, La Cienega or The Swamp. Snow has appeared many times, and it is said that about forty years ago a heavy storm occurred, leaving nearly two feet of snow on the level. Hailstones are of frequent occurrence, even in spring and fall. The nights are always chilly, and during the dry season, from the middle of October to the middle of June, water sometimes freezes, and white frosts are common. The surrounding country is mountainous and very rocky, sparsely covered with pines and oaks.”

His next station was in the Wakenakili Mountains, one day's journey from La Cienega, and at about the same altitude, which locality he describes as follows: “A small range of mountains running southeast; highest points about 7000 to 8000 feet. Bounded on the east by the large Arroyo de Colomos, and on the west by the deep cañon-like valley of the Rio Santa Maria. The mountains abound in cliffs and deep arroyos, and are sparsely timbered with small pines,

oaks, and other trees. There are several springs that flow during the dry season, and in the arroyos bushes and trees fringe the water-courses."

The next camp was in the Sal se Puerdes, at the same altitude and not many miles distant from the Wakenakili Mountains. Sal se Puerdes is described as a very broken and very barren mountain range; "a half day's hunt was necessary to find a flat place a few yards square to camp by water. The country is very slightly timbered, with nothing but bare rocks in the arroyo bottoms. The country, in most parts, resembles a stone quarry."

La Laja, where he spent the next three weeks (May 16 to June 4), "literally means a flat ledge, and probably was so named on account of the many flat rocks. It is probably the highest llano, mesa, or tableland in the State of Jalisco, having an altitude of 9000 to 10,000 feet. It is situated between two sharp ranges of the Espirito de Santos Mountains. There is no water in the dry season on the llano proper, but there are many springs in the arroyos which never run dry. It is timbered with pines, oaks, junipers, and many other kinds of small trees. The nights are cool in summer, and light snows occur occasionally in the winter months. Heavy rain storms send bodies of water rushing down the valleys, twelve to twenty feet deep. You will hear a roar for a few minutes and then comes a deluge of rushing water, carrying with it even large boulders."

From La Cienega Mr. Batty proceeded to Tuxpan, about 150 miles southeast of La Cienega, and soon after began work in the Sierra de Colima. His localities in this region are Tuxpan, June 24-26; Volcan de Fuego, altitude 10,000 feet, July 5-31; Las Canoas, on the tableland, about 40 miles west of Tuxpan, at an altitude of about 7000 feet, August 4 to September 4, and September 20 to October 2 (about 300 specimens); Artenkikil, an arroyo near Las Canoas, September 5 to September 21; Volcan de Nieve, altitude 12,000-13,000 feet, September 4-18 (about 100 specimens); Tanko Riparti and La Joya are other localities on the Volcan de Nieve where a few specimens were obtained, at altitudes respectively of 10,500 feet and 13,500 feet. Timber line on these mountains is given by him as at about 13,000 feet.

Mr. Batty's collections in Jalisco were thus made at two points in the State, (1) in northwestern Jalisco within a short distance of the Tepic boundary, from December 17 to June 4, the mammals obtained at the various points in this region where collections were made numbering about 844; (2) in southern Jalisco, a little west of

Tuxpan, and in the Sierra de Colima, near the Colima boundary, from June 24 to October 2, where about 554 specimens of mammals were collected. The whole number of mammals from Jalisco included in this report therefore numbers altogether about 1,400 specimens, representing 48 species, of which 2 are herein described as new. Further collections, not yet received, were made by him in southern Jalisco before his departure to the State of Oaxaca, where he is continuing his work.¹

The absence from this collection of specimens of *Oryzomys* and *Neotoma*, while *Sigmodon*, *Peromyscus*, *Reithrodontomys*, *Heteromys*, and *Perognathus* are well represented, is noteworthy, and not easily explained, except on the ground of their probable absence at the particular localities where the trapping of small mammals was vigorously prosecuted. The genus *Peromyscus* is represented by 5 species and over 250 specimens; *Sigmodon* by 2 species and over 60 specimens, *Reithrodontomys* by 2 species and 41 specimens, *Microtus* by 17 specimens, and *Heteromys* by about 80 specimens. *Oryzomys* and *Neotoma* would have hardly escaped the traps had they been present.

Only one representative of the Geomyidæ was taken — namely, *Platygeomys gymnurus* (52 specimens) — and this only in the vicinity of Zapotlan (the type locality), although Mr. Batty was urged to give special attention to this group. He reports that he tried to obtain them at various points, and observed at a few localities old 'signs' of what appeared to be extinct colonies. The only place where he saw fresh indications of their presence was where he found the large colony of *Platygeomys*. From other localities, in Durango and Lower California, he has sent large series of both *Thomomys* and *Neotoma*, especially of the latter, so that their absence from the Jalisco collections is the more surprising.

1. *Marmosa sinaloæ* Allen.

One specimen, Rancho Palo Amarillo, near Amatlan de Cañas, Tepic, Jan. 15.

2. *Didelphis mesamericana mesamericana* (Oken).

Ten specimens, all adult: Estancia, 6 specimens, Jan. 22, 26,

¹ Since the manuscript of this paper was sent to the printer, another collection has been received from Mr. Batty, containing about 120 specimens of mammals obtained at Los Masos (altitude 5800 feet) in southern Jalisco, and collected between October 5, 1905, and February 16, 1906. These add several species to the list, and are now included in order to complete the account of the Jalisco collections. Unfortunately Mr. Batty's notebook covering this period of his work has not yet been received, so that measurements and dates of collecting are not available for record. This later material raises the total number of Jalisco specimens to about 1520, and the number of species to 60.

Feb. 22, March 12, 17; Rio Sta. Maria, 2 specimens, Feb. 4; Wakenakili Mountains, 1 specimen, May 3; Las Canoas, 1 specimen, September.

Two of the Estancia specimens are in the black phase; all the others are in the gray phase.

Also Los Masos, 4 specimens (1 female, 3 males), all adult and all in the gray phase.

3. *Tatu novemcinctum mexicanum* (Peters).

Two specimens, Las Canoas, Aug. 12, 21.

4. *Tayassu angulatum sonoriense* (Mearns).

Four adults collected as follows: La Cienega, ♂ ad. (skull only), April 23; Wakenakili Mountains, ♀ ad., April 26; Volcan de Fuego, ♂ ad., July 16; Los Masos, 1 very old female.

The collector's measurements of the first three of these specimens are, respectively, total length, 901, 965, 934; head and body, 864, 914, 914; tail vertebrae, 37, 51, 20; hind foot, 190, 197, 190; ear, 89, 79, 95. Skulls, respectively, total length, 236, 238, 241; basal length, 178, 182, 189; palatal length, 130, 129, 134; width of rostrum, 29, 28, 30; zygomatic breadth, 95, 101, 107; postorbital processes, 69, 68, 75; width of braincase, 53, 54, 58; width of palate at m^2 , 19, 21, 22; width of basioccipital, 17, 16.5, 21; upper molariform series, 61, 58.5, 63.5; audital bulla, 10.5×13 , 11×13 , 12×13.5 . One of the skulls has the orbitosphenoids and adjacent parts inflated; in the other two they are normal (see *antea*, p. 201).

The Wakenakili Mountains specimen is strongly suffused with deep buff, especially on the sides of the head, sides of the neck, the chest, flanks, and shoulder stripes, which latter are unusually conspicuous. The Volcan de Fuego specimen is much less suffused, and the shoulder stripes are not prominent. This specimen, from the locality, should, perhaps, be referable to *T. a. humerale*, from Armeria, State of Colima, but it is not apparently distinguishable from average Sinaloa specimens (see *antea*, p. 203). The three Jalisco skulls find exact counterparts in the Escuinapa series.

5. *Odocoileus sinaloæ* Allen.

Eighty-two specimens: 14 skins with skulls, 8 additional skulls, and about 60 pairs of antlers. The skins with skulls were collected as follows: Estancia, 1 adult male, Jan. 24; La Cienega, 1 adult male,

1 adult female, April 16, 21; Wakenakili Mountains, 1 adult male, May 6; La Laja, 1 young adult male and 1 old male, May 19, 25; Volcan de Fuego, 3 males, 2 females, and additional skulls, July 8-28; Volcan de Nieve, 2 adult males, Sept. 7, Oct. 2. The antlers were collected mostly at La Cienega, La Laja, and the near-by Mesa de Cullutan.¹

Of the 10 males (skins with skulls), 4 are more or less immature, two of them being about half-grown and the others young adults; of the 3 females, only one is an old adult, the other two being more or less immature. The collector's measurements of the adults are as follows:

Adult males, 6 specimens: Total length, 1422 (1373-1473); head and body, 1225 (1194-1282); tail vertebræ, 196 (179-203); hind foot, 377 (368-406); ear from notch, 152 (133-165). One old female: 1359, 1156, 203, 356, 140.

The subjoined table of measurements of skulls shows the same wide range of individual variation in all the principal dimensions as in the Sinaloa series (see *antea*, p. 207), with no average difference of any importance. In the Sinaloa series of 6 males the nasals average slightly larger than in the 5 males from Jalisco, but the nasals are so inconstant in size and form that a few more specimens added to either series might materially change the average. In all other measurements there is no appreciable difference.

MEASUREMENTS ² OF 7 SKULLS OF *Odocoileus sinaloæ* FROM THE STATE OF JALISCO, MEXICO.

	25783 ♂	25052 ♂	26136 ♂	25781 ♂	26000 ♂	Aver'ge of 5 ♂♂	25578 ♀	25999 ♀
Condyllo-basal length	129	225	232	225	127	227	212	221
Palatal length	149	149	146	142	148	147	136	143
Interorbital breadth	57	53	62	55	56	56.5	49	54
Postorbital breadth	85	72	82	81	76	79	61	62
Breadth at lower edge of orb.	110	102	113	106	100	106	91	99
Palatal breadth at m ³	41	40	45	40	34	40	35	41
Distance between premaxilla and nasals	10	4	0	2.5	0	3.3	2	8
Nasals, length	71	72	72	70	66	70	67	64
" breadth anteriorly	23	18	18	16	18	18.6	14.5	17
" " posteriorly	26	20	23	27	24	25	18.5	22
Length of upper tooththrow	65	70	67	67	65	67	68.5	66
" " lower tooththrow	—	72	73	72	70	71	73	73
Antlers, length of main beam along external curvature	356	120	270	—	—	—	—	—
Greatest expanse	315	223	280	—	—	—	—	—
Number of points	3-3	3-3	3-3	—	—	—	—	—
Condition of teeth	g. w.	s. w.	m. w.	s. w.	s. w.	n. w.	n. w.	g. w.

¹ Also 7 specimens (skins and skulls), and 4 additional sets of antlers, from Los Masos. Six of the skins are very old females in the gray winter coat; the other is a young male in the red summer coat.

² For explanation of measurements see *antea*, p. 207. Condition of teeth: g. w. = greatly worn; m. w. = much worn; n. w. = not worn; s. w. = slightly worn.

MEASUREMENTS OF 15 PAIRS OF ADULT ANTLERS OF *Odocoileus sinuatus*.

	25813	25817	25820	26138	25785	25441	25804	25701	25811	25705	25787	25786	25800	25827	25879
Length of main beam along ext'l curvature	300	355	315	325	410	380	285	325	287	264	277	250	310	370	375
Length in straight line from bur to tip	200	250	191	205	187	100	173	205	185	155	184	170	157	200	175
Greatest expanse (outside to outside)	400	307	304	265	360	360	275	300	264	202	250	287	275	200	405
Distance between tips of main beams	310	165	162	235	165(?)	185	182	107	138	102	100	187	112	93	217
Diameter of bur	40	35	30	40	34	35	33	34	33	35	33	33	38	40	33
Number of points	4-4	4-4	4-4	4-4	3-4	4-4	4-4	4-4	3-4	4-4	4-4	3-3	3-3	3-4	3-4

The accompanying series of photographic illustrations (Plates XXXI-XXXIII) serves to show the development of the antlers with age, and also individual variation in size and form at different ages. In order to complete the series for the earlier stages, it was necessary to utilize a few skulls from the Sinaloa collection for the first and second year stages. The others are all from the State of Jalisco, and nearly all from the extreme northwestern part of the State, near the boundary line between Tepic and Jalisco.

A comparison of the detached antlers with those still attached to skulls enables one to judge pretty closely as to the age of the antlers here selected for illustration. About seven stages of growth may be recognized, counting the frontal processes of the first year as one stage, as follows:

First stage, antlerless frontal processes (animals 8 to 12 months old). Second stage, a short slender spike (2d year animals). Third stage, a longer, heavier, usually simple spike, in rare instances slightly forked at the tip (animals of the third year). Fourth stage, small, slender, branched antlers, usually 3-tined (animals of the fourth year). Fifth stage.—Similar to the fourth, but antlers very much heavier, but as a rule 3-tined (animals in the fifth year). Sixth stage.—Like the fifth, but antlers much heavier, 3-tined or 4-tined (animals of the sixth year). Seventh stage.—Similar to the fifth, but antlers heavier and usually 4-tined (animals of the seventh year). It is probably not possible always to distinguish between antlers of the fifth and later stages, as large antlers of the fifth stage might easily be mistaken for small antlers of the sixth stage, and *vice versa*. Seventh stage.—This differs from the sixth only in the antlers being generally larger and heavier. No satisfactory determination can be made as to the age of the antlers after the sixth year. Probably in very old animals they

are often smaller than in vigorous animals of the seventh to ninth years.

6. *Sciurus poliopus cervicalis* Allen.

Sixty-nine specimens: Tuxpan, 1 specimen, June 24; Volcan de Fuego, 61 specimens, July 5-31; Las Canoas, 1 specimen, Aug. 16; Tanko Riparti, 1 specimen, Sept. 26; Los Masos, 5 specimens.

The type of *cervicalis* was taken at Tonila, Jalisco, May 14, and has the nape patch and the rump more fulvous and less rufous than any specimen in the large series from Volcan de Fuego. A June specimen from Tuxpan, however, closely resembles it. Nearly all of the Volcan de Fuego specimens are in fresh pelage — very dark gray with the nape and rump patches very dark, often with only a little rufous suffusion, but generally distinctly suffused with rufous. In one specimen these patches are practically obsolete, they scarcely differing from the rest of the dorsal surface. In two or three others they are only faintly represented. In some specimens the lower surface of the tail is almost entirely deep black; in a few examples there is a slight mixture of yellow hairs along the median line of the lower surface of the tail, in this respect showing a slight approach to *S. p. colimensis* of the adjoining coast region.

The collector's measurements of 20 adult males average as follows: Total length, 499 (477-526); head and body, 253 (235-266); tail vertebræ 246 (230-266); hind foot without claws, 58.5 (56-60); hind foot with claws, about 66; ear from notch, 32 (30-35): 18 females, 501 (489-518); 252 (235-267); 248 (235-261); 58 (54-60); 31 (29-32). These measurements fall somewhat below those given by Mr. Nelson for 5 adults, namely 536, [268], 267, and (hind foot with claws) 64.4, — a difference of about 36 mm. in total length, due perhaps to different methods of measuring, but more probably to the fact that *all* of the Volcan de Fuego series, young adults as well as adults, is here included.

7. *Sciurus poliopus tepicanus* subsp. nov.

Type, No. 25258, ♀ ad., Rancho Palo Amarillo, near Amatlan de Cañas, Tepic, altitude 5000 feet, Jan. 1, 1905; J. H. Batty.

Top of head black varied with gray; nape patch a slight suffusion of pale fulvous, varying in different specimens from nearly obsolete to well-marked; rump patch similar but usually less distinct; rest of upper parts gray, much paler than in *S. p. cervicalis*; tail above with the hair broadly ringed subapically with black, and with long white tips; tail below with the hairs narrowly ringed with black and white, the white greatly prevailing; ventral surface white; feet gray; ears mixed gray and fulvous, with the usual large white spot at the

posterior base. The tail below is sometimes buffy along the median line; and sometimes the back is very faintly suffused with buffy.

