

Article XXXIV.—MAMMALS FROM NICARAGUA.

BY J. A. ALLEN.

During the last two years the Museum has received several collections of birds and mammals from Nicaragua, made by Mr. William B. Richardson, who for many years was in the employ of Messrs. Salvin and Godman as an ornithological collector in Mexico and Central America. The mammals thus far received comprise about 400 specimens, representing nearly 60 species, of which about one-fourth appear to be undescribed. This is perhaps not surprising, in view of the fact that very few mammals have been previously received from Nicaragua.

The most important of Mr. Richardson's discoveries are a new and very distinct species of *Bassaricyon*, and a new species of spiny rat, allied to the Ecuadorian *Echimyus gymnurus* Thomas, and representing a hitherto unrecognized genus. The collection contains also several other species which are quite different from any previously known.

Mr. Richardson's collecting trips have covered a wide extent of country. From his home at Matagalpa, in the central part of Nicaragua, he visited the highlands to the northward and northwestward, and also the Pacific coast; eastward his explorations extended from Lake Nicaragua to the vicinity of the Atlantic coast. The principal points at which collections were made are as follows:

Matagalpa, altitude about 3000 feet.

San Rafael del Norte, altitude about 5000 feet.

Ocotol, altitude about 4500 feet.

Chinandega, on the Pacific slope, about 700 feet.

Chontales, lowlands east of Lake Nicaragua, altitude about 500 to 1000 feet.

Tuma and Lavala, east of Matagalpa, on the Atlantic slope, below 1000 feet.

Rio Grande, south of Tuma, and at somewhat lower altitude.

Prior to his present engagement Mr. Richardson had given very little attention to mammals, and hence has been somewhat handicapped in his work by lack of experience, yet his collection is a most valuable one and adds greatly to our knowledge of the mammal fauna of this part of Central America. Unfortunately quite a number of the skulls of some of the smaller species were accidentally lost, but future shipments will probably contain additional specimens of most of these species. Later shipments will be made the basis of a supplemental paper.

I am greatly indebted to Dr. M. W. Lyon, Jr., Assistant Curator, Division

of Mammals, United States National Museum, for the use of important specimens for examination in the present connection, including the type of the genus *Bassaricyon*.

1. *Marmosa murina* (Linnaeus). One specimen, San Rafael del Norte, April 11, 1907.

2. *Marmosa murina mexicana* Merriam. One specimen, Volcan de Chinandega, May 9, 1907.

3. *Caluromys laniger pallidus* Thomas. One specimen, adult male, Matagalpa, April 30, 1906.

4. *Metachirus fuscogriseus* Allen. Six specimens (5 ♀, 1 ♂): Matagalpa, Dec. 12, 1906, Jan. 8 and Nov. 17, 1907; San Rafael del Norte, April 16; Lavalala, Oct. 6; Tuma, Nov. 26, 1907.

5. *Metachirus nudicaudatus colombianus* Allen. One specimen, male, not quite adult (last molar just in place), Chontales, Feb. 27, 1908.

Very closely resembles the type of this subspecies; but the top of the head and nape are blacker, and the general coloration above is slightly darker. Further material may show that the forms from the two regions are subspecifically separable.

6. *Didelphis mesamericana tabascensis* Allen. Six specimens — four adult (3 ♂, 1 ♀) and two about one-fifth grown, taken at Matagalpa, Jan. 8, 25, and 28, and Sept. 14 and 17, and at Lavalala, Oct. 6, 1907. Five are in the gray phase and one in the black phase. The two young ones are about the same age, but one was taken Jan. 8, and the other Oct. 6.

7. *Choloepus hoffmanni* Peters. Two specimens, a young male and an adult female, Matagalpa, Jan. 2, 1908.

8. *Bradypus griseus* (Gray). Two specimens, an adult female and a young female about one fourth grown, Chontales, Feb. 20, 1908; said by the collector to be mother and young.

The adult has a long black dorsal stripe, extending from the front of the shoulders to the middle of the back, flanked on either side by a narrow band of dull orange, which fades out laterally into a broader band of yellowish white. The young specimen has a short dull black dorsal stripe of soft black hair, shorter than in the adult, and not bordered by orange and yellowish white as in the adult. The young specimen is apparently still in first pelage, with the general color above dull cinnamon brown, instead of gray brown varied with white as in the adult.

The name *griseus* Gray is adopted provisionally, as the description and type locality are fairly pertinent.

9. *Cyclopes dorsalis* (Gray). One specimen, male, Rio Grande, April 7, 1908.

10. *Tamandua tetradactyla chiriquensis* Allen. One specimen, adult male, Ocotal, May 7, 1908.

11. **Tatu novemcinctus** (*Linnaeus*). Two specimens, an adult male, Lavala, Oct. 19, 1907, and a younger specimen (label lost).

12. **Mazama tema** *Rafinesque*. Five specimens, an adult and two young males and two adult females, all taken at Tuma, Nov. 28–Dec. 8, 1907.

13. **Lepus floridanus chiapensis** *Nelson*. Three specimens: Leon, May 1, 1907; Chontales, Feb. 13, 1908; Ocotal, May 9, 1908.

These specimens differ from *L. f. aztecus* in the same manner as *chiapensis* is said to differ, but the dorsal surface is apparently more heavily washed with black than in *chiapensis*.

14. **Lepus gabbi tumacus** subsp. nov.

Type, No. 28409, adult ♂, Tuma, Nicaragua, Dec. 2, 1907; W. B. Richardson.

Similar in size and cranial characters to *L. gabbi*, but coloration much deeper throughout; rufous of feet and limbs much more intense, and soles of feet much darker; ears darker and whole dorsal surface much more heavily varied with black, which is the predominant color of the whole dorsal area.

Represented by two specimens, the type, from Tuma, and another specimen from Ocotal, May 11, 1908. Both are adult males, and the collector's measurements are respectively as follows: total length, 360 and 340 mm.; hind foot, 68 and 70. Skulls, occipitonasal length, 69 (type), 66; zygomatic breadth, 32 (type), 31.6.

15. **Dasyprocta punctata** *Gray*. Four specimens: Matagalpa, May 14, male, and Sept. 26, juv., 1907; Lavala, male and female, Oct. 7 and 19, 1907.

16. **Coendu mexicanus** (*Kerr*). Three specimens: male, Volcan de Chinandega, May 10, 1907; female, Chontales, Feb. 18; female, Ocotal, May 1, 1908. The collector's measurements are

28334	♂	Total length, 790; tail vertebræ, 370; hind foot, 70
28485	♀	" " 680; " " 300; " " 60
28484	♀	" " 870; " " 400; " " 80

17. **Proechimys centralis** (*Thomas*). Twelve specimens: Rio Grande, March 20–April 4, 1908.

Hoplomys¹ gen. nov.

Type, *Hoplomys truei* sp. nov.

External characters in general as in *Proechimys*, but the spines much coarser and stronger. Molariform teeth with four transverse furrows instead of three as in *Proechimys*, deeper and longer, and those of the maxillary teeth much more oblique. (Figs. 1–4.)

¹ ὄπλα, arms, armor, μῦς, mouse; in allusion to the spiny covering.