Measurements.—Type, ♀ ad., total length, 508; head and body, 254; tail vertebræ, 254; hind foot without claws, 60, with claws, 67; ear from notch, 32. The collector's measurements of 18 specimens (12 males, 6 females) average: Total length, 528; head and body, 263; tail vertebræ, 265; hind foot (without claws), 60; ear from notch, 32. Adult skulls average about 59 in total length, and 34 in zygomatic breadth.

Represented by 21 specimens, taken as follows: Rancho Palo Amarillo, near Amatlan, Tepic, 4 specimens, Jan. 1-7; Estancia, 5 specimens, Jan. 31, Feb. 2, March 4; Rio Sta. Maria, 3 specimens, Feb. 2, 7; Arroyo de Plantanar, 1 specimen, Feb. 17; La Cienega, 1 specimen, April 23; Wakenakili Mountains, 6 specimens, April 25-May 7; La Laja, 1 specimen, May 28. These localities are all near each other, along the territorial boundary between Tepic and Jalisco, at altitudes ranging from 5000 to 7000 feet.

These specimens vary from the type described above mainly in the greater or less distinctness of the nape and rump patches, which range from nearly obsolete to strongly developed, in most of the specimens they being well-marked. A few specimens, about one in five, show a slight suffusion of fulvous throughout the dorsal area, only slightly stronger on the nape and rump than elsewhere. These very closely agree with topotypes of *S. p. nemoralis* from central Michoacan, and were they all of this character the Jalisco and Tepic series might readily be referred to that form. One or two specimens show a slight infusion of pale yellow in the central line of the under surface of the tail, through the great reduction of the amount of black, which is much less than the amount of white, thus reversing in a marked degree the conditions in *cervicalis*. *Tepicanus* also is slightly larger—about an inch longer in total length—with a relatively longer tail, which slightly exceeds one-half the total length instead of falling slightly below one-half, as in *cervicalis*. The light colors of *tepicanus*, as compared with the dark colors of *cervicalis*, correspond with the semiarid conditions of the environment in the case of the former and the markedly more humid environment of the latter. That the difference in color is not seasonal is shown by a series of *cervicalis* collected in the Sierra de Colima at the same season as the Tepic and Jalisco specimens.

8. *Citellus (Otospermophilus) variegatus variegatus* (Erxleben).

Thirty-six specimens: Arroyo de Gavilan, Jalisco, 3 specimens, Dec. 17, 25; Estancia, Jalisco, 3 specimens, Jan. 28, March 3; Ojo de Agua, Tepic, 5 specimens, Feb. 15; Arroyo de Plantanar, Jalisco, 5 specimens, Feb. 17, 18, 20; Rio Ameco, Jalisco, 1 specimen, March

18; Garabatos, Tepic, 2 specimens, March 20; (all of these localities are within a few miles of the boundary line between Tepic and Jalisco;) Tuxpan, 1 specimen, June 24; Las Canoas (near Zapotlan), 16 specimens, Aug. 10-23 and Oct. 1.

The series consists largely of adults but includes 4 specimens (Ojo de Agua, Feb. 15) about one-quarter grown, and 4 (Las Canoas, Oct. 1) nurslings. The latter, all from apparently the same litter, are thinly haired, clear gray above, darker on the head, nape, shoulders, and anterior half of the back, and faintly suffused with brownish over the lower back and rump, and everywhere minutely flecked with black.

The collector's measurements of 9 adult males from the Tepic-Jalisco boundary are as follows: Total length, 545 (505-573); head and body, 308 (305-323, with one at 270); tail vertebræ, 235 (210-254); hind foot without claws, 61 (57-69); ear from notch, 24 (23-25). Four females: Total length, 493 (463-534); head and body, 272 (250-305); tail vertebræ, 222 (213-229); hind foot, 55; ear, 24.

The Las Canoas specimens are younger and smaller, but are otherwise similar. Specimens from Zapotlan, collected many years ago by Dr. Buller, are among the largest of the series, an old male skull measuring 68 mm. in total length by 42 in zygomatic breadth.

Very few of the Tepic and Jalisco specimens show any tendency to a blackish area on the head, as do specimens from the Valley of Mexico (the assumed type locality of *variegatus*) and Puebla. In northern Durango and thence northeastward into Coahuila, specimens (*C. v. rupestris*) without a conspicuous black cap are exceptional; further to the eastward and northward this form passes into the melanistic *C. v. couchi*. The form in western Mexico, ranging from Tepic and Jalisco into Michoacan, is almost uniformly gray-headed and very large. Unfortunately the form to which the name *variegatus* has now become restricted, is an intermediate phase between the small, light-colored, black-headed form of north-central Mexico and the large, dark-colored, gray-headed form of the south. As, however, the Tepic-Jalisco gray-headed form is very constant in its characters over a wide range, it seems as fairly entitled to a distinctive name as many other geographical forms now currently recognized.

9. ***Citellus (Xerospermophilus) mexicanus mexicanus* (Erxleben).**

Twenty-eight specimens, nearly all adult: Zapotlan, 1 specimen, July 25; Las Canoas, 27 specimens, Aug. 5-25.

Two phases of coloration are represented: most of the specimens

are yellowish chestnut above varied with small white spots bordered with blackish, but about one in six are decidedly paler and more grayish. This difference proves to be purely individual and is not due to condition of pelage.

10. *Mus rattus* Linn.

Six specimens: 2 typical examples and 1 hybrid between *M. rattus* and *M. alexandrinus*, but with the characteristics of the latter the most pronounced, near Amatlan, Tepic, Jan. 16 and Feb. 15; Las Canoas, 1 specimen, very young, Aug. 26; Los Masos, 2 specimens, typical.

"Blue Rat. Common on the Pacific slope from Mazatlan into State of Jalisco." — J. H. B.

11. *Mus alexandrinus* Geoffroy.

Two very young examples, taken at Las Canoas, Sept. 1, and a half-grown one at Los Masos.

12. *Peromyscus melanotis melanotis* Allen & Chapman.

Fifty-four specimens, all from Volcan de Nieve, taken at an altitude of 12,500 to 13,000 feet (near timber line), Sept. 5-18.

These specimens are all in the dark pelage and look very unlike April and May specimens, in the red phase, from the type locality and points in the high tableland of the States of Vera Cruz and Hidalgo, at altitudes of about 8000 feet. I am especially indebted to the kindness of Mr. Osgood for their identification

13. *Peromyscus labecula* Elliot.

One hundred and forty-one specimens, collected as follows: Arroyo de Plantanar, Jalisco, 3 specimens, Feb. 18 and 19; Ojo de Agua, near Amatlan, Terr. Tepic, 4 specimens, Feb. 15; Garabatos, Jalisco, 1 specimen, March 27; Estancia, Jalisco, 5 specimens, Feb. 3 and 22, March 8, 11, and 17; Las Canoas, 113 specimens, Aug. 5-Sept. 1; Los Masos, 15 specimens.

14. *Peromyscus hylocetes* Merriam.

Six specimens, all adult, taken as follows: Volcan de Nieve, 1 specimen, Sept. 16; Tanko Riparti (10,500 feet), 5 specimens, Sept. 22-24; Los Masos, 1 specimen.

15. *Peromyscus spicilegus spicilegus* (Allen).

Three specimens, Arroyo de Gavilan, Jalisco, Dec. 16-18. These specimens are quite indistinguishable from Escuinapa examples, and are much paler than the rest of the Jalisco specimens. Arroyo de Gavilan is very nearly on the boundary between Tepic and Jalisco.

16. *Peromyscus spicilegus simulus* Osgood.

Twenty-nine specimens, collected as follows: Estancia, 1 specimen, Feb. 3; La Cienega, 4 specimens, April 18 and 25; Sal se Puerdes, 1 specimen, May 7; Wakenakili Mountains, 13 specimens, altitude 7000-8000 feet, April 27-29 and May 19; La Laja, 3 specimens, May 27; Volcan de Fuego, 7 specimens, July 9, 10, and 22-27.

The Volcan de Fuego specimens, from an altitude of 10,000 feet, are much darker and richer colored than the others, which are from the tableland, mostly from altitudes of 7000 to 8000 feet.

17. *Peromyscus (Baiomys) musculus* (Merriam).

Thirty-six specimens, collected as follows: Arroyo de Plantanar, 2 specimens, Feb. 19; Arroyo de Gavilan, 18 specimens, Dec. 19-26; Estancia, 7 specimens, Feb. 24 and March 10; La Laja, 1 specimen, May 20; Las Canoas, 7 specimens, Aug. 10-18; Tanko Riparti (alt. 10,600 ft.). 1 specimen. Sept. 20.

18. *Sigmodon hispidus colimæ* Allen.

Thirty-five specimens: Rancho Palo Amarillo, near Amatlan de Cañas, Tepic, 4 specimens, Jan. 13, 15; Estancia, Jalisco, near Tepic border, 10 specimens, Jan. 22, 25, Feb. 4, March 11; Ojo de Agua, near Amatlan, 1 specimen, Feb. 16; Rio Sta. Maria, Jalisco, 6 specimens, Jan. 13, 15, Feb. 1, 2; Las Canoas, near Zapotlan, 11 specimens, Aug. 6, 9, 15, 20; Artenkiki, 3 specimens, Sept. 10, 17.

Only 5 or 6 of the specimens taken in January and February are adult, 7 are less than one-fourth grown, and the others range up to one-half to two-thirds grown; the August and September specimens are all adult, except a litter of 7 nursing young, taken Sept. 20.

These specimens are not appreciably different from the large series from Escuinapa, Sinaloa (*cf. antea*, p. 209).

19. *Sigmodon vulcani* sp. nov.

Type, 26310, ♀ ad., Volcan de Fuego, Jalisco, alt. 10,000 feet, July 25 1905; J. H. Batty.

Similar in coloration to *S. toltecus* and *S. borucæ*, but smaller and with a very differently shaped skull—broad and short with a very broad braincase.

Above yellowish brown, less rufous than *S. toltecus* or *S. borucæ*, though not very distinctly different; ventral surface gray; sides of nose pale buffy; feet gray; tail decidedly blackish above, slightly grayish below.

Measurements.—Type, total length, 235; head and body, 140; tail vertebræ, 95 (slightly imperfect); hind foot without claws, 32; ear from notch, 22. Eight of the largest (adult) males measure, total length, 245 (238–257); head and body, 138 (133–146); tail vertebræ, 109 (102–111); hind foot, 30 (27–32); ear from notch, 21.4 (19–22). Eight of the largest (adult) females: total length, 248 (238–257); head and body, 140 (136–146); tail vertebræ, 108 (102–111); hind foot, 32 (30–34); ear from notch, 20 (19–22). An average adult skull (the type): total length, 34; basal length, 28; zygomatic breadth, 19; width of braincase, 14 (in several other skulls, 15).

Skull.—The skull is short and broad, in comparison with the other Mexican forms, the interorbital region being especially shortened, forming a very noticeable feature in comparison with *S. borucæ* and *S. toltecus*.

In *S. vulcani* the pelage is soft and full, and not at all bristly, in this respect resembling *S. mascotensis* (= *S. alleni* Bailey), but it is darker and more fulvous in coloration, and differs also from this species in the shortness and breadth of the skull, particularly in the short interorbital region and the more abrupt expansion of the braincase. The young in first pelage are especially darker than the young of *S. mascotensis* in the corresponding stages. Compared with the large *S. colimæ* of the neighboring tablelands, the differences in sizes, coloration, and shape of the skull are striking.

Represented by 29 specimens, all taken on the Volcan de Fuego at an altitude of about 10,000 feet, July 10 to 28, 1905. They are mostly adults or young adults, but include a small series of young in first pelage.

20. *Reithrodontomys tenuis* Allen.

Thirty-nine specimens: Amatlan de Cañas, Tepic, 7 specimens, Jan. 4–12; Rancho Palo Amarillo, near Amatlan, 12 specimens, Jan. 2–22; Ojo de Agua, Tepic, 3 specimens, Feb. 9, 10; Arroyo de Gavalan, Jalisco (on the Tepic boundary), 1 specimen, Dec. 21; Estancia, Jalisco, 5 specimens, Jan. 30, Feb. 3, 5; La Cienega, 1 specimen, April 25; Wakenakili Mountains, 2 specimens, April 27, 29; La Laja, 1 specimen, May 16; Las Canoas, about 20 miles west of Zapotlan, 7 specimens, Aug. 6, 13, 15; Los Masos, 1 specimen.

A large number of the specimens are immature, especially among those taken in December, January, and February, while those taken

in August are all adult. These Tepic and Jalisco specimens do not differ appreciably from the large series taken near Escuinapa, Sinaloa.

21. *Reithrodontomys colimæ* Merriam.

Two specimens, immature, Volcan de Fuego, July 5 and 12.

22. *Neotoma sinaloæ* Allen.

One specimen, Wakenakili Mountains, an eastern spur of the Sierra Madre, May 1, 1905. This specimen is not appreciably different from topotypes of the species from southern Sinaloa.

23. *Microtus phæus* Merriam.

Seventeen specimens, about one-half fully adult, Volcan de Nieve (alt. 13,000 ft.), Jalisco, Sept. 5-18.

24. *Platygeomys gymnurus* (Merriam).

Fifty-two specimens: Las Canoas, near Zapotlan, Aug. 5-19. About 40 are in the red phase of coloration and 12 in the dusky phase, varying from plumbeous more or less suffused with dark chestnut to slaty black. They include all ages from very old to young less than one-fourth grown.

25. *Perognathus flavus mexicanus* Merriam

Seven specimens, Las Canoas, Aug. 9-22.

26. *Heteromys pictus pictus* Thomas.

Seventeen specimens, collected as follows: Rio Santa Maria, 8 specimens, Feb. 1-4; Wakenakili Mountains, 7 specimens, April 27, May 1, 8, 10; Sal se Puerdes, 1 specimen, May 10. These localities are near the Santa Maria River, in the high tableland and eastern spurs of the Sierra Espirito de Santos, at an elevation of about 7000 feet. Also 1 specimen from Estancia, Feb. 28, and 2 from Arroyo de Plantanar, Feb. 18 and 20.

In size, color, and all external characters these specimens are not distinguishable from either true *pictus* or the form named *plantinarensis* by Dr. Merriam. The nasals, however, are truncate posteriorly, as in *pictus*, and not emarginate, as in *plantinarensis* and *escuinapæ*. *Plantinarensis* is apparently a southeastward extension of the southern Sinaloa form I have named *escuinapæ*, with which it agrees in the form of the nasals, but it is smaller and brighter colored.

It is remarkable that the only positive character that will readily distinguish these three forms is the squarely truncated nasals in *pictus* and the distinctly emarginate nasals in *plantinarenensis* and *escuinapæ*, all of which forms probably intergrade geographically. If the decided difference in the form of the posterior border of the nasals, in the absence of any other appreciable differences of size, form, number of toe-pads, or coloration, be considered of specific importance, then *pictus* will stand as a species, and *plantinarenensis* also as a species with *escuinapæ* as a subspecies of the latter.

None of these 13 specimens are very old, being mostly young adults, and thus fall below true *pictus* in size, averaging practically the same as the *plantinarenensis* specimens of corresponding age.

These two forms, as represented in the present series, are almost separated geographically, all of the specimens from the Wakenakili Mountains, Rio Santa Maria, and Salse Puerdes, 15 in number, being true *pictus*, while all those from Ojo de Agua, Palo Amarillo, and Amatlan, 25 in number, are true *plantinarenensis*; but of 11 specimens from Estancia, Jalisco, and 5 from Arroyo de Plantanar, one of the former and two of the latter, or 3 specimens out of 16, are true *plantinarenensis* while the others are *pictus*. In about 3 skulls out of 53 the form of the posterior border of the nasals is irregular, being convex rather than truncate.

27. *Heteromys pictus plantinarenensis* Merriam.