This genus is characterized externally by the abundance and strength of the spines, which occupy nearly the whole of the dorsum and nearly conceal

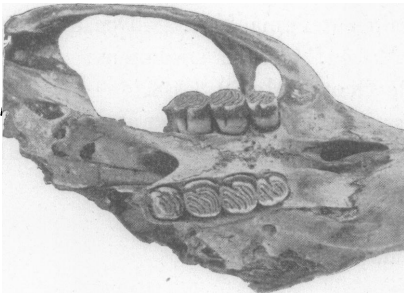


Fig. 1. *Hoplomys truei*. Type. No. 28367, ♂ ad. The last molar only slightly worn. ♀.

the underlying fur. The enamel pattern of the molariform teeth presents four strong, deep, oblique furrows instead of three short, shallow, transverse furrows as in *Proechimys*; the same differences characterize the lower molariform series, except that m_3 has only three furrows instead of four, as in the other teeth. These differences are well shown in the accompanying figures.

Echimys gymnurus Thomas is to be referred to this genus, and probably also *Echimys subspinosus* Tomes, both from Ecuador.

18. *Hoplomys truei* sp. nov.

Echimys centralis ALLEN, Bull. Am. Mus. Nat. Hist., IX, 1897, 42, Costa Rica (not of Thomas, 1896).

Type, No. 28367, ♂ ad., Lavalá, Matagalpa Province, Nicaragua, Oct. 5, 1907.

General color of upper parts blackish varied with pale rusty brown; flanks grayish brown; whole ventral area pure white; forelimbs dusky grayish brown, the toes lighter; hind feet buffy white, more or less edged and mottled with dusky brown; soles of all the feet blackish brown; ears nearly naked, dark brown passing into blackish apically; tail wholly naked and coarsely scaled, grayish brown above, whitish below. Head and body, 380 (type) and 400 mm.; tail, 170 (type) and 140; hind foot 50 (type) and 45 (collector's measurements); hind foot, with claw (in dry skin), 53 (type) and 51. Skull (type), occipito-nasal length, 55; zygomatic breadth, 27; mastoid breadth, 21; length of nasals, 20, upper molariform series, 10; lower, 10.5.

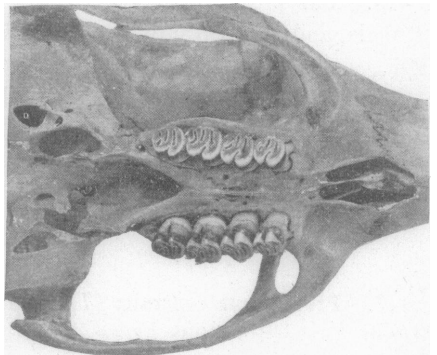


Fig. 2. *Proechimys trinitatis*. Type species of the genus *Proechimys* and type skull of the species. No. 6018, ♀ ad.

The teeth are slightly more worn than in the skull of *Hoplomys* shown in Fig. 1, but the attrition has not changed the pattern of the crown surface of the teeth. ♀.

This species closely resembles in coloration *Echimys semispinosus* Tomes,¹ from "Ecuador" (exact locality not known,² but probably from

¹ Proc. Zool. Soc. London, 1860, p. 265, fig. 1-4, skull.

² Thomas, Ann. and Mag. Nat. Hist. (6), XX, Dec. 1897, p. 551.

the coast). It differs from it in the spines not being "confined to the middle of the back"; neither are they "short and flexible," but long and very rigid. Neither is the tail "pretty evenly sprinkled with shortish hairs," but is entirely naked, the scales coarse, smooth and conspicuous. The skull as figured bears a close general resemblance to that of *H. truei*, and also to that of *P. centralis* Thomas, especially in the heavy ascending branch of the zygomata, which in *H. truei* is much narrower in lateral view. The nasals, however, are markedly different from the nasals in either *P. centralis* or *H. truei*, they terminating considerably anterior to the premaxillaries.

In 1897,¹ I referred a young specimen of spiney rat collected by Mr. A. Alfaro at Suerre, Costa Rica, to *Echimy*s [= *Proechimys*] *centralis*, and later (on the museum label) to *E. semispinosus* Tomes. It proves, however,

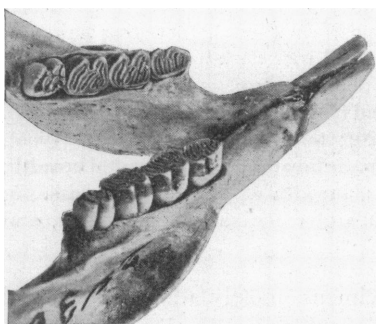


Fig. 3.

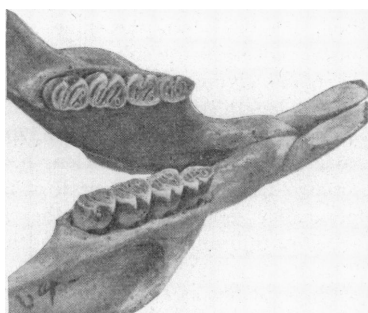


Fig. 4.

Fig. 3. *Hoplomys truei*. Lower jaw of skull shown in Fig. 1. ♀.

Fig. 4. *Proechimys trinitatis*. Lower jaw of skull shown in Fig. 2. ♀.

to be referable to *H. truei*, both in external characters and in the tooth pattern. This shows that the range of *H. truei* extends southward into Costa Rica. It has not been reported from Panama, whence many specimens of spiney rats have been received in recent years, all referable to the *Proechimys centralis* group, except the San Miguel Island form described by Bangs as *Loncheres* [= *Echimy*s] *labilis*. This makes the third genus of spiney rats now known from Central America.

The heavy-spined *Echimy*s *gymnurus* Thomas, from northern Ecuador, differs radically in coloration from *H. truei* but agrees with it in tooth pattern, in the coarseness of the dorsal spines and (comparatively) hairless tail. It is beyond question a species of *Hoplomys*.²

¹ Bull. Amer. Mus. Nat. Hist., IX, p. 42.

² On referring to my notes on the Echimyinae made at the British Museum in 1901, I find *Echimy*s *gymnurus* Thomas indicated as the type of a "gen. nov." with a rough sketch of the tooth pattern. The genus is here first published (see above) as *Hoplomys*, with *H. truei* as type, a species congeneric with *H. gymnurus*.

This species is named in honor of Dr. F. W. True, Curator of the Department of Biology, U. S. National Museum, who was the first to make known the occurrence of any member of the Octodontidæ in Central America.¹

19. **Heteromys vulcani** sp. nov.

Type, No. 28315, ♀ ad., Volcan de Chinandega, altitude about 4000 feet, May 4, 1907; W. B. Richardson.

Soles hairy, 5-tuberculate; no lateral line. Above blackish, varied with gray, owing to the whitish basal portion of the spines showing at the surface, especially on the sides, black prevailing over the median area; ventral surface and inside of limbs white or yellowish white; *fore limbs wholly white*; hind limbs externally like the dorsal surface; fore and hind feet white; ears small, rounded, scantily haired, dark brown or blackish, very faintly edged with white; tail bicolor, blackish above, whitish below, very scantily haired, the annulations unconcealed, and slightly tufted. In the adults the spines are heavy, nearly without intervening hairs; in younger specimens the spines are weaker and mixed with dark hairs, annulated with pale rufous, giving a slight ruddy tinge to the dorsal surface.

Total length (type), 220 mm.; tail, 110; hind foot, 25 (collector's measurements). Four adult specimens, total length, 205 (190–220); tail, 100 (90–110). Skull (type), total length, 31; condylo-basal length, 27; zygomatic breadth,—; interorbital breadth, 7; mastoid breadth, 14; length of nasals, 11; breadth of rostrum at middle, 5; upper molar series, 4. Four other adult skulls give the same total length, and practically the same mastoid breadth.

This species is represented by 12 specimens, mostly adult, but several are in poor condition. Nearly all are from the type locality.