Forty specimens, collected as follows: Amatlan de Cañas and vicinity including the localities Ojo de Agua, Palo Amarillo, Estancia, Rio Ameca, Arroyo de Plantanar, etc. (local names not on maps, on the boundary between Tepic and Jalisco), Jan. 14 to Feb. 28. The various localities, some of them in Tepic and some in Jalisco, are represented as follows: Rancho Palo Amarillo, Tepic, 13 specimens, Jan. 2-4 and 13-16; Amatlan, Tepic, 9 specimens, Jan. 4-11; Estancia, Jalisco, 10 specimens, Jan. 23-31 and Feb. 1, 3, 6, 22, and 28; Ojo de Agua, Tepic, 3 specimens, Feb. 9, 14, and 16; Arroyo de Plantanar, Jalisco, 5 specimens, Feb. 18-20; Volcan de Fuego, 1 specimen, July 13. (This last specimen has no skull, and its reference here is thus necessarily provisional.)

Of these 40 specimens only 3 or 4 are very old, with worn teeth, the greater part being middle-aged or young adults, with a few still younger. Taking the skulls as a basis for comparison, the older specimens are as large as topotypes of corresponding age of *H. pictus*,

having a total length (average of 4 specimens) of 31.8 and a mastoid breadth of 14 mm., or exactly the same as 4 topotypes of corresponding age of *H. pictus*. Young adult and middle-aged specimens range in total length from 28.5 to 30 mm.

The external measurements of 18 males, selected at random, are as follows: Total length, 214 (205-247); tail vertebræ, 112 (98-133) hind foot without claws, 25.3 (24-27), to which about 2 mm. may be added for the claws. Females average slightly smaller, as follows: 13 females, total length, 203 (197-229); tail vertebræ, 105 (95-121); hind foot, 24 (22-27). The maximum dimensions given above indicate the size of old individuals, the low general average being due to the immaturity of the specimens forming the series as a whole, although in no case were specimens selected which had not mature dentition.

It thus appears that *H. plantinarenensis* is not so very much smaller than *H. pictus* as Dr. Merriam supposed when characterizing the form from a single specimen, of which the present series are in part (practically all) topotypes.

The relationship of the two forms and their distribution as represented by the present material have been already considered under the head of *H. pictus*.

28. *Heteromys jaliscensis* sp. nov.

Type, No. 26325, ♂ ad., Las Canoas, about 20 miles west of Zapotlan, Jalisco, altitude 7000 feet, Aug. 6, 1905; J. H. Batty.

Near *H. canus* but much darker, the upper parts being dusky gray, with a slight admixture of fulvous; size smaller.

Type, total length, 232; head and body, 120; tail vertebræ, 112; hind foot (from dry skin), 27.5; ear from notch, 13. Skull, total length, 32; zygomatic breadth, 15. Four adult males average, total length, 228; 6 adult females average, total length, 210.

Compared with *H. canus*, the present species is much smaller, and is further readily distinguished by its much darker coloration. The skull has a relatively narrower braincase, and is nearly 2 mm. shorter and much lighter and less massive.

Represented by 4 adult males and 6 adult females from Las Canoas (near Zapotlan), an adult male and female and a young female from Arroyo de Gavalan, a young female from Arroyo de Plantanar, and a young female from Ojo de Agua. The last three localities are near Amatlan de Cañas, where it is apparently not common and of local occurrence, as of 80 specimens of *Heteromys* collected at these

points only 5 belong to this species. It apparently ranges thence southward over the tableland to at least Zapotlan.

29. *Lepus floridanus subcinctus* Miller.

Sixteen specimens: Ojo de Agua, 1 specimen, Feb. 15; Estancia, 2 specimens, Feb. 21, March 17; Garabatos, 2 specimens, March 20, 22; Llanos e Casco, Tepic-Jalisco boundary, 2 specimens, March 28; La Cienega, 2 specimens, April 15, 17; Las Canoas, 6 specimens, Aug. 4, 5, 13, 22; Los Masos, 1 specimen.

External measurements: 5 males, total length, 409 (400-413); head and body, 372 (362-381); tail vertebræ, 37 (33-38); hind foot without claws, 84 (83-89); ear from notch, 63 (55-67); tip to tip of ears distended laterally, 181 (171-191): 6 females, total length, 422 (406-438); head and body, 385 (368-400); tail vertebræ, 37 (35-38); hind foot without claws, 84 (83-86); tip to tip of ears distended laterally, 188 (165-200).

Skulls: 4 males, occipito-nasal length, 73 (71-77); zygomatic breadth, 35 (34-37); parietal breadth (greatest width of braincase), 26 (25.3-27): 4 females, occipito-nasal length, 77 (76-80); zygomatic breadth, 36.5 (36-37); parietal breadth, 27 (25-27.5).

As is often the case in this genus, the females average slightly larger than the males. In the present case, however, the females average slightly older than the males, although all are fully adult.

Apparently this very distinct form of the *L. floridanus* group agrees satisfactorily with *L. f. subcinctus* Miller, described from "Nagrete, State of Michoacan," not far from the Jalisco boundary.

30. *Lepus callotis* Wagler.

Sixteen specimens: Arroyo de Gavalan, 8 specimens, Dec. 17, 18, 25; La Laja, 4 specimens, May 16, 29, and June 4; Las Canoas, 3 specimens, Aug. 18; Artenkiki, 1 specimen, Sept. 10.

Collector's measurements: 7 adult males, total length, 516 (508-530); head and body, 446 (425-457); tail vertebræ, 70 (64-76); hind foot without claws, 118 (114-124), with claws about 10 mm. more; ear from notch, 122 (118-129); spread of ears from tip to tip, directed laterally, 332 (321-349): 7 adult females, total length, 529 (514-537); head and body, 461 (438-490); tail vertebræ, 69 (64-76); hind foot without claws, 116 (108-124); spread of ears, 345 (326-365). Skulls: 4 males, occipito-nasal length, 90 (85-93); zygomatic breadth, 43.4 (42.6-44): 3 females, occipito-nasal length, 91 (89-93).

31. *Felis oregonensis aztecus* Merriam.

One specimen, skin and skull of an old female, Los Masos.

32. *Felix glaucula* Thomas.

Two specimens, Los Masos.

33. *Canis vigilis* Merriam.

Three specimens, 1 male, 2 females, all adult: Ojo de Agua, Tepic, 1 specimen, Feb. 12; Las Canoas, Jalisco, 1 specimen, Aug. 17; Arteni-kiki, 1 specimen, Sept. 13.

In size and coloration these specimens present the same characters as the series from Sinaloa (*antea*, p. 223). The external measurements are: Total length, 1144 (♂), 1118 (♀), 1099 (♀); head and body, 826, 826, 775; tail vertebræ, 318, 294, 324; hind foot without claws, 191, 178, 178; ear from notch, 114, 108, 108. Skulls, total length, 194 (♂), 190 (♀), 195 (♀); basal length, —, 167, 170; zygomatic breadth, 99, 99.5, 98.5; mastoid breadth, 61, 62, 63.

34. *Urocyon cinereoargenteus scotti* Mearns.

Thirteen specimens: Rio Sta. Maria, 1 specimen, Feb. 4; Ojo de Agua, 1 specimen, Feb. 11; Estancia, 1 specimen, Feb. 22; Sal se Puerdes, 1 specimen, May 10; Volcan de Fuego, 1 specimen, July 13; Las Canoas, 5 specimens, Aug. 9, 16, 19, Sept. 2; Los Masos, 3 specimens.

This series consists, in the average, of much younger specimens than the Sinaloa series (see *antea*, p. 224), ranging from young adults to middle-age, with some so young that they have not fully acquired the mature dentition. The older specimens agree in size with specimens of corresponding age in the Sinaloa series, nor are they appreciably different in coloration.

35. *Bassariscus astutus astutus* (Lichtenstein).

Four specimens (3 adult, 1 immature): Rio Sta. Maria, Jalisco, Feb. 4; Arroyo de Plantanar, March 14; La Cienega, April 24; Los Masos.

In two of the adult specimens the ventral surface is pale buff. Measurements of 2 adults: Total length, 781, 838; head and body, 375, 381; tail vertebræ, 406, 457; hind foot without claws, 73, 73; ear from notch, 51, 52.

"Native name *Sal Coyote*. Inhabits the mountains of central

and western Mexico, especially rocky localities, such as dry river bottoms, cañons, broken hills, and ridges. Nocturnal in habits, hunting cat-like for rodents and large insects. Fruit furnishes its main food in the wet season, especially wild figs and the coporno balls. It is a good climber and readily escapes from dogs when it is followed." — J. H. B.

36. *Procyon hernandezii hernandezii* Wagler.

Five specimens, 3 males, 1 female: Arroyo de Plantanar, Jalisco, 1 specimen, Feb. 19; Garabatos, 2 specimens, March 22, 26; Las Canoas, 2 specimens, Aug. 4, 9.

These specimens are all fully adult, with worn teeth. They average, on account of greater age, slightly larger than the Sinaloa series (see *antea*, p. 226), the skulls of the 3 males measuring, total length, 122.7 (119–125), zygomatic breadth, 77.5 (76–79). The collector's external measurements of the 3 males are: Total length, 852.5 (826–883); head and body, 541 (508–559); tail vertebræ, 311.5 (299–324); hind foot without claws, 118 (112–126); ear from notch, 64 (57–65). The female is slightly smaller than the smallest of the four males.

37. *Nasua narica narica* (Linn.).

Fifty-four specimens, collected as follows: Arroyo de Plantanar, 3 specimens, Jan. 22, Feb. 20, 22; Rio Sta. Maria, 4 specimens, Feb. 2, 3, 9; Ojo de Agua, near Amatlan, Tepic, 5 specimens, Feb. 12, 13, 15; Estancia, 11 specimens, Feb. 1, 22, March 3–11; La Cienega, 1 specimen, April 17; Wakenakili Mountains, 1 specimen, May 7; Sal sé Puerdes, 8 specimens, May 7–11; Los Masos, 5 specimens. Also 17 specimens, without data other than the collector's numbers (his corresponding notes are not now available), but they are from the same localities as the others collected in northwestern Jalisco, and mostly from quite near the Tepic boundary.

This series of specimens is comparable as to season with the Escuinapa February–May series. They present the same wide range of individual variation in coloration (see *antea*, pp. 229–231), but are on the whole rather darker and richer in color, with a larger proportion of specimens with the head, nape, and shoulders deep ochraceous.¹ They also average considerably smaller in external measurements, and slightly smaller in cranial measurements, with very slightly

¹ The Los Masos specimens, however, are all dark, with the top of the head, nape, and shoulders dark brown.

smaller teeth, and a greater breadth of skull in comparison with the length. (Compare the table of cranial measurements with those of the Sinaloa series, *antea*, p. 234.)

The present series is provisionally referred to true *narica* of eastern Mexico, rather than to *molaris*, which, if it really be a well-marked form, is apparently confined to the coast region of western Mexico, from the State of Colima northward. Lack of sufficient material from eastern Mexico for a proper study of the Mexican Coatis renders these determinations tentative.

The collector's measurements are: 3 old males, total length, 1095 (1057-1143); head and body, 549 (536-559); tail vertebræ, 546 (521-584); hind foot without claws, 93 (89-95), with claws about 10 mm. more; ear from notch, 40 (38-44): 4 old females with worn teeth, total length, 1047 (985-1105); head and body, 516 (483-532); tail vertebræ, 541 (502-584); hind foot, 83 (80-89); ear, 40 (37-43): 6 adult females, with the teeth not worn, total length, 1013 (978-1092); head and body, 512 (483-584); tail vertebræ, 501 (470-546); hind foot, 88 (80-98); ear, 40 (38-44).

The cranial measurements of these same specimens, with others (of which the external measurements are not available), are given in the subjoined table. They show the same variation with age and sex as the Sinaloa series (*cf. ante*a, p. 233), the measurements being divided into three categories according to the sex and age of the specimens. These measurements may be summarized as follows:

Old males, with sagittal crests but the teeth showing practically no wear (hence a little younger than the Sinaloa series of 'old males'): 8 specimens, total length, 133 (129-137); basal length, 115.5 (112-120); palatal length, 80 (78-82); postpalatal length, 35.8 (33-38); zygomatic breadth, 73.3 (70-78.5); interorbital breadth, 27.6 (28-34); postorbital breadth, 28 (23-33); mastoid breadth, 47.8 (44-51.5); audital bulla, 10.6×12.9 ($10 \times 11-12 \times 14.5$); pm^4-m^2 , 21.6 (21-22.7); height of occipital crest, 0-9.

Old females (teeth worn): 7 specimens, total length, 127.5 (122-130); basal length, 110 (107-113); palatal length, 76.4 (73.5-79); postpalatal length, 34 (33-35); zygomatic breadth, 63.4 (60-65); interorbital breadth, 29.3 (27-31); postorbital breadth, 32 (30-33); mastoid breadth, 45.2 (43-47); audital bulla, 10.3×13.5 (10×12 or $9.5 \times 13-11.5 \times 15$); pm^4-m^2 , 21.3 (20.6-22.7).

Adult females (teeth wholly unworn): 9 specimens, total length, 125 (123-127); basal length, 109.7 (107-112); palatal length, 76.4 (74-78.5); postpalatal length, 33.3 (32-34); zygomatic breadth, 61.2

MEASUREMENTS OF 24 SKULLS OF *Nasua narica molaris*, FROM STATE OF JALISCO.

Mus. No.	Sex	Total length	Basal length	Palatal length	Postpalatal length	Zygomatic breadth	Interorb. breadth	Postorb. breadth	Mastoid breadth	Audital bullae	Length of pm4-m2	Height of crest	Condition of teeth
25200	♀	134.5	119	81	38	—	32	23	51.5	11 x 13	21	9	Worm.
25191	♀	129	113	80	33	71.5	28	25.5	47	10.5 x 11.5	21.4	5	Not worm.
25248	♀	133.5	115	80	35	74	30.5	27	47.5	11 x 13.3	22.7	5.5	"
25254	♀	134.5	115	78	37	78.5	33	29	48	10 x 15	21.3	7	"
25844	♀	129	112	78	35	72	28	27	47.5	10 x 11.5	22	2	"
25215	♀	131.5	114	79	35	70	34	33	47	10 x 11	21	4	"
25204	♀	137	120	82	37	72.5	29	30	50	12 x 14.5	22	4	"
25545	♀	133	115	80	36	74.3	26.5	30.5	44	10 x 13	22.4	5	"
Average, 8 old ♂	♂	133	115.5	80	35.8	73.3	27.6	28	47.8	10.6 x 12.9	21.6	0	"
25213	♀	130	113	78	35	64	28	30	47	11.5 x 15	22.7	0	Not worm.
25247	♀	130.5	113	79	34	64.5	31	32	46.3	10 x 14.2	22	0	Slightly worm.
25841	♀	125.5	109	76	33	62	28	—	44.5	10 x 14	20.6	0	Worm.
25193	♀	122	107	73.5	33.5	64	27	32.5	44.5	9.5 x 13	21.3	0	"
25664	♀	129	109	75	34	64	30	32.5	43	10 x 12.5	20.7	0	Much worm.
25206	♀	126	109	—	—	65	30	32	46	10 x 12	21.5	0	"
25208	♀	129.5	111	76	35	60	30.5	33	45	11 x 14	21	0	Worm.
Average, 7 old ♀	♀	127.5	110	76.4	34	63.4	29.3	32	45.2	10.3 x 13.5	21.3	0	"
25207	♀	123.5	109	75	34	62	27	29	42.5	11 x 13	19.6	0	Not worm.
25199	♀	125	111	77.5	33.5	58.2	27	34	44	11.5 x 14	21	0	"
25244	♀	127	110	78	32	62	29	32.5	44	11.5 x 13.5	21.2	0	"
25205	♀	126.5	112	78.5	33.5	63	29	31.5	47	10 x 13	22	0	"
25192	♀	123	108	75	33	60	26.5	27	43.5	11 x 14	22	0	"
25194	♀	127	110	76	34	63.7	29	34	45	10.5 x 12	22	0	"
25245	♀	124	108	75	33	58	26	32	43	12 x 14.5	21	0	"
25212	♀	123	107	74	33	60.5	26	30.5	44	10 x 12.5	22	0	"
25249	♀	126.5	112	78	34	63.5	29	31.5	46	10 x 13	22	0	"
Average, 9 ad. ♀	♀	125	109.7	76.4	33.3	61.2	27.6	31.2	44.4	10.8 x 13.3	21.4	0	"

(58-63.5); interorbital breadth, 27.6 (26-29); postorbital breadth, 31.2 (27-34); mastoid breadth, 44.4 (42.5-47); audital bulla, 10.8 \times 13.3 (10 \times 12.5-11.5 \times 14 and 12 \times 14.5); pm⁴-m², 21.4 (19.6-22).