Heteromys vulcani is easily recognized by the combined characters of small size, hairy soles, fore limbs wholly white, and absence of a lateral line. The type is the only specimen in the series in which the tail exceeds 100 mm. The nasals are emarginate or V-shaped posteriorly, and terminate slightly in advance of the posterior border of the premaxillæ.

20. **Heteromys fuscatus** sp. nov.

Type, No. 28451, ♂ ad., Tuma, Nicaragua, Dec. 1, 1907; W. B. Richardson.

General color above blackish, darker on the head, slightly varied with buffy gray; back slightly suffused with fulvous; sides pale fulvous strongly lined with black; top and sides of nose nearly black; thighs and outer surface of hind limbs and

¹ 'On the Occurrence of *Echinomys semispinosus* Tomes, in Nicaragua.' Proc. U. S. Nat. Mus., XI, 1888, pp. 467, 468.

This record is based primarily on three specimens collected in the vicinity of Greytown, which proved to be not *E. semispinosus* Tomes, but referable to a new species later described by Thomas, from Nicaragua specimens, as *E. centralis*. In the same connection he also made mention of three specimens from Pacuare, Costa Rica, likewise referred by True to *E. semispinosus*. Through the kindness of Dr. M. W. Lyon, curator of mammals at the U. S. National Museum, these six specimens have been sent to me for examination, and all prove to be referable to *Proechimys centralis*.

buttocks dusky gray or blackish; outer surface of fore limbs gray; upper surface of fore and hind feet whitish; ventral surface and inside of limbs pure white; no fulvous lateral line; tail nearly naked, bicolor, blackish above, whitish below; ears nearly naked, dusky, with a barely perceptible edging of white; soles of hind feet naked, brownish black, 6-tuberculate.

Total length (type), 300 mm.; tail, 150; hind foot, 30 (collector's measurements). Three specimens (2 ♂, 1 ♀) measure, total length 293 (280–300); tail, 153 (150–160). Skull, occipitonasal length, 36.3; condylo-basal length, 32; zygomatic breadth, 15.7; interorbital breadth, 10; mastoid breadth, 15.5; length of nasals, 10; width of rostrum above base of incisors, 5; upper molar series, 4.5.

This species agrees in size and proportions with *H. repens* Bangs, from Panama, except in having smaller feet, but differs from it greatly in coloration, being much darker, while the suffusion of the upper parts is much paler — buff instead of tawny. The skull differs in the less posterior extension of the nasals, which terminate slightly in front of the posterior border of the premaxillæ instead of extending decidedly beyond them.

This species is based on 4 specimens, the type, from Tuma, a second specimen from Chontales, and two from Matagalpa. All are adult, but the Chontales specimen is a little younger than the others, and a little smaller and darker.

21. *Neotoma chrysomelas* sp. nov.

Type, No. 28372, ♀ ad., Matagalpa, Nicaragua, Sept. 17, 1907; W. B. Richardson.

Sides of body, from nose to thighs, golden brown; dorsal region, from top of head to base of tail, similar but heavily overlaid by black-tipped hairs, rendering the dorsal area blackish; ventral surface white, with the basal half of the pelage dusky, usually showing more or less at the surface along the lateral borders and inside of hind limbs; fore and hind limbs passing into dusky apically; fore feet abruptly silvery white; hind feet whitish, mottled with dusky, sometimes the white, sometimes the dusky prevailing; ears large, dark brown, the apical two-thirds nearly naked; tail heavily haired, wholly concealing the annulations, blackish above, grayish white below.

Total length (collector's measurements), 380 mm.; tail vertebræ, 170; hind foot (from dry skin), 36. Skull, total length, 47; condylo-basal length, 45; zygomatic breadth, 25; length of nasals, 19. Four specimens (3 ♂, 1 ♀), all adult, measure as follows: Total length, 375 (340–390); tail vertebræ, 160 (150–170). Skull, total length, 45.9 (45–47); zygomatic breadth, 24.7 (24–25); nasals, 18.2 (17.8–19). All the specimens were taken at the type locality.

Neotoma chrysomelas is a member of the *N. ferruginea* group, to which also belong *N. picta* and *N. isthmica*, and perhaps other ferruginous forms of southern Mexico. It differs from *N. ferruginea* Tomes, its nearest geographical ally (type locality, Dueñas, Guatemala), in larger size, relatively broader skull, and longer nasals (skull of *N. ferruginea*, total length, 45

zygomatic breadth, 21, nasals, 16.7). The two forms apparently are quite similar in coloration, judging from Tomes's description (P. Z. S., 1861, pp. 282-284).

22. **Akodon teguina** (*Alston*). Five specimens, all collected at San Rafael del Norte, altitude 4000 to 5000 feet, April 12-17, 1907. Provisionally referred to *A. teguina*, the type locality of which is Coban, Guatemala, although probably subspecifically different.

23. **Reithrodontomys modestus** *Thomas*. Seven specimens, of which four are from San Rafael del Norte and three from Lavala. Unfortunately the skulls are lost or too much broken to be of use in identification. Three adults measure, total length, 140 mm., tail, 70-75. A young adult agrees very well with Thomas's description of *modestus*, but two adults differ in having the sides of the body strongly suffused with yellowish rufous, and the tail is gray below instead of concolor, and the breast spot is fulvous instead of drab, as in the younger specimens. The type locality of *modestus* (Jinotega, Nicaragua, altitude 4650 feet) is only a short distance from San Rafael del Norte.

24. **Reithrodontomys** sp. One specimen, without skull, Ocotal, May 11, 1908. A dull-colored medium-sized species; total length, 170 mm., tail, 80.

25. **Reithrodontomys** sp. Two immature specimens, without skulls, one each from Rio Grande and Tuma (below 1000 feet).

26. **Reithrodontomys** sp. One specimen, San Rafael del Norte, April 10, 1907. A very small species with a very long tail (total length, 140 mm., tail, 90), wholly unlike the other San Rafael specimens of *Reithrodontomys*.

Further notice of these undetermined species of *Reithrodontomys* is deferred in the hope that additional specimens with good skulls will be received in later shipments.

27. **Oryzomys (Melanomys) chrysomelas** *Allen*. Sixteen specimens all from the east coast low country, as follows: Lavala, 2 specimens, Oct. 11 and 13, 1907; Tuma, 6 specimens, Nov. 20-28, 1907; Chontales, 2 specimens, Feb. 20 and 25, 1908; Rio Grande, 6 specimens, Feb. 25, 28, March 30, April 2 and 4, 1908.

The collector's measurements of 12 specimens, about an equal number of males and females, all adult, are: Total length, 206 mm. (200-220); tail vertebrae, 98.5 (80-110); hind foot, without claws, 20.1 (20-20.5).

Externally these specimens are indistinguishable from the original type series of five from Suerre, Costa Rica, of which there were no external measurements, of which none was very old, the teeth of all being nearly unworn. In the present series the skulls average slightly larger, evidently owing to the greater age of most of the specimens, in some of which the teeth are much worn.

28. ***Oryzomys couesi* Thomas** (ex Alston). Twenty-nine specimens, of which 23 are from Chontales, Feb. 8–28, 1908; 2 from Ocotal, May 4 and 11, 1908; 1 from San Rafael del Norte, April 12, 1907, and 3 from Tuma, Nov. 3, 23, and 24, 1907.