38. *Mephitis macroura macroura* Lichtenstein.

Twenty-three specimens: Arroyo de Gavalan, 1 specimen, Dec. 19; Arroyo de Plantanar, 1 specimen, Feb. 19; Estancia, 4 specimens, Feb. 24, March 13; Rio Ameca, 1 specimen, March 18; Garabatos, 1 specimen, March 23; Llano e Casco, 2 specimens, March 28, 29; La Cienega, 1 specimen, April 23; La Laja, 5 specimens, May 16-19; Las Canoas, 2 specimens, Aug. 15, 23; La Joya, 1 specimen, Sept. 21; Artenkiki, 2 specimens (nurslings), Sept. 16; Los Masos, 2 specimens.

Collector's measurements: 7 adult males, total length, 658 (578-666); head and body, 291 (279-317); tail vertebræ, 367 (317-387); hind foot without claws, 58 (57-60); ear from notch, 30 (25-35): 10 adult females, 598 (540-654); head and body, 277 (261-305); tail vertebræ, 335 (305-362); hind foot without claws, 54 (51-56); ear from notch, 28 (25-33).

Skulls: Adult male skulls measure, total length, 70; basal length, 57; zygomatic breadth, 42; mastoid breadth, 35: adult female skulls, 67, 55, 39, 32.5.

This series presents the usual wide range of variation in color characteristic of the species. One specimen is almost wholly black, the only white being a few white hairs on the right side near the shoulder, a very narrow white line on the left side behind the shoulder, and a little white at the extreme base of the tail hairs. Even the white line so constantly present on the head is lacking in this specimen, and also in one other of the series. In the other extreme the dorsal surface and the tail are more than half white. In two young examples (nurslings), said by the collector to be both from the same litter, one is all black except for the usual narrow white head stripe, and a narrow lateral white band on each side, running from the ear to the base of the tail, widening on the thighs, and continued on the basal three-fourths of the *lower* surface of the tail. The other has the whole of the dorsal area, from the crown to the rump, white—an outer band of clear white enclosing a central area of mixed black and white (giving the effect of black veiled with white)—the whole *upper* surface of the tail white, and a broad lateral line of white on each side, from the ear to the posterior border of the thigh.

39. *Conepatus sonoriensis Merriam.*

Thirty-six specimens: Arroyo de Plantanar, 3 specimens, Feb. 16, 17; Estancia, 4 specimens, Jan. 22, 27, March 13; Garabatos, 6 specimens, March 20-26; La Laja, 13 specimens, May 17-24; Las Canoas, 9 specimens, Aug. 5, 12; Los Masos, 1 specimen.

Very uniform in coloration. The black at the base of the under surface of the tail, however, is somewhat variable, being usually limited to the basal inch or less (occasionally wanting), but sometimes extending to two inches or slightly more than two inches. Besides this, the sides and lower surface of the basal fourth to basal third of the tail have often a slight mixture of black hairs mingled with the white, sometimes amounting to a conspicuous blackish grizzle.

Collector's measurements: 16 males, total length, 616.3 (566-699 — only 2 above 631); head and body, 372.5 (337-445 — only 2 above 381); tail vertebræ, 238.8 (216-267 — only 1 above 257); hind foot without claws, 66 (60-70), with claws about 5-7 mm. more; ear from notch, 26 (25-28): 10 females, total length, 594 (551-635 — only 2 above 616); head and body, 349 (330-381); tail vertebræ, 245 (221-263); hind foot without claws, 63 (57-66); ear from notch, 25 (23-28).

Skulls: 8 skulls of males (fully adult to old) measure, total length, 80.6 (77.5-85); basal length, 66 (62-68.5); zygomatic breadth, 50 (45-56); mastoid breadth, 42.3 (41-45.5): an old female skull, 76, 62, 47.5, 38.

Compared with the Sinaloa series (*antea*, p. 225), the only difference in coloration is evidently mainly seasonal; the Sinaloa (Escuinapa) specimens were nearly all taken in February, just before the spring moult, and were thus in worn, faded pelage, and, excepting some of the younger specimens, were brownish black instead of deep black; the Jalisco series was all taken later in the season, mostly in May and August, when the pelage was unworn and fresh, with the black parts of the animal deep, intense black.

There is also no appreciable difference between the skulls of the two series, either in size or details of structure, a series of comparable male skulls varying in their principal measurements, in the average, less than a millimeter in length and about 2 mm. in breadth, the Jalisco specimens averaging slightly broader in both mastoid and zygomatic dimensions. There is, however, a notable discrepancy in external measurements, the Sinaloa series averaging about 100 mm. longer in total length, and about 25 mm. in length of tail vertebræ,

with the length of hind foot and ear correspondingly greater. As the measurements were all taken by the same person the apparent difference in external measurements is probably a valid difference. As the two regions differ somewhat in comparative aridity, the intensity of the black in the Jalisco series as compared with the Sinaloa series may be only in part due to the season of capture.

Two old males and one female in the Sinaloa series and two old males of the Jalisco series greatly exceed in size any other specimens of either series, the total length of the former being respectively 738 and 769 (♂) and 699 (♀), and of the latter 699, 699,—about 130 and 86 mm. above the next in size. They are apparently simply giants of their race. The skulls of these specimens, while the largest of the series, do not, however, so greatly exceed the next in size.

None of the specimens of the Jalisco series seem referable to *Conepatus mesoleucus mearnsi*, which is supposed to range over the Jalisco tableland.

It is worthy of note that one of the skulls of this series (No. 25170, ♀ ad., Arroyo de Plantanar, Feb. 16, 1905) has three supernumerary premolars in the upper jaw, one on the left side, in size and form resembling the anterior upper premolar in *Mephitis*, and two on the right, much smaller, but the two equalling in bulk the single supernumerary premolar on the left side. The larger of these two is anterior in position to the other.

40. *Spilogale angustifrons angustifrons* Howell.

Eleven specimens: Arroyo de Plantanar, 1 specimen, Feb. 17; Garabatos, 4 specimens, March 24-29; Estancia, 5 specimens, Jan. 27, Feb. 22, March 8, 11, 17; Rio Ameca, 1 specimen March 20.

Collector's measurements: 5 males, total length, 378 (352-390); head and body, 236 (222-248); tail vertebræ, 142 (130-152); hind foot without claws, 38 (35-41), with claws, 44; ear from notch, 25.6 (22-29): 6 females, 346 (336-374); 221 (216-241); 125 (114-133); 35 (33-38); 23 (22-25).

One of the females (the skin shows it to have been correctly marked for sex) exceeds in size the average of the males, and one of the males barely exceeds the average for the females.

Some of the specimens have a broad white band across the thighs, while others are entirely without it; in still others the band is reduced to a small spot or even to a few white hairs.

41. *Putorius frenatus frenatus* (Lichtenstein).

Two specimens, Artenkiki, Sept. 5, and Los Masos.

42. **Sorex oreopolus** *Merriam.*

One specimen, in faded, worn pelage, Volcan de Fuego, altitude 13,000 feet, Sept. 12.

43. **Myotis velifer** (*J. A. Allen.*)

Nineteen specimens: Las Canoas, 17 specimens (10 salted), Sept. 1-4; Artenkiki (near Las Canoas), 2 specimens, Sept. 5.

Collector's measurements of 9 specimens: Alar expanse, 295 (289-305); length, 56 (51-63).

44. **Myotis thysanodes** *Miller.*

Seven specimens, Los Masos.

45. **Myotis californicus mexicanus** (*Saussure.*)

Three specimens, Los Masos.

46. **Myotis nigricans** (*Wied.*)

Eight specimens, Los Masos.

47. **Vespertilio fuscus** *Beauvois.*

Five specimens, Los Masos. Forearm, 47-49 mm.

48. **Lasiurus borealis mexicanus** (*Saussure.*)

Five specimens, Los Masos. Forearm, 38-40 mm.

49. **Lasiurus cinereus** (*Beauvois.*)

One specimen, Los Masos.

50. **Molossus nigricans** *Miller.*

One specimen, Los Masos.

51. **Molossus obscurus** *Geoffroy.*

Two specimens, Los Masos. Forearm, 39 mm.

52. **Nyctinomus mexicanus** *Saussure.*

Thirty specimens: 16 skins and skulls, and 14 salted specimens, Las Canoas, Sept. 1-5.

53. **Spectrellum mexicanum** (*Miller.*)

Twelve specimens, Rancho Palo Amarillo, near Amatlan, Tepic, Jan. 15, 16.

These specimens range in color from pale buffy brown to ochraceous. Alar expanse, 254-279, averaging about 267; length (body only), 35-45.

54. *Chilonycteris mexicana* Miller.

Fourteen specimens, Rancho Palo Amarillo, 13 specimens near Amatlan, Jan. 16, 19, 20, Feb. 9; Los Masos, 1 specimen. All but two are in the dark phase; the others are more yellowish on the head and shoulders, but only slightly approach the yellow phase, described as "entire head and body tawny ochraceous."

Collector's measurements of 5 specimens: Alar expanse, 368 (337-375); length, 61 (60-63).

55. *Pteronotus davyi fulvus* (Thomas).

Three specimens, Los Masos. In one the pelage is bright fulvous, in the others dark brown.

56. *Aello megalophylla senicula* (Rehn).

Two hundred and sixty-four specimens: Rancho Palo Amarillo, near Amatlan, Tepic, 56 specimens, skins and skulls, and 195 salted specimens, Jan. 16-20; Ojo de Agua, 4 specimens, skins and skulls, Feb. 9; Los Masos 9 specimens, skins and skulls.

The series includes about an equal number of males and females. There is apparently no sexual difference in either size or coloration. The species is slightly dimorphic, with a yellowish brown phase and a darker, somewhat dusky brown phase. According to the collector's measurements the alar expanse averages about 368 mm. (352-381), with very few specimens below 362 or above 374; the length averages about 64, ranging from 60 to 70.

57. *Glossophaga mutica* Merriam.

Six specimens, skins and skulls, and 70 salted specimens, Rancho Palo Amarillo, near Amatlan, Jan. 16, 19.

58. *Choeronycteris mexicana* Tschudi.

Eighteen specimens, Los Masos. All are dark brown except one, which is deep fulvous, showing that the species is dichroic.

59. *Dermanura tolteca* (Saussure).

Four specimens: Artenkiki, 2 specimens, near Las Canoas, Sept. 16, Los Masos, 2 specimens.

60. **Desmodus rotundus** (*E. Geoffroy*).

Seven specimens: Rancho Palo Amarillo, near Amatlan, Tepic, 2 specimens, Jan. 15, 19; Las Canoas, Jalisco, 5 specimens, Aug. 27, 28.

The specimens are all in the dark phase,—blackish with the extreme tips of the hairs light. The 5 Las Canoas specimens, all males, measure: Alar expanse, 386 (375–400); length, 84 (82–85).

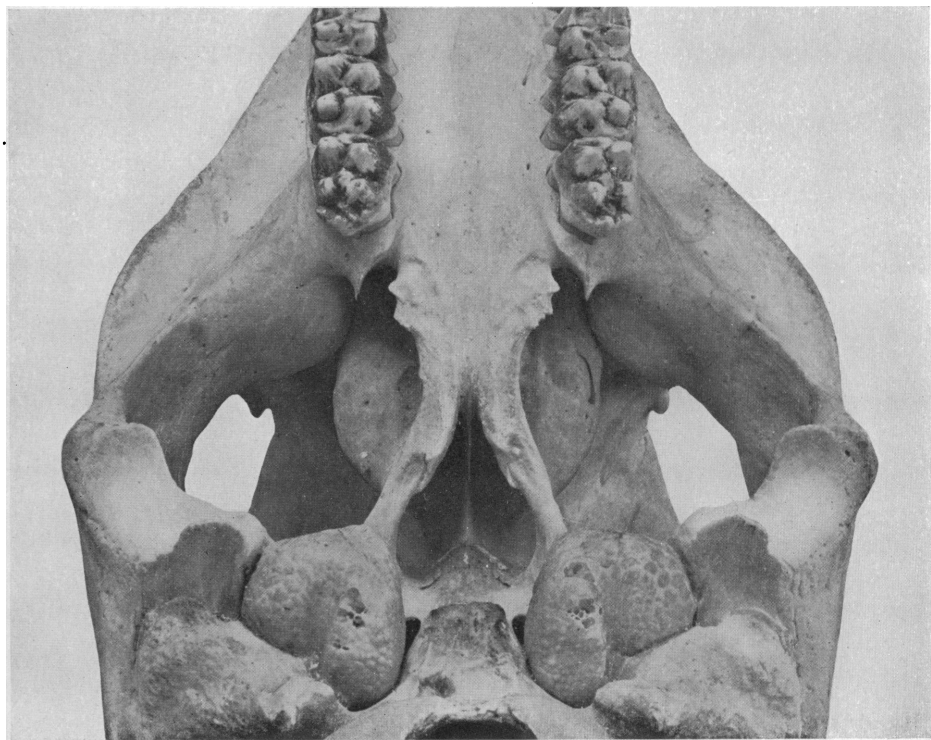
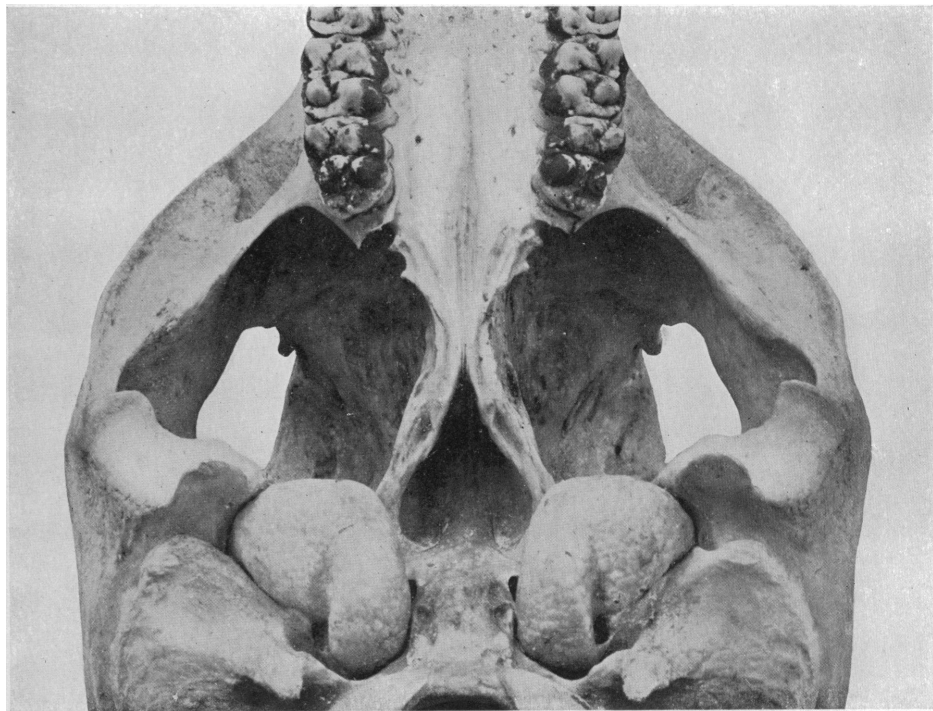
EXPLANATION OF PLATE XX.

TAYASSU ANGULATUM SONORIENSE (*Mearns*).