These specimens agree satisfactorily with Thomas's redefinition¹ of *O. couesi* (type locality, Coban, Guatemala). The coloration above is fulvous, finely lined with black on the back, which is thus somewhat darker than the sides; below buffy white. Very old specimens are brighter colored, tending to rufous on the lower back and to strong buff below. Ten of the oldest specimens of the series (judging by the skulls) measure (collector's measurements), total length, 268 (260–280); tail, 136 (130–140). Basal length of skull, 27.5–29.5; nasals, 11–11.6; width of braincase, 12.2–12.7.

This species has apparently a wide range, from the low Atlantic coast district (altitude 500 to 1000 feet) to the highlands (altitude 4000 to 5000 feet) of the central part of the Republic, specimens from the latter district being in no way distinguishable from those from the former.

29. ***Oryzomys alfaroi* Allen.** Nine specimens: Chontales, 6 specimens, Feb. 13–25, 1908; Tuma, 3 specimens, Nov. 15–18 and 25, 1907.

These specimens are indistinguishable from the type and topotypes of the species, from San Carlos, Costa Rica.

30. ***Oryzomys alfaroi incertus* subsp. nov.**

Type, No. 28584, ♂ ad., Rio Grande, March 28, 1908; W. B. Richardson.

Differs from *O. alfaroi alfaroi* in smaller size, darker back, and golden rufous instead of pale fulvous suffusion of the upper parts. Total length (type), 190 mm.; tail, 100. Two other specimens measure, respectively, total length 190 and 200; tail, 100. Five specimens of *alfaroi* from Chontales measure, total length, 210 (200–220); tail, 106 (100–110). The skulls are badly broken, lacking the occipital portion, but so far as they can be compared appear to present no distinctive features.

31. ***Oryzomys ochraceus* sp. nov.**

Type, No. 28548, ♂ ad., Rio Grande, Nicaragua, March 27, 1908; W. B. Richardson.

Pelage very thick, long and soft. Upper parts ochraceous, somewhat darker on the back by the admixture of black-tipped hairs, and brighter on the flanks; top and front of head not darker than the body; under parts strongly washed with buff or pale yellow; ears dark brown, naked; upper surface of fore and hind feet dingy grayish brown; tail uniform dark brown throughout, not lighter below, naked in some specimens, in others with very short fine hairs, not concealing the annulations.

Total length (type), 300 mm.; tail, 180; hind foot, 40 (collector's measurements).

¹ Ann. and Mag. Nat. Hist. (6), Vol. XI, May, 1893, pp. 403, 405.

The type is a very old male. Three other specimens, the smallest a young adult, measure respectively as follows: total length, 280, 310, 340; tail, 150, 170, 180.

The skull, particularly in the old specimens, is very broad and heavy, with the supraorbital ridge very heavy and broadly overhanging the orbits. Total length (type), 36; condylo-basal length, 30; zygomatic breadth, 20; interorbital breadth, 7; mastoid breadth, 13; length of nasals, 14; upper toothrow, 6. Posterior border of nasals ending in a V-shaped point, opposite the front border of the orbit. Anterior palatal foramina short and broad, 5×2 mm. The skull in 4 specimens (one a young adult) averages, total length, 35.5; zygomatic breadth, 19.

O. ochraceus differs greatly from any other species of *Oryzomys* known to me. A marked feature is its heavy soft pelage, which has a length on the back of about 15 mm., the basal four-fifths of which is deep plumbeous, the hairs individually tipped with rufous, mixed with others tipped with black. On the ventral surface the basal part of the pelage is grayish plumbeous, the surface heavily washed with deep buff or pale yellow. In external measurements it is much smaller than *O. devius* Bangs, from Chiriqui, and differs from it markedly in coloration, in the character of the pelage, and in the form of the skull (compared with topotypes of *O. devius*). From *O. talamancæ* Allen (compared with the type) it differs in much larger size and in coloration. It also appears quite distinct from any species thus far known from Guatemala or Mexico.

[I take the present opportunity to describe a strongly marked new species of *Oryzomys* from Costa Rica, collected by M. A. Carriker, Jr., in 1904, as follows:

***Oryzomys carrikeri* sp. nov.**

Type, No. 25976, ♀ ad., Rio Sicsola, Talamanca, Costa Rica, August 18, 1904; M. A. Carriker, Jr., for whom the species is named.

Pelage very short, fine, soft and velvety. Sides, from nose to rump, ochraceous brown; back dark brown suffused with ochraceous; below, from chest to base of tail, uniform gray — dark gray in worn pelage, gray washed with whitish in fresh pelage; chest and throat whitish — nearly white in fresh pelage; ears of medium size, dark brown, almost naked; fore feet whitish, hind feet flesh color, nearly naked; tail practically naked (all the scales distinctly visible), dull brown above, lighter below, especially on the basal fourth.

Total length (type), 265 mm.; tail, 133; hind foot, 30.5 (collector's measurements). Two other specimens measure respectively: ♂ ad., 248, 121, 29.5; ♀ juv. ad. (a nursing female), 240, 118, 30. Skull (type), total length, 31.5; condylo-basal, 26; zygomatic breadth, 14.7; interorbital, 5; mastoid, 11.2; nasals, 12; upper molariform series, 5. The adult male skull gives essentially the same measurements; the young adult female skull is about 2 mm. shorter, with the other dimensions in proportion. The nasals extend posteriorly considerably beyond the premaxillaries and end in an obtusely V-shaped point. The supraorbital ridges are well-developed; the anterior palatine foramina are narrow anteriorly and diverge posteriorly, the two foramina forming a V-shaped opening.

Represented by three specimens, all from the type locality and all collected August 18, 1904, by Mr. M. A. Carriker, Jr.

Oryzomys carrikeri belongs to the same group as *O. alfaroi* of Costa Rica, *O. gracilis* of Ecuador, *O. velutinus* of northeastern Colombia, and *O. villosus* of Trinidad. It differs from *O. alfaroi* in its much darker coloration above, suffused with ochraceous instead of pale yellow, and in being nearly twice larger. In size and coloration it approaches *O. villosus* and *O. velutinus*, especially the latter, some of the adult topotypes of which are almost indistinguishable in coloration from *O. carrikeri*, but the ears in both the Trinidad and Colombian species are fully twice the size of those of *carrikeri*, while the cranial differences are strongly marked.

O. talamancae, also from Talamanca, belongs to a quite different group,¹ in a general way resembling *O. costaricensis*, but about twice the size of that species.]

32. *Sigmodon hispidus griseus* subsp. nov.

Type, No. 28497, ♂ ad., Chontales (in the coast lowlands), Nicaragua, Feb. 20, 1908; W. B. Richardson.

General color above dark gray; underparts whitish gray. Middle of dorsal region, from front of eyes to base of tail, gray, heavily lined with black; sides lighter, more yellowish gray and less varied with black; feet gray; tail blackish brown above, somewhat lighter below, very slightly haired.

Three adults (collector's measurements), total length, 280–300 mm.; tail, 110–130; hind foot (skin), 31.

This form differs from *S. h. borucae*, its nearest known geographical ally, in the gray color of the dorsal surface, which agrees almost exactly with that of average specimens of *S. h. littoralis* from Florida, to which in coloration it bears a striking resemblance. It further differs from *borucae* in the form of the skull, which is much broader in proportion to the length. Thus, in comparable skulls, the total length in *griseus* is 37 mm., with a zygomatic breadth of 21.5; in *borucae* these measurements are respectively 38 and 20.5. The pelage of *griseus* is harsher and coarser than in *borucae*.

Of the 9 adult specimens in the present series 7 are gray like the type above described, while one has a slight suffusion of rufous, but much less than average specimens of *borucae*. The other adult specimen is in abnormal pelage, which in both color and texture greatly resembles that of a half-grown brown house rat (*Mus norvegicus*). The two young examples (nurslings) are much darker than *borucae* of corresponding age, and the suffusion is pale fulvous instead of rufous.