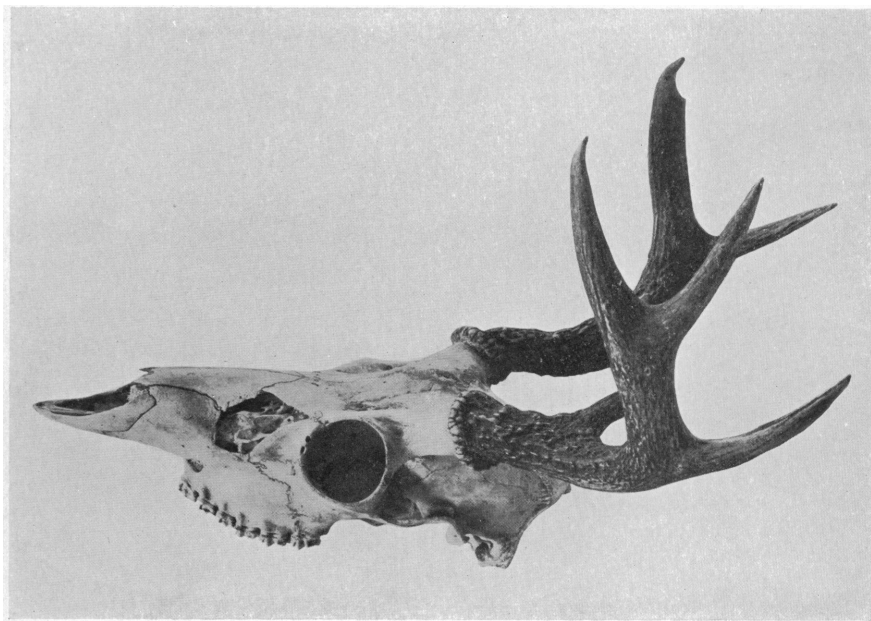
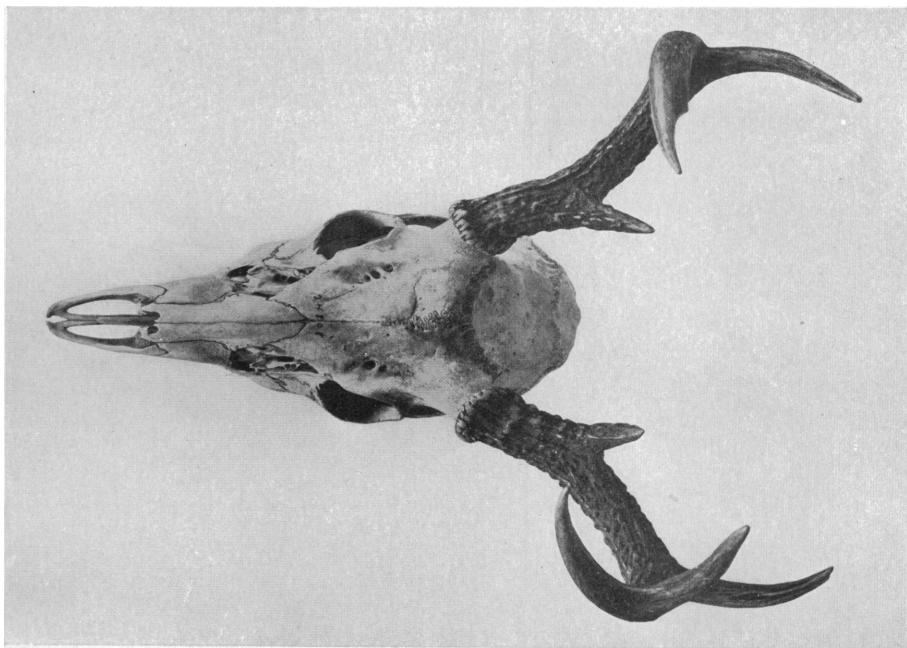
FIG. 1 (upper figure). No. 24593, ad. ♂, Escuinapa, Sinaloa. Ventral view of middle region of a normal skull. $\frac{1}{2}$ nat. size.

FIG. 2 (lower figure). No. 24586, ad. ♀, Escuinapa, Sinaloa. Ventral view of middle region of skull, showing pathological conditions. $\frac{1}{2}$ nat. size.

Note the tubular expansion of the inferior orbitosphenoid-lachrymal region, and the greatly inflated maxillary portion of the zygoma. This condition is present in rather more than 50% of the Escuinapa series, and in about the same proportion of skulls from other localities in Mexico, Texas, and Arizona; in 80% of skulls (large series of each species) of *T. torvum* and *T. tajacu* from, respectively, Colombia and Brazil, and in nearly 100% of a large series of skulls of *T. pecari* from the Santa Marta district of Colombia.



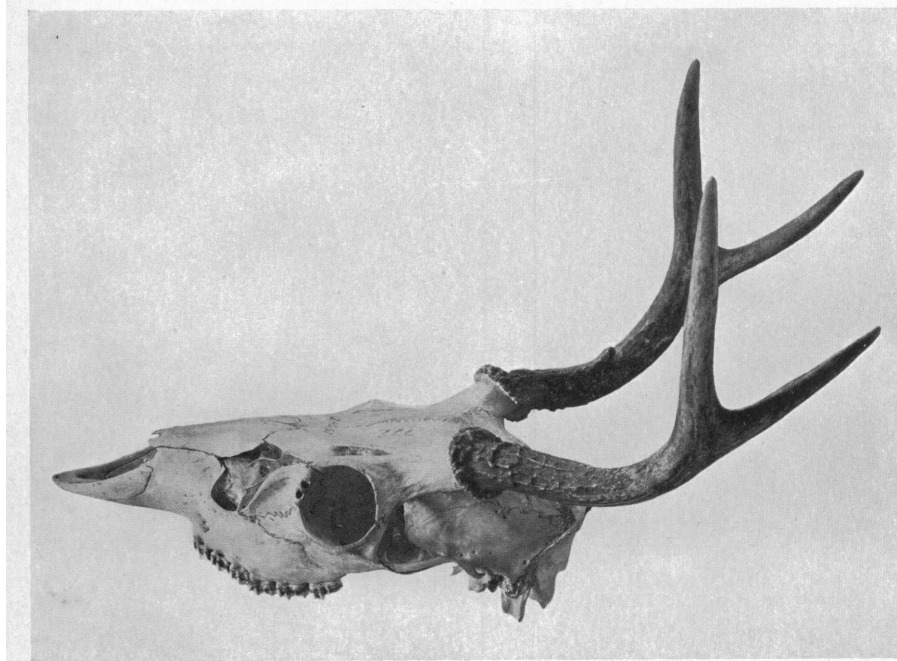
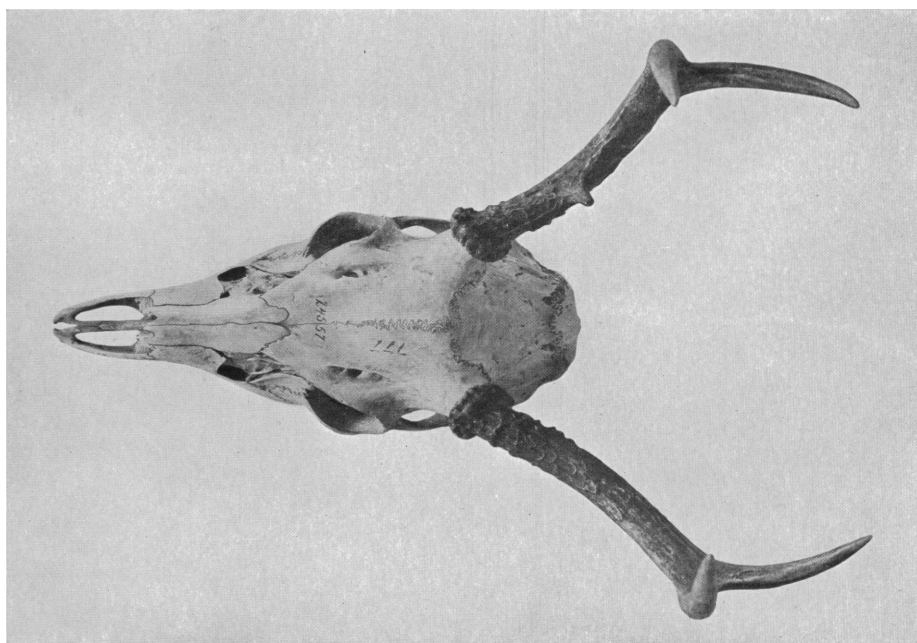
TAYASSU ANGULATUM SONORIENSE.



ODOCOILEUS SINALOAE.

Old male, No. 24808, Escuinapa, Sinaloa, Mex.

About one-third natural size. Teeth somewhat worn; animal probably six years old.



ODOCOILEUS SINALOAE.

Young adult male, No. 24557, Escuinapa, Sinaloa, Mex.

About one-third natural size Teeth slightly worn; animal probably four years old.

EXPLANATION OF PLATE XXIII.

ODOCOILEUS SINALOÆ *Allen*.

Specimens (third year males), all collected at Escuinapa, Sinaloa, Mexico.

Figures $\frac{1}{4}$ nat. size.

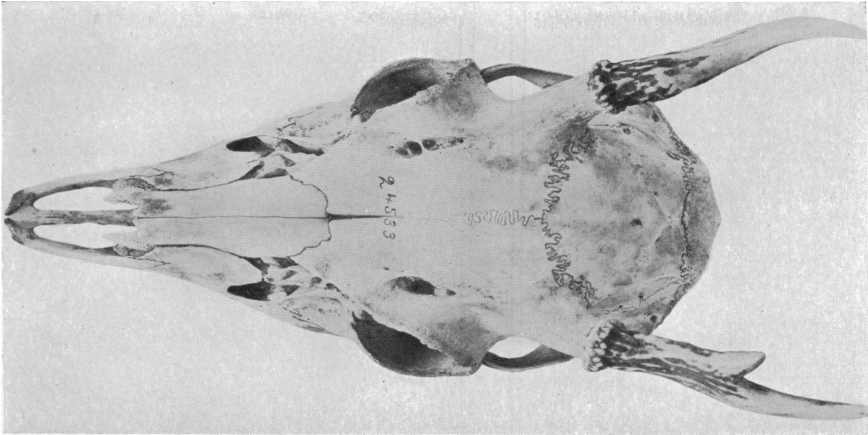
FIG. 1. No. 24533, ♂, 3d year; dentition, dp^1-3 , m^1-3 . Dorsal view: nasals of medium length, very broad, truncate posteriorly, slightly notched anteriorly.

FIG. 2. No. 24559, ♂, 3d year (dp^1-3 , m^1-3). Dorsal view: nasals of medium length, very narrow, emarginate posteriorly, moderately notched anteriorly.

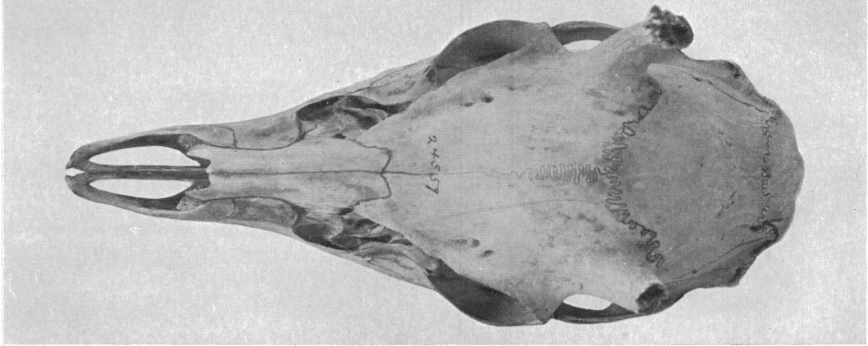
FIG. 3. No. 24540, ♂, 3d year (dp^1-3 , m^1-3), *with canines*. Dorsal view, showing large, posteriorly convex nasals.

FIG. 4. No. 24542, ♂, 3d year. Dorsal view, showing very small nasals, with double-convex posterior border, and deep frontal emargination.

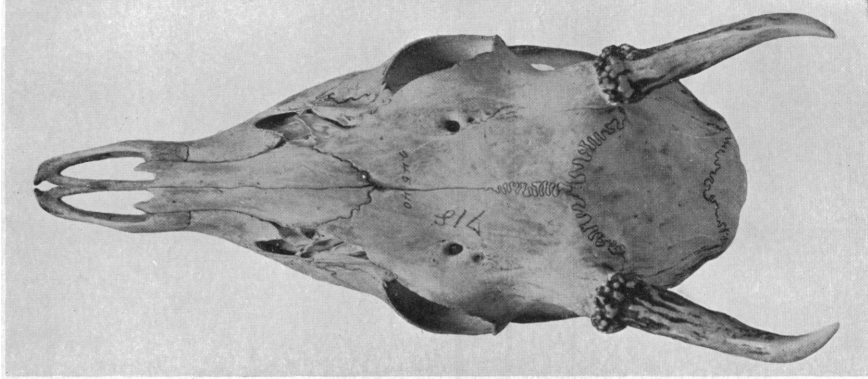
See also nasals and premaxillaries in Plates XXI, XXII, and XXXI.



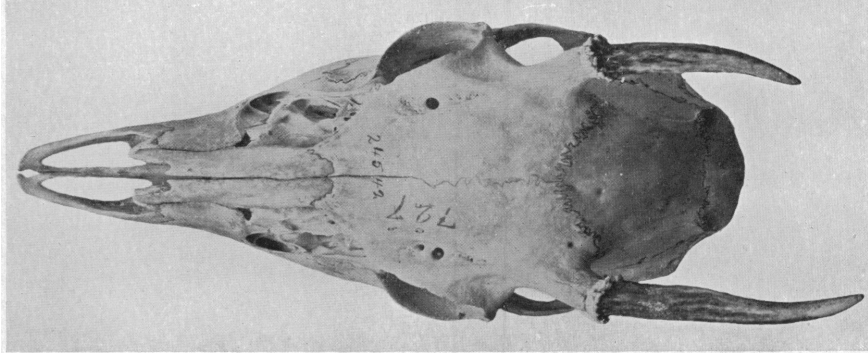
1.



2.



3.



4.

EXPLANATION OF PLATE XXIV.

ODOCOILEUS SINALOÆ *Allen*.

Lateral view of the specimens shown in Plate XXIII.

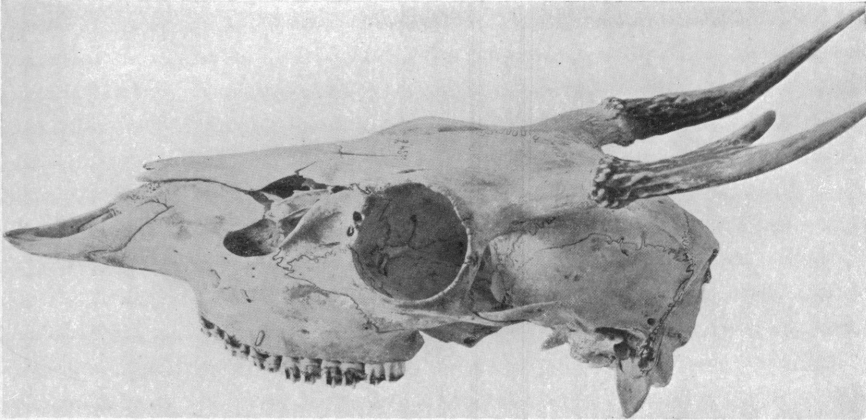
Figures $\frac{1}{4}$ nat. size.

FIG. 1a. Same specimen as Fig. 1, Plate XXIII. Lateral view, showing a very small and unusually-shaped lachrymal fossa, due to an exceptional posterior extension of the superior maxilla.

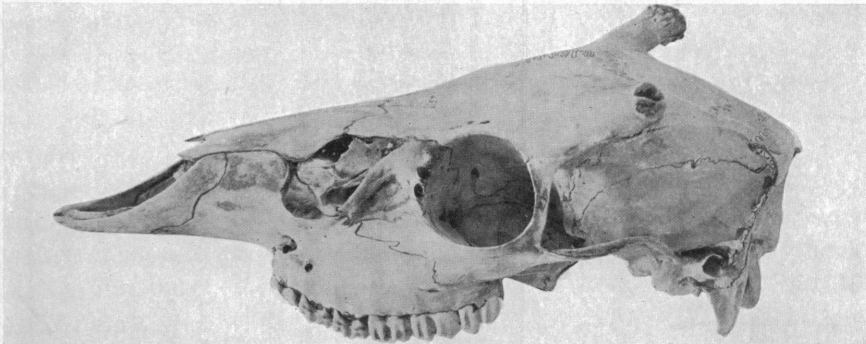
FIG. 2a. Same specimen as Fig. 2, Plate XXIII. Lateral view, showing the apposition of premaxilla and nasal; lachrymal fossa of medium size and form.