¹ I am indebted to Dr. M. W. Lyon, Jr., Assistant Curator, Division of Mammals, U. S. National Museum, for an opportunity to reexamine the type of *O. talamancae* in the present connection.

33. *Ototylomys fumeus* sp. nov.

Type, No. 28291, ♂ ad., Matagalpa, Nicaragua, March 18, 1907; W. B. Richardson.

Above dusky gray brown, darkening on the middle of the back to blackish brown; below pure white, the pelage short, thick and soft; outside of limbs like the dorsal surface, as far as the base of the toes, which are whitish with a dusky spot at the base; inside of limbs pure white to the base of the toes; ears dusky brown, apical three-fourths naked, not larger than is usual in *Neotoma*; tail naked, the scales large and smooth, black, slightly lighter on ventral surface.

Total length (type), 330 mm.; tail vertebrae, 140; hind foot, 30 (collector's measurements). Four adult specimens (1 ♂, 3 ♀) measure: Total length, 320 (300–330); tail, 148 (140–170 — only one 170). Skull (type, ♂), total length, 42; condylo-basal length, 38; zygomatic breadth, 21; length of nasals, 14. An adult female, total length, 42; condylo-basal, —; zygomatic breadth, 21.5; nasals, 15. (The five other skulls are too much broken or are too immature for measurement).

Represented by 7 specimens, of which 4 are fully adult with worn teeth, the others immature. The half-grown young are dark grayish brown above, heavily washed with black; below white. Five were taken at Matagalpa, one at Ocotal and one at Volcan de Chinandega. It thus appears to range from about 4000 to about 6000 feet.

This species is much larger than the other known forms of the genus (from Yucatan and Campeche), with a relatively shorter tail, smaller ears, and absence of fulvous suffusion, the skull being 4 mm. longer, and the head and body about 30 mm. longer than in *Ototylomys phyllotis* Merriam (type of the genus) from Yucatan, while *O. p. phæus* Merriam, from Campeche, is still smaller.

In the unworn teeth, both upper and lower, the tubercles of the crown are placed directly opposite, three pairs on m 1, two pairs on m 2, and two pairs on m 3, which has a posterior loop in both upper and lower series. When worn down the pattern is much as in *Zygodontomys*.

A striking feature of the tail is the great width of the smooth, black annulations, wholly unconcealed by hairs.

34. *Rhipidomys salvinii* (Tomes). Two specimens, referred provisionally to this species, both taken at Ocotal, in the highlands of northern Nicaragua, Feb. 18 and May 9, 1908; both adult males. They seem to agree in every particular with Tomes's description, based on specimens from Dueñas, Guatemala.

35. *Peromyscus nicaraguæ* sp. nov.

Type, No. 28282, ♂ ad., Matagalpa (altitude about 4000 feet), Nicaragua, March 10, 1907; W. B. Richardson.

Similar in coloration to *P. nudipes* (Allen) from Central Costa Rica, but wholly

lacking the brown pectoral spot so conspicuous in *nudipes*; sides paler and much less golden; ventral surface clear white; it is also much smaller with the skull relatively narrower.

Total length (type), 240 mm.; tail vertebrae, 110. Average of 10 adults from Matagalpa, total length, 235 (220–250); tail, 113 (110–130). Skull (type), occipitonasal length, 33.5; width of braincase, 13. Six Matagalpa specimens, occipitonasal length, 32.3 (31–33.5); width of braincase, 13.3 (13–13.5). Ten adult specimens from San Rafael del Norte and Ocotal present the same averages and ranges of variation. (The type is one of the oldest and the largest specimen of the series).

Compared with a similar number of adults of *P. nudipes*, the average differences are as follows: Total length, *P. nudipes*, 260 (255–265); tail vertebrae, 126 (120–135); skull, occipitonasal length, 34 (33–35); width of braincase, 14 (13.7–14.3). Thus *P. nicaraguae* is about an inch shorter, with the tail half an inch shorter, the skull about 2 mm. shorter and nearly a millimeter narrower across the braincase. The ptergoid fossa in *nudipes* is conspicuously narrower and relatively longer.

This species is represented by about 40 specimens, of which 20 are from Matagalpa, 7 from San Rafael del Norte, and several from Ocotal, Volcan de Chinandega, and 13 from Chontales, the latter unfortunately nearly all young.

36. *Mus rattus* *Linnaeus*. Three specimens, all immature. Two are from Matagalpa, Sept. 22, 1907, and one from Lavalá, Oct. 12, 1907.

37. *Sciurus boothiae belti* *Nelson*. Six specimens: Matagalpa, 3 specimens, Jan. 31, Feb. 1, March 7, 1907; Lavalá, 1 specimen, Oct. 18, 1907; Chontales, 2 specimens, Feb. 15, 1908.

In five of the specimens the ventral surface is deep rusty rufous, with small irregular patches of white, either on the breast or abdomen or on both, with a median line of white in one. The other (a female) has the ventral surface much paler — yellowish rufous — with a small patch of white on the breast, lower abdomen, and in each axilla.

38. *Sciurus griseoflavus* (*Gray*). Six specimens are provisionally referred to this species. They fall into two groups, both geographically and in coloration: Matagalpa, 3 specimens, Sept. 12, 17, and 28, 1907; Volcan de Chinandega, 2 specimens, May 12, 1907; San Rafael del Norte, 1 specimen, April 7, 1907.

In the Matagalpa specimens, the dorsal surface is pale buffy gray in two, varied with black; in the other the black wash is the prevailing color, and the buffy suffusion is much stronger. The ventral surface in two is mainly white, with a lateral band of yellow extending along the lower edge of the flanks from the head to the base of the tail, and including also the inner surface of both fore and hind limbs; in the other the ventral surface (including

inside of limbs) is deep ochraceous yellow, with broad areas of white on the chest and lower abdomen, connected by a narrow median line of white. The fluffy patch at the base of the ears varies from nearly white to clay color.

The two specimens from Volcan de Chinandega have the dorsal surface nearly as in the darkest Matagalpa specimen, black strongly prevailing; the ventral surface in one is pale buffy gray, with patches of white on the breast, axillæ and lower abdomen; in the other the ventral surface is pure white on the neck, breast, proximal half of inner surface of the fore limbs, and on the abdomen, irregularly mottled with patches of pure white and buffy gray, with the hind limbs and feet black.

The single (rather young) example from San Rafael del Norte is like the Volcan de Chinandega specimens, except that the whole ventral surface and inside of the limbs is pure white.

The tail in all is black washed with white, with a slight tendency to a grizzled buffy gray median band on the ventral surface.

It is quite probable that the Volcan de Chinandega specimens represent a geographical form different from that found at Matagalpa, and different from the true *S. griseoflavus*.

39. *Sciurus richmondi* Nelson. Three specimens: Chontales, 2 males, Feb. 26, 1908; Rio Grande, 1 male, March 23, 1908. These specimens were taken not far from the type locality of the species.

40. *Sciurus deppei matagalpæ* subsp. nov.

Type, No. 28440, ♀ ad., San Rafael del Norte, Nicaragua, April 10, 1907; W. B. Richardson.

Differs from *S. deppei deppei* in the color of the upper parts, which are yellowish brown instead of rusty brown; underparts yellow, varying in different specimens from pale buff to ochraceous, but generally ochraceous yellow instead of white or grayish white. In size and cranial characters similar to *deppei*.