FIG. 3a. Same specimen as Fig. 3, Plate XXIII. Lateral view, showing nasal and premaxilla broadly in apposition, small lachrymal fossa, *and the presence of canines*.

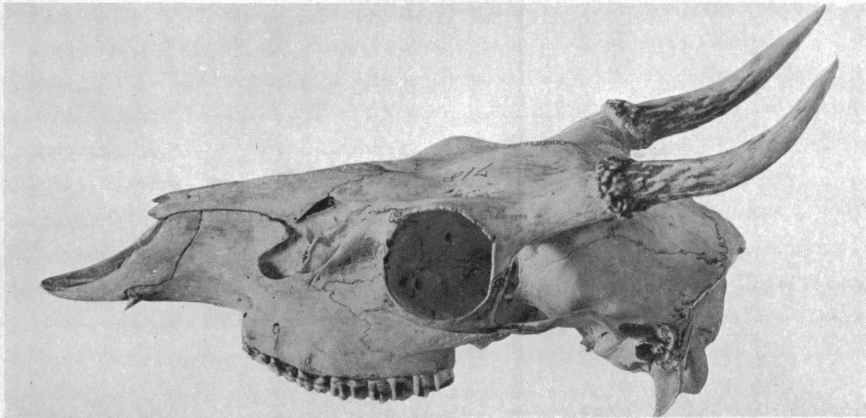
FIG. 4a. Same specimen as Fig. 4, Plate XXIII. Lateral view, showing nasal and premaxilla widely separate, exceptionally large lachrymal fossa, and vertically narrow nasals.



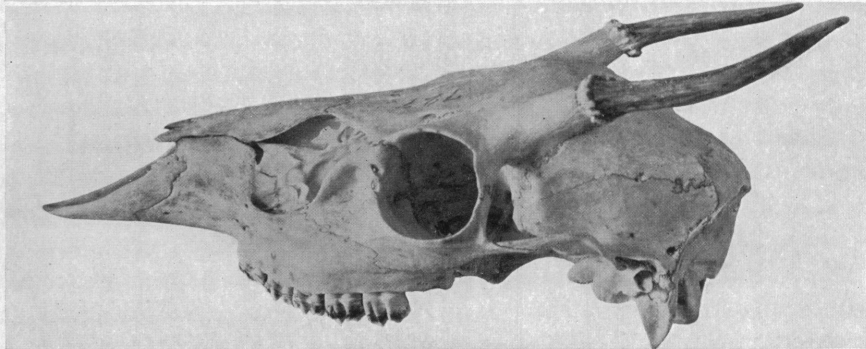
1a.



2a.



3a.



4a.

262-15

ODOCOILEUS SINALOAE.

EXPLANATION OF PLATE XXV.

ODOCOILEUS SINALOÆ *Allen*.

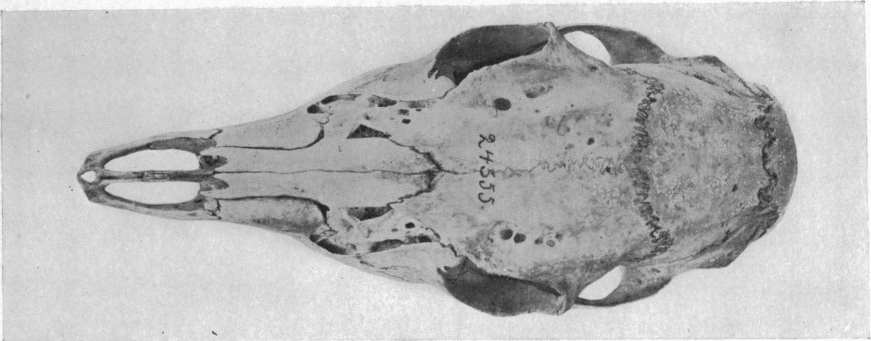
Specimens (females in fourth to sixth year) all collected at Escuinapa, Sinaloa, Mex. Figures $\frac{1}{2}$ nat. size.

FIG. 5. No. 24555, ♀, 4th year or older. Dorsal view: nasals rather long and rather narrow—deficient on lateral border of middle, etc.

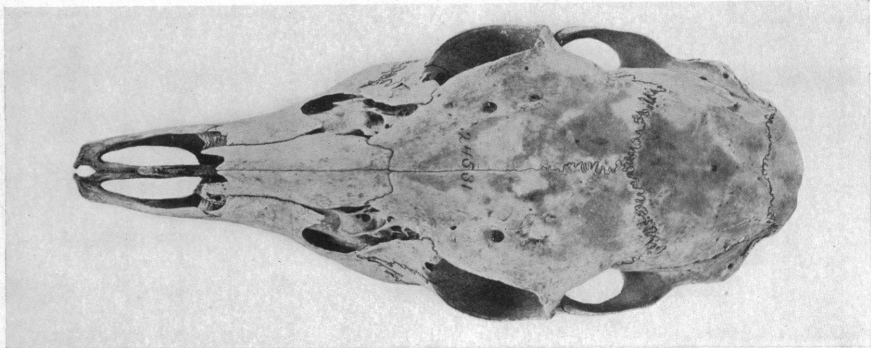
FIG. 6. No. 24531, ♀, 4th year or older. Dorsal view showing especially the unusually short and unusually broad nasals.

FIG. 7. No. 24550, ♀, 4th year. Dorsal view, showing very narrow and exceptionally long nasals, irregularly convex on the posterior border and deeply double-emarginate on the anterior border.

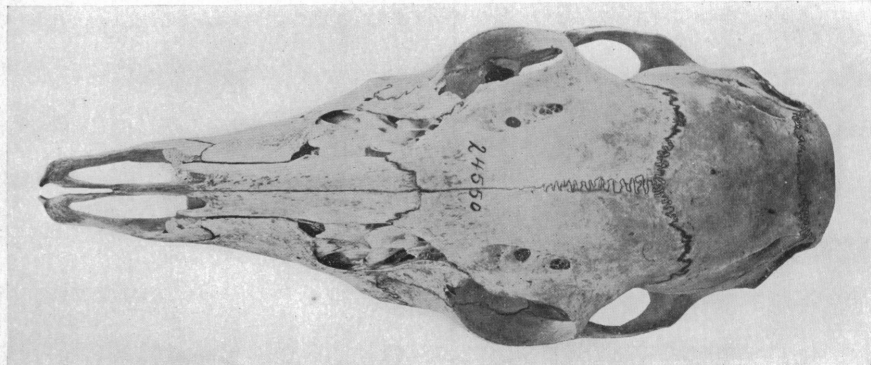
FIG. 8. No. 23878, ♀, probably of 5th or 6th year, *with canines*. Dorsal view, showing nasals of about average size and form, with strongly convex posterior and deep double emargination of front border.



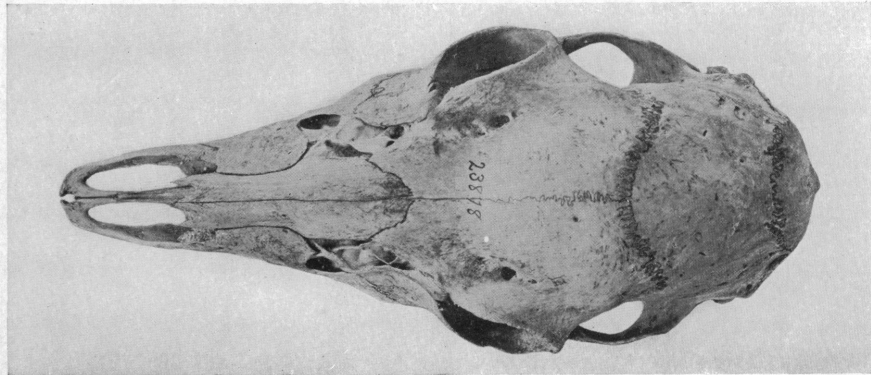
5.



6.



7.



8.

EXPLANATION OF PLATE XXVI.

ODOCOILEUS SINALOÆ *Allen*.

Lateral view of the specimens shown in Plate XXV.

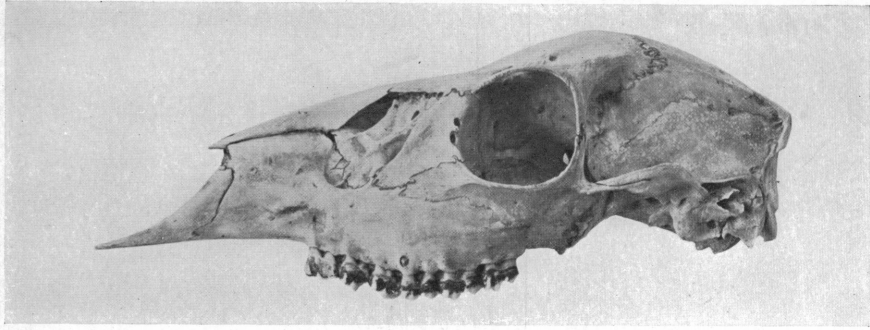
Figures $\frac{1}{4}$ nat. size.

FIG. 5*a*. Same specimen as Fig. 5, Plate XXV. Lateral view, showing deficient lower border of nasal, large lachrymal fossa, and maxilla separating nasal from premaxilla,—in this respect showing average conditions.

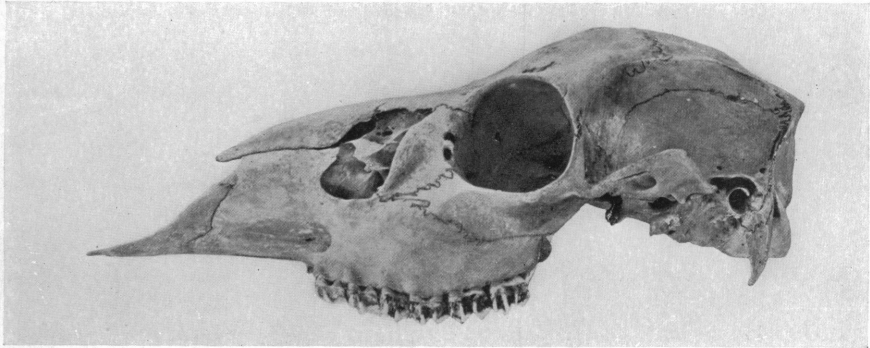
FIG. 6*a*. Same specimen as Fig. 6, Plate XXV. Lateral view, showing the very small lachrymal fossa, etc. (P^1 and p^2 broken.)

FIG. 7*a*. Same specimen as Fig. 7, Plate XXV. Lateral view, showing the slight lateral production of the nasals, very large lachrymal fossa, and approximation of premaxilla to nasals.

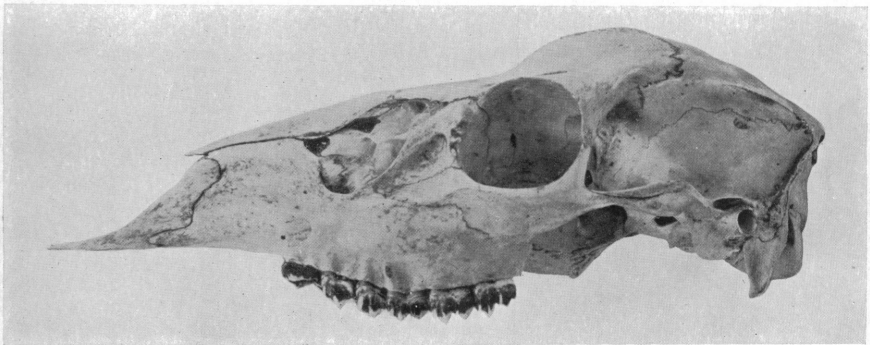
FIG. 8*a*. Same specimen as Fig. 8, Plate XXV. Lateral view, showing a *well-developed canine*, small lachrymal fossa, and about average maxilla-premaxilla-nasal conditions.



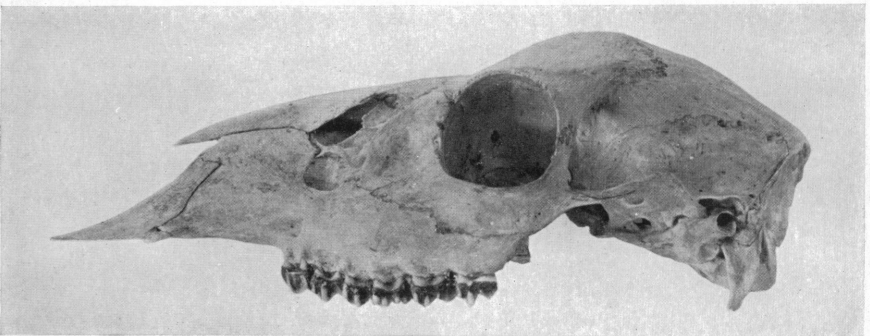
5a.



6a.



7a.



8a.

EXPLANATION OF PLATE XXVII.

NASUA NARICA MOLARIS *Merriam*

Figures all $\frac{1}{2}$ nat. size.

Lateral view of 6 skulls, 3 male and 3 female, to illustrate variation due to sex and age. Specimens all from Escuinapa, southern Sinaloa, Mexico.

FIG. 1. No. 23984, ♀ juv., Jan. 17, 1904. Entire milk dentition still in place, with also permanent m^1 fully functional.

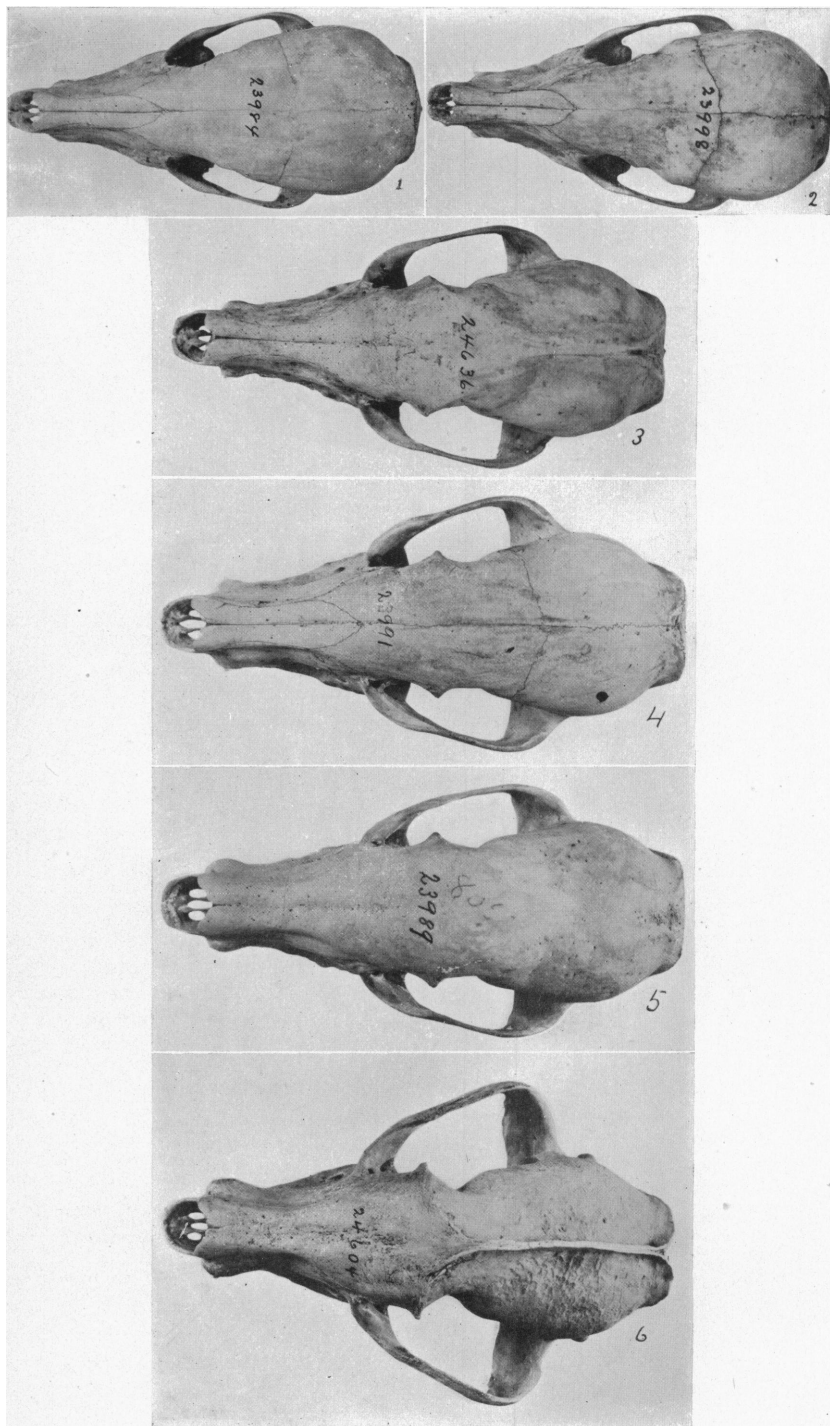
FIG. 2. No. 23998, ♂ juv., Jan. 10, 1904. Same age as specimen shown in Fig. 1, with the same condition of dentition.