Represented by six specimens, of which four are from Matagalpa, Feb. 1, and Sept. 1, 1907, and two from San Rafael del Norte, April 10, 1908. They are all uniformly yellowish brown instead of rufous brown above, and strongly ochraceous below. The fore limbs are grayish varying to deep iron gray in some; the tail is washed lightly with white.

41. *Lutra latidens* sp. nov.

Type, No. 28435, ♂ ad., Lavalá, Matagalpa, Nicaragua, Oct. 28, 1907.

Distinguished from its near allies by large size, and especially by the massive dentition.

Pelage short and thin; color above dull rather dark uniform brown; below,

from chin to behind fore legs, pale fulvous; rest of lower parts pale brown, without distinct rufous suffusion. Nose pad rounded above, as in the Central and South American forms of *Lutra*, not rising into a broad V-shaped point as in the *L. canadensis* group. External measurements, as taken by the collector from the fresh specimen, total length, 1280 mm., tail vertebræ, 490.

The skull is unfortunately broken into small pieces and is thus unavailable for a complete series of measurements. Length of upper molar-premolar series, 37; lower molar-premolar series, 37.5; p^4 , on outer side, 13; width at middle, 10.5; oblique length (diagonally from the antero-internal point of lobe to postero-outer angle), 15; p_3 , length, 16; width at middle, 8; width near posterior border, 7.6; length of lower jaw, 72; breadth of condyle, 19.2; height at coronoid, 33.4; angle to top of condyle, 12. Bullæ broad and flat.

This form differs from *L. annectens* Forsyth-Major, in its much larger size and in the relatively much greater size of the teeth, the upper premolar-molar tooththrow having a length of 37 mm., while the same measurement in a nold male *annectens* is 31; the oblique length of p^4 is 15 and in *annectens* 13, with corresponding differences throughout the dental series. There is also a marked difference in the form of the individual teeth, especially in respect to p^4 and m^1 , which in *latidens* much more resemble the corresponding teeth of large northern examples of the *L. canadensis* group, but they are much more massive.

42. ***Putorius tropicalis* Merriam.** Three specimens, all taken at Matagalpa (Jan. 23, 1906, May 4, 1906, and Feb. 7, 1908), and all sexed as male by the collector. Provisionally referred as above.

These specimens, all from the same locality and all of the same sex, present a wide range of variation in color, especially of the ventral surface. In one (No. 28333), the lower surface is nearly white from the thoracic region to the chin, passing posteriorly into pale ochraceous. The brown of the upper parts wholly covers the fore limbs from the toes to the elbows. The white frontal spot is reduced to a narrow transverse line, and the white spot between the ear and eye is reduced to a narrow line. The black below and in front of the eye encroaches upon the sides of the throat. No. 28592 has the white facial markings very broad; the anterior part of the ventral surface is strongly yellow, passing posteriorly into ochraceous, and extending down the inner surface of the fore limbs nearly to the toe pads. There is a distinct black spot on each side of the throat, behind the angle of the mouth, separated from the black of the cheeks by a narrow white line. No. 28322 has the white facial markings of normal extent, and the edge of the upper lip broadly white posteriorly; the under parts are deep ochraceous, becoming lighter on the fore neck and whitish on the chin and upper throat. There is a large brown spot on the inside of the left thigh.

Only one of the specimens is adult, and this is not 'old'. Of this the

collector's measurements are: total length, 420 mm., tail vertebrae, 150; hind foot, 50.

43. *Tayra*¹ *barbara inserta* subsp. nov.

Type, No. 28492, ♂ ad., Uluce, Department of Matagalpa, Nicaragua, Jan. 5, 1908; W. B. Richardson.

Body, limbs, and tail black, the black extending forward on the ventral surface to the throat; head and neck duller, brownish black; no trace of a white or yellow spot on the fore-neck.

Size small; skull narrow; zygomatic arches much less expanded than in other members of the *Tayra* group. Skull (type), condylo-basal length, 110 mm., zygomatic breadth, 69. Unfortunately external measurements from the fresh specimens are not available.

Represented by four specimens, all from the Province of Matagalpa, taken as follows: Lavala, Oct. 13, 1907, young male; Uluce, Jan. 3 and 5, 1908, two young adult males and an adult male (type).

Except in smaller size, less expansion of the zygomatic arches and total absence of a light spot on the fore-neck, this form closely resembles *T. barbara biologie* (Thomas) from Panama. The old male skull is slightly smaller than a female skull of corresponding age of *biologie*, and very much smaller than male skulls of that form. Costa Rica specimens are intermediate in respect to the throat-spot; in a series of 4 from Talamanca it is wholly absent in two, very slight in one, and greatly reduced in the other.

The Matagalpa series of *tayras* is of interest as presenting a form in which the usual light spot on the fore-neck is wholly absent, in contrast with all the other forms, and especially with the Colombian form (*T. barbara irara* Allen), which has usually in addition to the fore-neck spot another similar mark on the withers. (Cf. this Bulletin, XX, 1904, pp. 36-38.)

44. *Spilogale angustifrons elata* Howell. One specimen, adult male, Matagalpa, Sept. 28, 1907.

45. *Mephitis macroura vittata* (Licht.). One specimen, adult male, Matagalpa, Dec. 30, 1908.

46. *Potos flavus aztecus* Thomas. Two specimens, both adult males, Ocotal, May 11, 1908. They closely resemble Mexican examples.

47. *Bassaricyon richardsoni* sp. nov.

Type, No. 28486, ♀ ad., Rio Grande (altitude below 1000 feet), Atlantic slope, Nicaragua, April 9, 1908; W. B. Richardson, for whom the species is named.

General color above pale fulvous, strongly varied with black-tipped hairs, which

¹ For the use of *Tayra* in place of *Galera*, see *antea*, pp. 586-589.

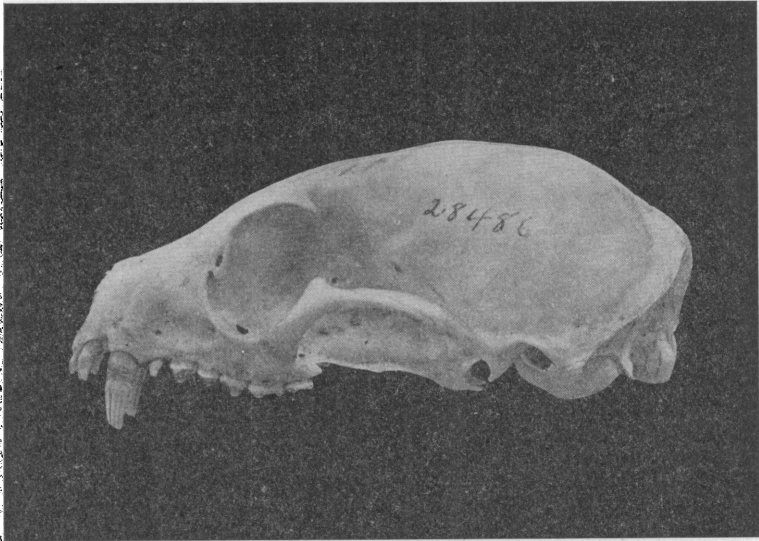


Fig. 5. *Bassaricyon richardsoni*. Type No. 28486, ♀ ad., Rio Grande, Nicaragua. Nat. size.