FIG. 3. No. 24636, ♀ ad., April 28, 1904. A middle-aged female, with the teeth showing only slight traces of wear.

FIG. 4. No. 23991, ♂ ad., Jan. 6, 1904. A young adult, slightly younger than the female shown in Fig. 3.

FIG. 5. No. 23989, very old ♀, Jan. 6, 1904. Similar, in the general contour of the skull, to the middle-aged female, and young adult male, shown in Figs. 3 and 4. Note absence of any trace of a sagittal crest. The great age of the specimen is shown by the worn-out teeth and the heavily ossified condition of the skull. An average example, however, of a very old female.

FIG. 6. No. 24604, very old ♂, Feb. 7, 1904. Strictly comparable as regards age with the female skull shown in Fig. 5. Note the great difference in the configuration of the middle region of the skull—the form of zygoma, the great depth of the postorbital constriction, and the slight depth of the interorbital constriction—as compared with the same parts in the old female and in the middle-aged male and female, shown respectively in Figs. 5, 4, and 3.



NASUA NARICA MOLARIS.

EXPLANATION OF PLATE XXVIII.

NASUA NARICA MOLARIS *Merriam.*

Figures all $\frac{1}{2}$ nat. size.

Ventral view of the 6 specimens shown in Plate XXVII.

FIG. 1. ♀ juv., same skull as shown in Fig. 1, Pl. XXVII.

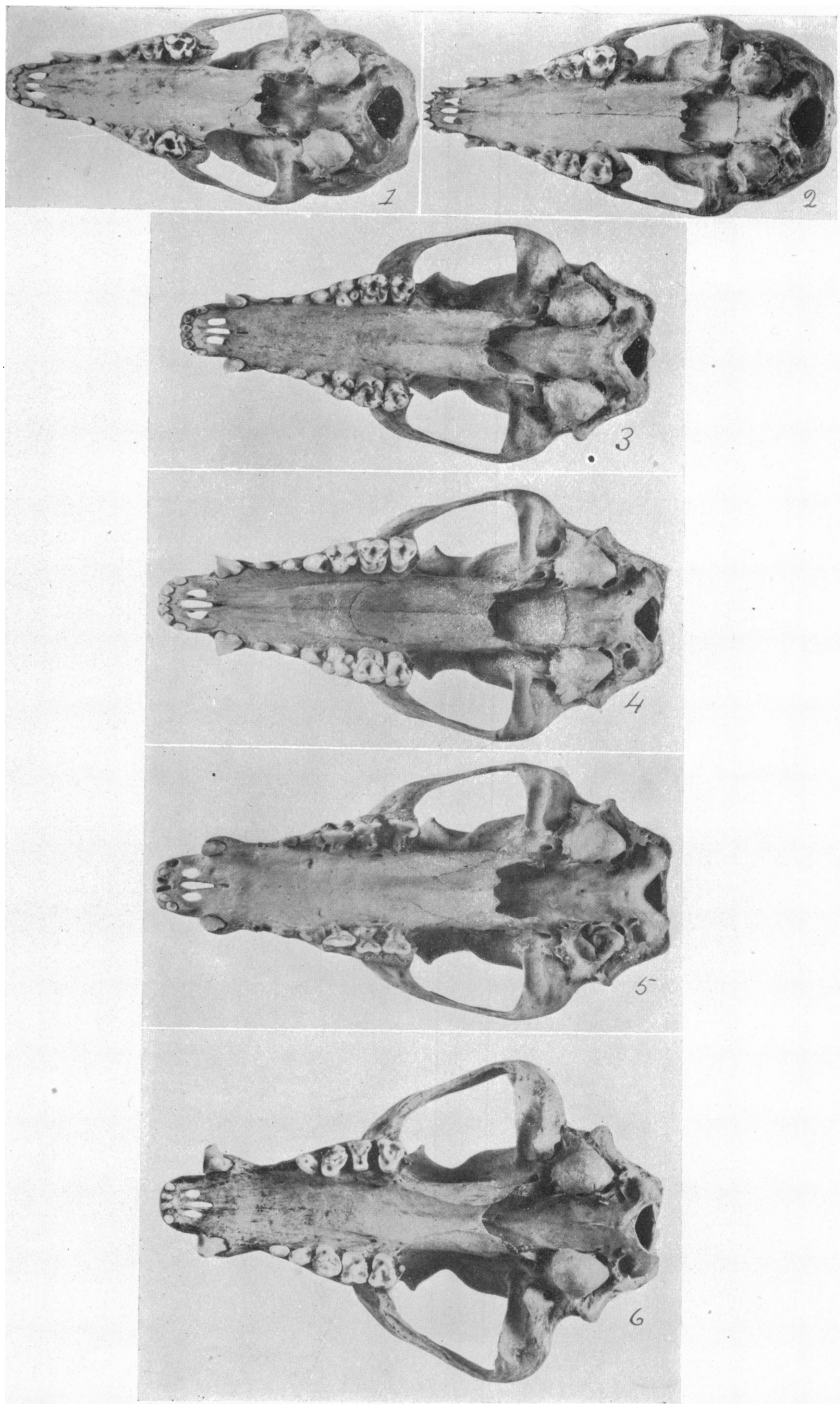
FIG. 2. ♂ juv., same skull as shown in Fig. 2, Pl. XXVII. At this stage of growth there is very little sexual difference in the skull, beyond the distinctly larger size of the male.

FIG. 3. Middle-aged ♀, with the teeth still practically unworn. Same skull as shown in Fig. 3, Pl. XXVII.

FIG. 4. Young adult ♂, probably a year or so younger than the female shown in Fig. 3, as indicated by the sutures being still open. Note the heavier dentition in the male skull, particularly the much larger canines, while the general contour of the skull is practically the same in both.

FIG. 5. A very old ♀, for comparison with the very old male shown in Fig. 6. Same skull as shown in Fig. 5, Pl. XXVII.

FIG. 6. A very old ♂, for comparison with the old female, a young male, and a middle-aged female shown respectively in Figs. 5, 4, and 3. Note especially the greater depth of the postorbital constriction, the lessened width of the post-maxillary portion of the palatal region, and the much wider and more angular zygoma.



NASUA NARICA MOLARIS.

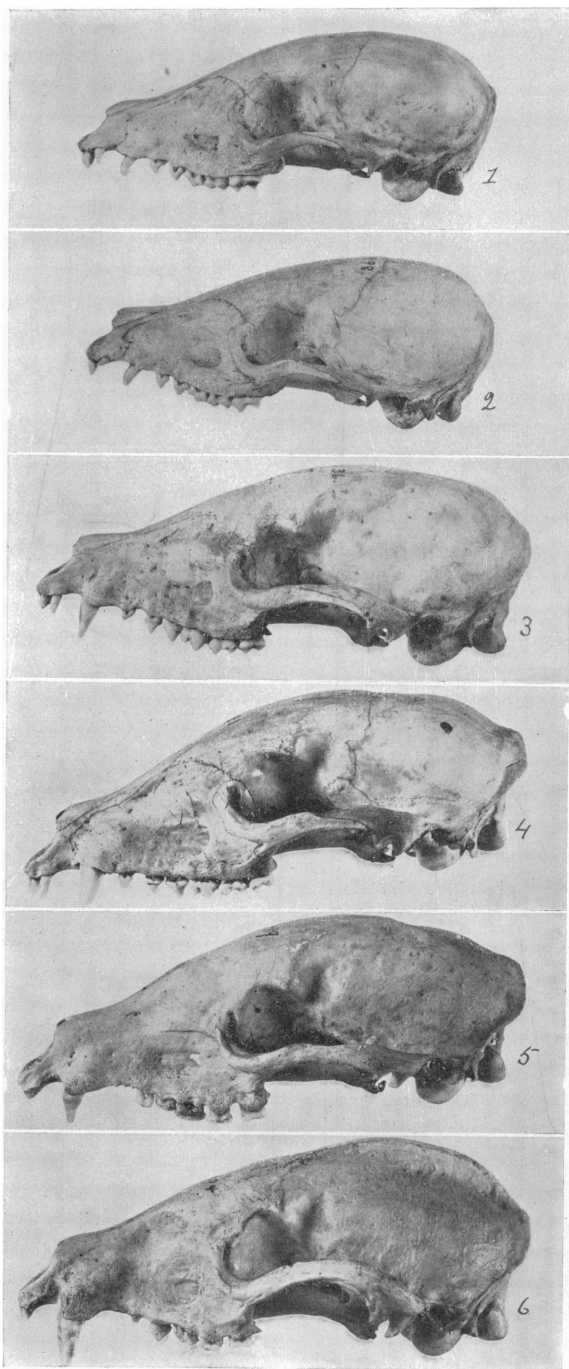
EXPLANATION OF PLATE XXIX.

NASUA NARICA MOLARIS *Merriam*.

Figures all $\frac{1}{2}$ nat. size.

View in profile of the 6 specimens shown in Plates XXVII and XXVIII.

FIG. 1, ♀ juv.; Fig. 2, ♂ juv.; Fig. 3, middle-aged ♀; Fig. 4, young adult ♂; Fig. 5, very old ♀; Fig. 6, very old ♂. Note the similarity in all features of Figs. 1 (♀) and 2 (♂); the change in the dorsal outline of the skull with age, and the difference in the size of the canines in Figs. 3 and 5 (♀) as compared with Figs. 4 and 6 (♂).



NASUA NARICA MOLARIS.

EXPLANATION OF PLATE XXX.

NASUA NARICA MOLARIS *Merriam*.

Figures all $\frac{1}{2}$ nat. size.

Lower jaws of skulls shown in Plates XXVII, XXVIII, and XXIX.

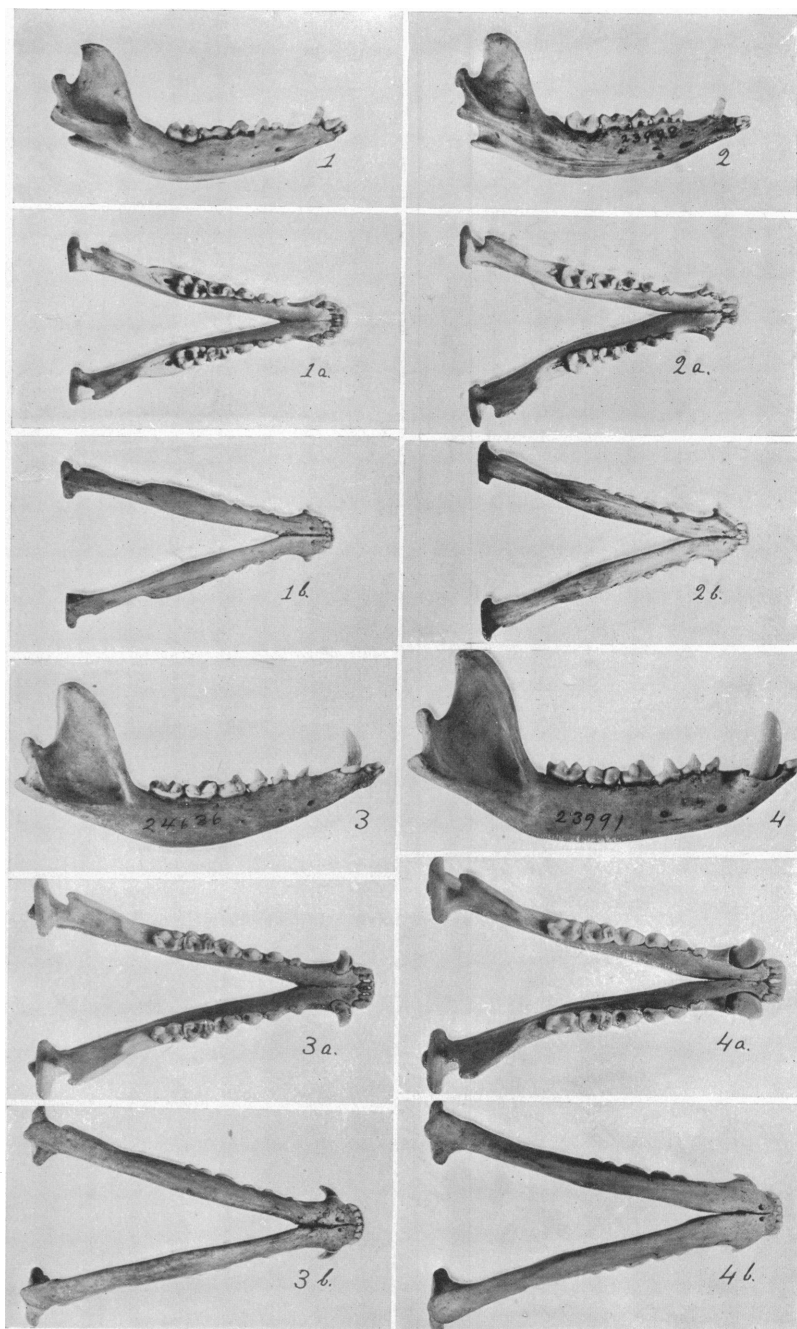
FIG. 1-1*b*. No. 23984, ♀ juv.

FIG. 3-3*b*. No. 24636, ♀ ad.

FIG. 2-2*b*. No. 23998, ♂ juv.

FIG. 4-4*b*. No. 23991, ♂ ad.

Note the similarity in all details of Figs. 1-1*b* and Figs. 2-2*b*; and the differences in Figs. 3-3*b* and Figs. 4-4*b* due to the much greater development of the canines in the male (Figs. 4-4*b*) than in the female (Figs. 3-3*b*), the difference in the size of the canines resulting, of course, in marked correlated differences in the depth and thickness of the distal half of the jaw.



NASUA NARICA MOLARIS.

EXPLANATION OF PLATE XXXI.

ODOCOILEUS SINALOÆ *Allen.*

Figures 1-8 and 1a-8a, $\frac{1}{4}$ nat. size; Figs. 9-13 and 9a-13a, $\frac{1}{8}$ nat. size.

Plates XXXI-XXXIII illustrate the development, and also individual variation in size and form, of the antlers, from the first year to old age.

Plate XXXI, Figs. 1, 1a-4, 4a, dorsal view of four skulls of males less than one year old (8 to 11 months); Figs. 5, 5a-8, 8a, same view of four skulls of animals in their second year (18 to about 22 months old); Figs. 9 and 9a, skull of male in 3d year; Figs. 10-13a, sets of antlers of animals in 3d year; Plates XXXII and XXXIII, antlers of animals of 4th year and older.

FIG. 1. No. 24543, Escuinapa, Sinaloa, Feb. 19, 1904; about 8 months old. Dentition: dp^{1-3} , m^1 ; m^2 just cutting the gum. Right frontal process broken. $\frac{1}{4}$ nat. size.

FIG. 2. No. 25777, La Cienega, Jalisco, April 16, 1905; about 10 months old. Dentition: dp^{1-3} , m^1 ; m^2 just coming into use. $\frac{1}{4}$ nat. size.