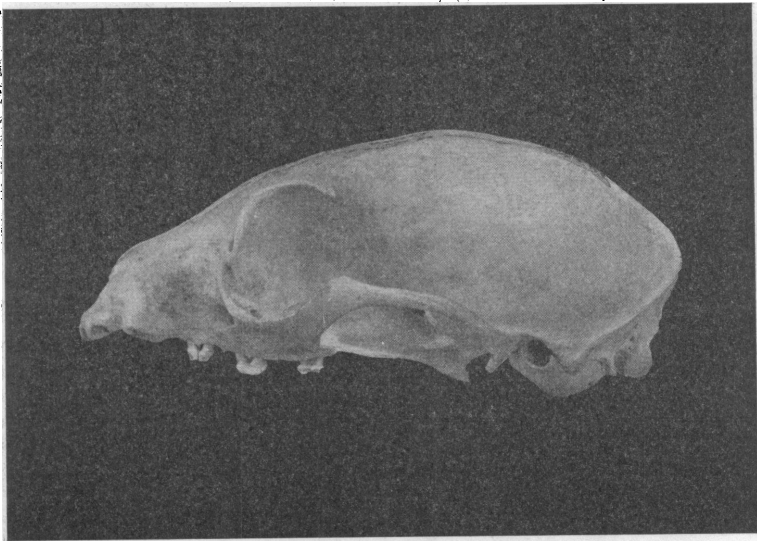


Fig. 6. *Bassaricyon gabbi*. Type, No. 14214 U. S. Nat. Mus. Talamanca, Costa Rica. Nat. size.

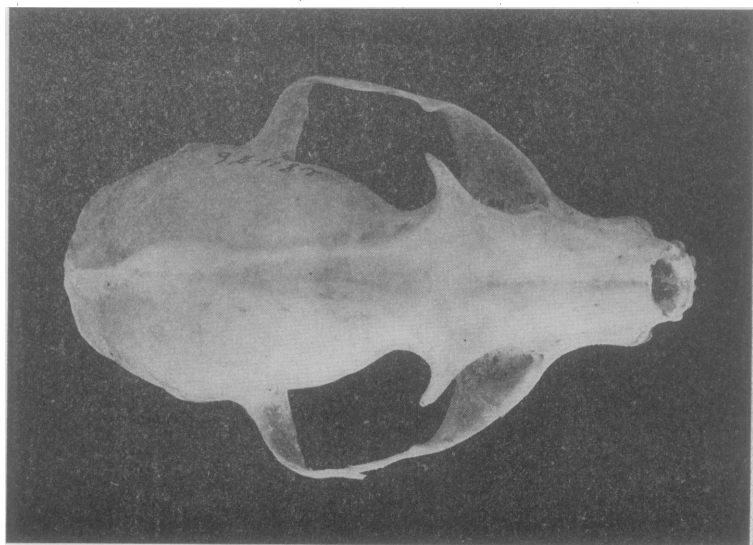


Fig. 7. *Bassaricyon richardsoni*. Same skull as shown in Fig. 5. Nat. size.

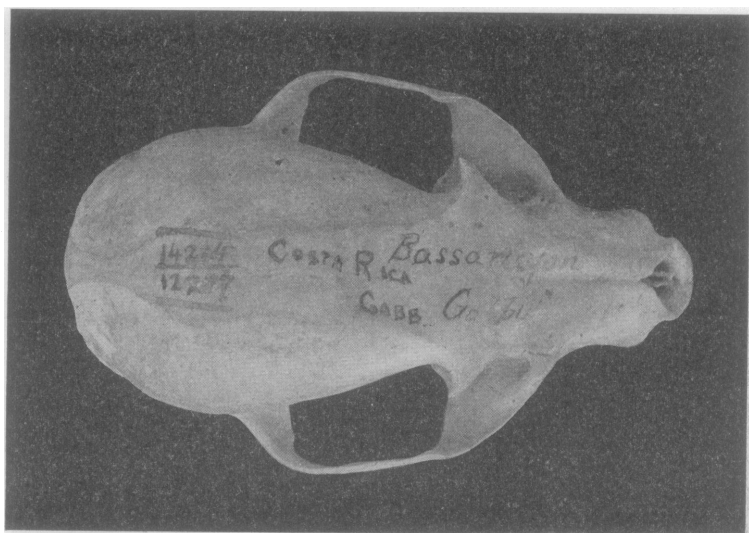


Fig. 8. *Bassaricyon gabbi*. Same skull as shown in Fig. 6. Nat. size.

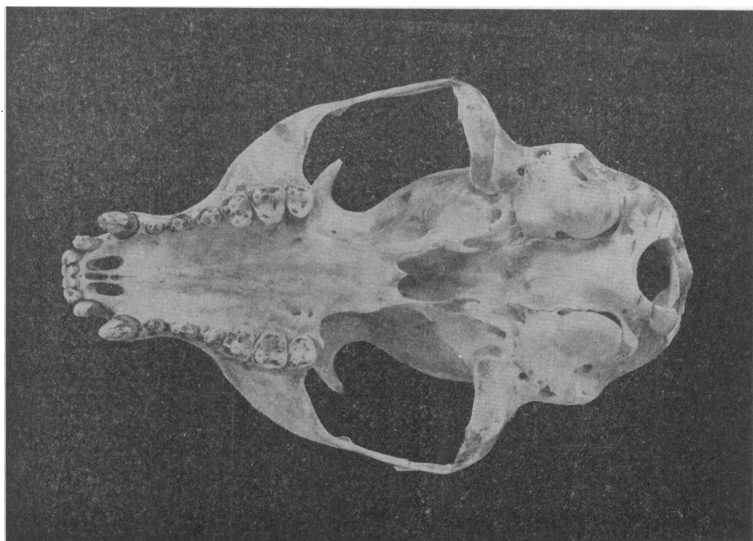


Fig. 9. *Bassaricyon richardsoni*. Same skull as shown in Figs. 5 and 7. Nat. size.

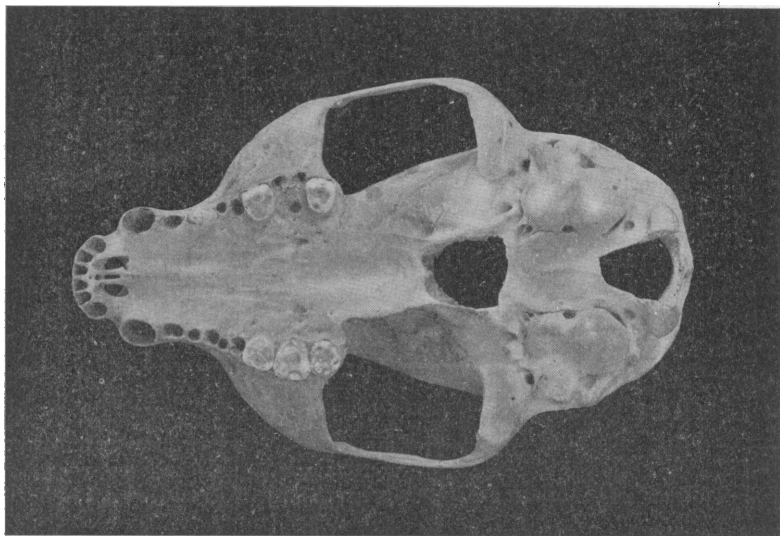


Fig. 10. *Bassaricyon gabbi*. Same skull as shown in Figs. 6 and 8. Nat. size.

along the median dorsal area give a prevailing blackish tone to the coloration from the forehead to the base of the tail; sides of body less varied with black, the prevailing color being pale fulvous; ventral surface uniform pale yellow from the fore neck to base of tail; limbs externally like the sides of the body and internally like the ventral surface; a patch below the ear, extending forward nearly to the eye, like the ventral surface; front of head anterior to the eyes, dull grayish brown, minutely varied with black-tipped hairs; sides of nose and chin dusky brown, passing on the throat into fulvous; tail like the body—pale fulvous, strongly varied on the median line above with black-tipped hairs, forming a poorly defined blackish median line, becoming blackish apically with the extreme tip nearly black

Total length, 950 mm.; tail vertebræ, 480; hind foot, 80 (collector's measurements); hind foot with claws, 85. Skull, condylo-basal length, 80.5; basilar length, 73; palatal length, 45; zygomatic breadth, 53; interorbital breadth, 17; width across orbital processes, 32; postorbital breadth, 17.5; breadth at base of canines, 17; mastoid breadth, 34.3; length of upper toothrow, excluding incisors, 28; molar series, 12; lower jaw, length, 58; height at condyle, 11; height at coronoid process, 25.5; lower toothrow, excluding incisors, 30; premolar-molar series, 25.