FIG. 3. No. 25780, La Laja, Jalisco, May 19, 1905; about 11 months old. Dentition: dp^{1-3} , m^{1-2} , the last (m^2) already functionally developed. $\frac{1}{4}$ nat. size.

FIG. 4. No. 26003, Volcan de Fuego, July 27, 1905; about 12 months old. Dentition: dp^{1-3} , m^{1-2} , both molars functionally developed. $\frac{1}{4}$ nat. size.

FIG. 5. No. 25779, Wakenakili Mts., Jalisco, May 6, 1905; about 22 months old. Dentition: dp^{1-3} , m^{1-3} ; m^3 fully functional. First antlers, the left one already shed. $\frac{1}{4}$ nat. size.

FIG. 6. No. 23885, Escuinapa, Sinaloa, Jan. 22, 1904; about 18 months old. Dentition: dp^{1-3} , m^{1-3} , the last molar fully functional. $\frac{1}{4}$ nat. size.

FIG. 7. No. 23887, Escuinapa, Sinaloa, Jan. 22, 1904; about 18 months old. Dentition: dp^{1-3} , m^{1-3} , the last molar not fully functional. $\frac{1}{4}$ nat. size.

FIG. 8. No. 25779, Wakenakili Mountains, May 6, 1905; about 22 or 23 months old. Dentition: dp^{1-3} already shed; m^1 - m^3 in full use; p^{2-3} through the gum but not functional; p^1 just breaking the gum. The right antler shows as a small spike; the left one had already been shed. $\frac{1}{4}$ nat. size.

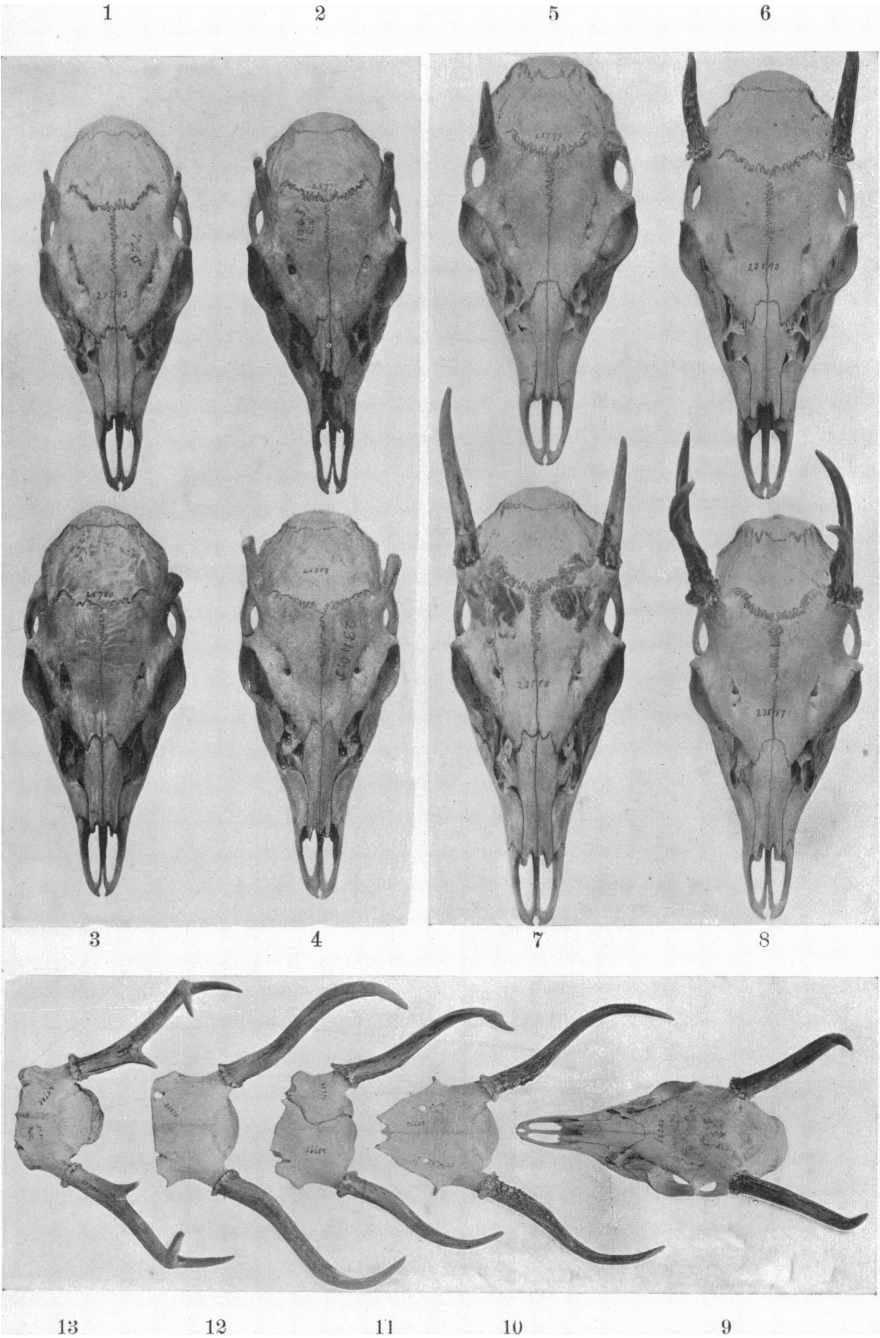
FIGS. 9-9a. No. 24529, Escuinapa, Sinaloa, Feb. 7, 1905; 3d year (2 years and about 8 months old). Dentition: permanent teeth strongly and perfectly developed but showing no appreciable wear. Short spike antlers. $\frac{1}{8}$ nat. size.

FIGS. 10-10a. No. 25792, La Cienega, Jalisco; 3d year. Spike antlers, medium size. $\frac{1}{8}$ nat. size.

FIGS. 11-11a. No. 25794, La Cienega, Jalisco, 3d year. Spike antlers, medium size. $\frac{1}{8}$ nat. size.

FIGS. 12-12a. No. 25810, La Laja, Jalisco; 3d year. Large, heavy spike antlers. $\frac{1}{8}$ nat. size.

FIGS. 13-13a. No. 25788, La Cienega, Jalisco; 3d year. Small, light, 3-tined, symmetrically branched antlers, in place of the usual spike antlers. $\frac{1}{8}$ nat. size.



ODOCOILEUS SINALOÆ.

EXPLANATION OF PLATE XXXII.

ODOCOILEUS SINALOÆ Allen.

Figures all $\frac{1}{2}$ nat. size.

Eight sets of antlers from animals of 4th (Figs. 1, 1a-4, 4a) and 5th (5, 5a-8, 8a) years.

FIGS. 1 and 1a. No. 25814, Mesa de Cullutan, Jalisco. Small, delicate antlers, the right 3-tined, the left with an additional (abnormal) point near the end of the main beam.

FIGS. 2 and 2a. No. 26140. Volcan de Fuego, Jalisco. Small 2-tined antlers.

FIGS. 3 and 3a. No. 25823, Mesa de Cullutan, Jalisco. Antlers 3-tined and heavier.

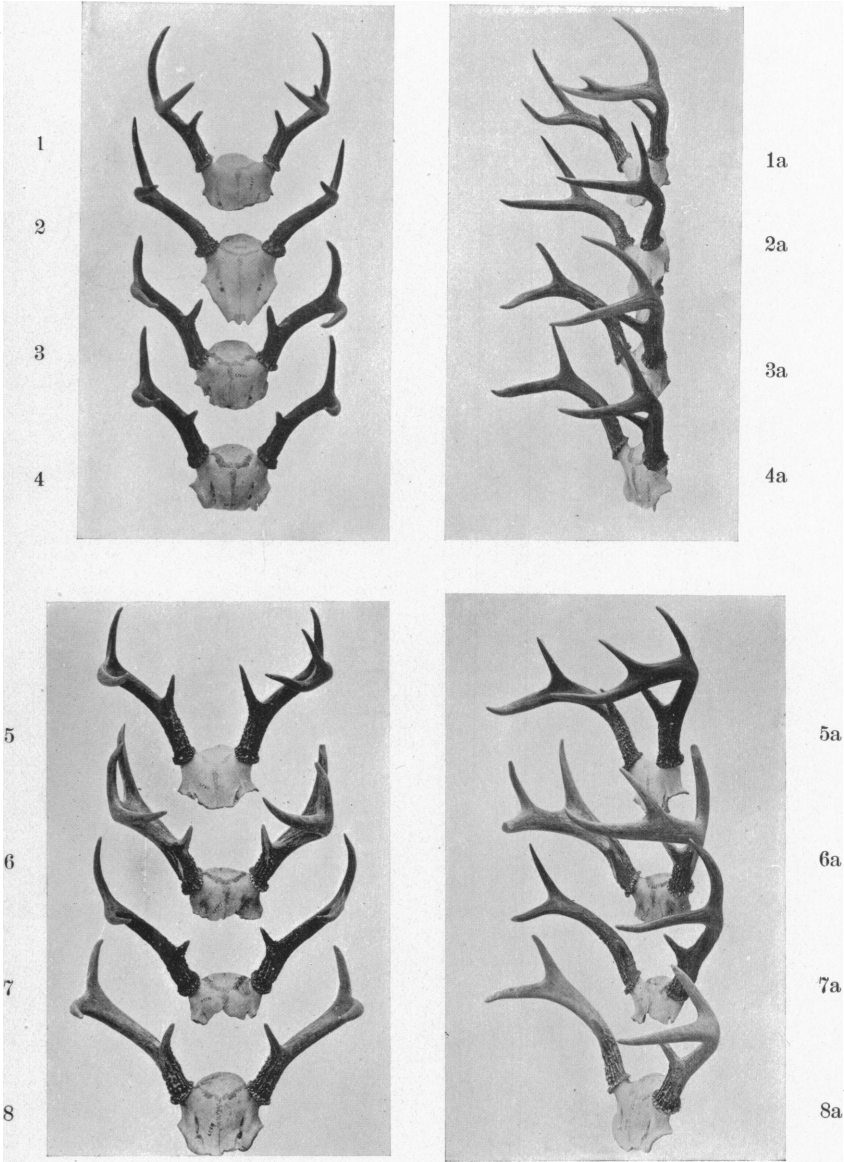
FIGS. 4 and 4a. No. 26141. Volcan de Fuego, Jalisco. Antlers as in the Fig. 3 specimen.

FIGS. 5 and 5a. No. 25811, La Laja, Jalisco. Heavy, 3-tined antlers. (This and the following three sets of antlers are much heavier than the preceding four sets, and are apparently from animals in their 5th year.)

FIGS. 6 and 6a. No. 25787, La Cienega, Jalisco. Antlers 4-tined, with greatly incurved main beams.

FIGS. 7 and 7a. No. 25786, La Cienega, Jalisco. Antlers 3-tined.

FIGS. 8 and 8a. No. 25819, Mesa de Cullutan, Jalisco.



ODOCOILEUS SINALOÆ.

EXPLANATION OF PLATE XXXIII.

ODOCOILFUS SINALOÆ Allen.

Figures all $\frac{1}{2}$ nat. size.

Eight sets of antlers from animals of 6th year or older—probably 6th to 10th years.

FIGS. 1 and 1a. No. 25800, Espirito de Santos Mts. Antlers 3-tined, the lower tine of the right antler merely a knob.

FIGS. 2 and 2a. No. 25795, La Cienega, Jalisco. Antlers each with 4 well-developed tines.

FIGS. 3 and 3a. No. 25796, La Cienega, Jalisco. Wide-spreading, 4-tined antlers.

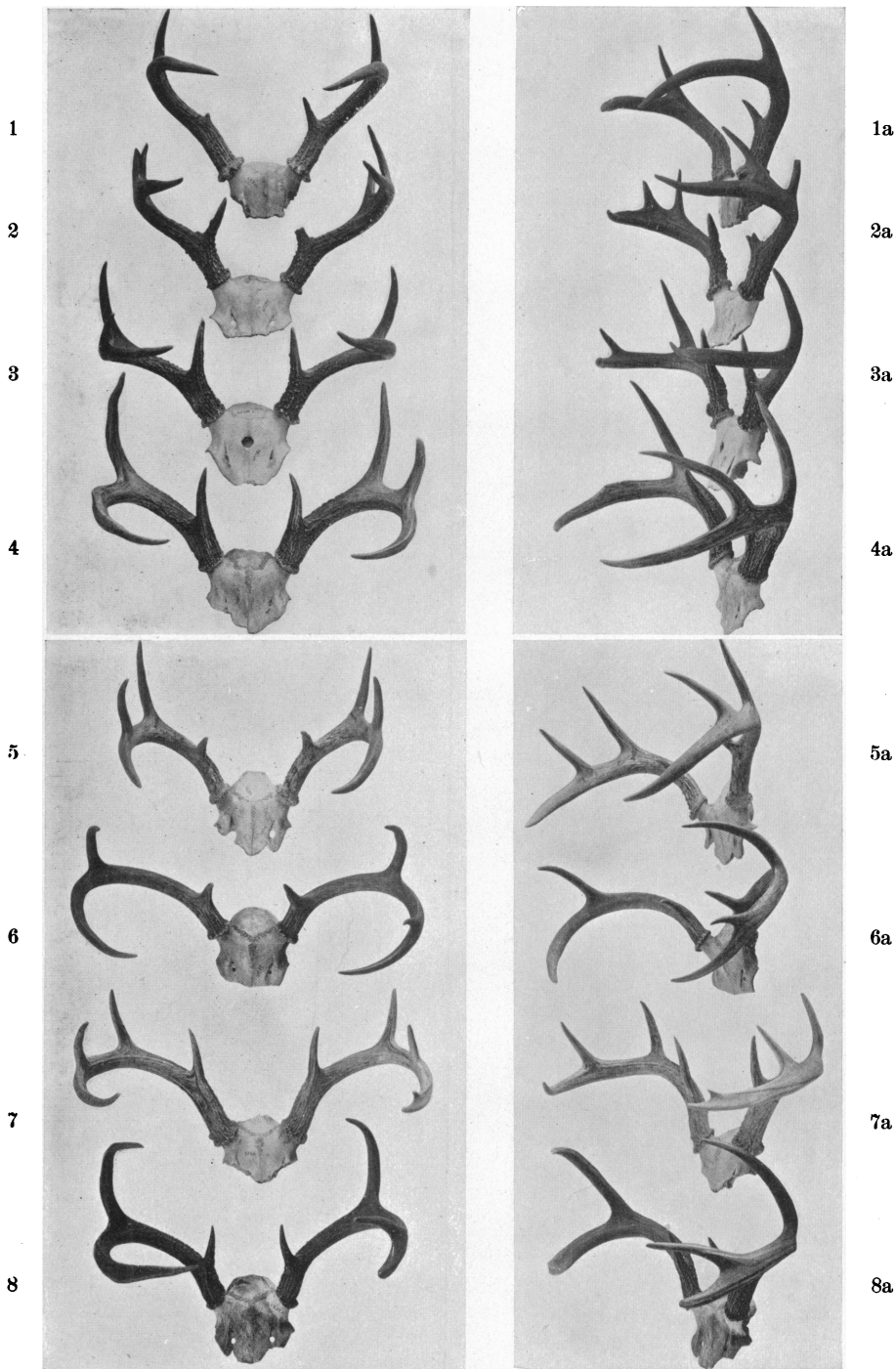
FIGS. 4 and 4a. No. 25441, Ojo de Agua, Tepic, near Jalisco boundary. Unusually long, 4-tined antlers. (Subapical tine of right antler broken off.)

FIGS. 5 and 5a. No. 25791, La Cienega, Jalisco. Antlers 4-tined, rather slender, with the main beam directed forward.

FIGS. 6 and 6a. No. 25789, Sierra de San Francisco, Jalisco. Right antler 3-tined, left antler 4-tined, wide-spreading and rather slender.

FIGS. 7 and 7a. No. 25813, La Laja, Jalisco. Symmetrical, typical, 4-tined antlers.

FIGS. 8 and 8a. No. 25875, La Cienega, Jalisco. Right antler 3-tined, left antler 4-tined, the main beams strongly incurved.



Odocoileus sinaloæ.