The type of *B. richardsoni* is, so far as known to me, the sixth known specimen of the genus *Bassaricyon*, which was originally based on a skull, without skin, collected by the late Professor Wm. M. Gabb in Talamanca, Costa Rica.¹ The second known specimen is the type of *Bassaricyon alleni*



Fig. 11.

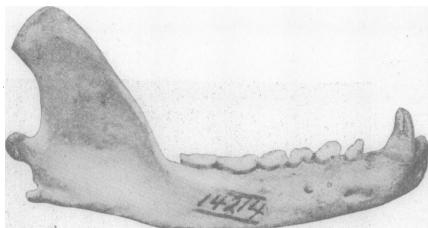


Fig. 12.

Fig. 11. *Bassaricyon richardsoni*. Same skull as shown in Figs. 5, 7, and 9. Nat. size.

Fig. 12. *Bassaricyon gabbi*. Same skull as shown in Figs. 6, 8, and 10. Nat. size.

Thomas, from Sarayacu, Ecuador, collected by Mr. Clarence Buckley.² In 1883, M. Huet described and figured two specimens of *Bassaricyon*, received at the Paris Museum of Natural History, from "Caimito, province de Correo, au nord de Panama," an adult female and a young example (last molar undeveloped).³ These two specimens were described in great

¹ 'Description of a new Generic Type (*Bassaricyon*) of Procyonidæ from Costa Rica. By J. A. Allen. Proc. Acad. Nat. Sci. Phila., 1876, pp. 20-23, pl. i. What was erroneously supposed to be the skin belonging to this skull was subsequently described and figured (Proc. Acad. Nat. Sci. Phila., 1877, pp. 267, 268, pl. ii), the mistake being fully explained later (Bull. Geogr. and Geol. Surv. Terr., Vol. V, No. 2, Sept., 1879, p. 169).

² 'On Mammals from Ecuador.' By Oldfield Thomas. Proc. Zool. Soc. London, 1880, pp. 393-403, pl. xxxviii, text figs. 1-4. (*B. alleni*, pp. 397-400, figs. 1-4, pl. xxxviii.)

³ 'Note sur les Carnassiers du genre *Bassaricyon*. Par M. Huet, Aide-Naturaliste. Nouv. Arch. du Mus. d'Hist. Nat. de Paris, 2^e sér., Vol. V, 1883, pp. 1-12, pl. i-iii.

detail, and a colored plate of the animal and figures of the skulls of both specimens were given, this important memoir forming the entire basis of our present knowledge of the external characters of *Bassaricyon gabbi*.¹

In March, 1894, a specimen of *B. alleni* (the second known) was received alive at the Menagerie of the London Zoölogical Society, presented by Mr. A. Murray as a kinkajou, and thus at first entered in the records of the Society.² It was said to have been "captured in the woods at Bastrica on the Essequibo River, British Guiana," but, as noted below, there seems reason to doubt the correctness of the assigned locality. It lived for several years in the Society's Menagerie, where I had the pleasure of seeing and handling it in 1896. After its death, some years later, Mr. F. E. Beddard published a valuable paper on its anatomy.³

M. Huet believed that *B. gabbi* and *B. alleni* were both referable to the same species, the differences between the two pointed out by Thomas being, according to his view, merely individual. In support of this opinion he cited the wide range of variation presented by the kinkajou. His conclusions, however, prove not to have been well founded.

The color of *B. gabbi*, as described and illustrated by Huet, is golden brown above and lighter, more yellow below;⁴ it is thus very different from that of either *B. alleni* or *B. richardsoni*, as are also the cranial characters.

Bassaricyon richardsoni, contrary to what might be expected, much more resembles *B. alleni* than it does *B. gabbi*, by which *B. richardsoni* and *B. alleni* are geographically separated, both externally and in the character of the skull. As shown by Thomas's colored plate and description, *B. alleni* has the face clear gray, instead of brown as in *B. richardsoni*, and the general color of "body and tail orange gray, the hairs of the back being tipped with black," instead of pale fulvous gray strongly washed with black. The skull is quite similar in the two species, as regards proportions and general form, both, however, differing widely and similarly from *B. gabbi*. But *B. alleni* and *B. richardsoni* differ markedly in the character of the last upper molar, which in *B. alleni* is much reduced in size and triangular, instead of being circular in outline and much larger.

The teeth of *B. gabbi* and *B. richardsoni* agree essentially in relative

¹ The exact locality of the type specimen of *Bassaricyon* was not given in the original description, but I have recently learned from Dr. M. W. Lyon, Jr., Assistant Curator, Division of Mammals, U. S. National Museum, that it came from Talamanca, on the southeast coast of Costa Rica, and therefore very near the locality of the Paris Museum specimens, which are thus almost topotypes of *B. gabbi*.

² Cf. Proc. Zool. Soc., London, 1895, p. 521.

³ "On the Anatomy of *Bassaricyon alleni*." By Frank E. Beddard, M. A., F. R. S., Prosector and Vice-Secretary of the Society. Proc. Zool. Soc. London, 1900, pp. 661-775, figs. 1-7.

⁴ He says: "... le sinciput, la moitié supérieure du cou, les flancs et le dos jusqu'à la base de la queue, les parties externes des membres jusqu'aux extrémités, sont brun roux. Le dessus des extrémités antérieures et postérieures est roux doré. Les parties inférieures en partant du menton, la gorge, le ventre et les parties internes des membres, sont beaucoup plus claires, les poils étant blanc jaunâtre à la base, roux doré clair au milieu et blanc jaunâtre à la pointe...."

size and form, but the skull in the two species is markedly different in contour and in details, as is well shown in the accompanying figures of the type skulls of each (Figs. 5-12). The anterior base of the zygoma is much lower in *B. gabbi* than in *B. richardsoni* and less arched upward; the postpalatal region is shorter and broader, as is also the postpalatal fossa and the pterygoid processes; the bullæ are shorter and more inflated; the rostrum descends much more abruptly and the anterior narial opening is lower and more oblique; the coronoid process is narrower, shorter, and directed less backward.

As now known, *Bassaricyon* is represented by three well marked species, inhabiting respectively the eastern lowlands of Nicaragua, the lowlands of southeastern Costa Rica and adjoining parts of Panama, and the vicinity of Sarayacu, Ecuador, east of the Andes and well within the upper drainage of the Amazon. If the British Guiana record for *B. alleni* be correct, the group may have a wide range in South America; in which case it seems strange that it has been so long overlooked, and that so few South American examples of it have thus far been obtained. As long since made known by Thomas, Huet, and Beddard, *Bassaricyon* bears a close resemblance externally to the kinkajou, although much smaller and with a non-prehensile tail. It may thus readily be mistaken by collectors and travellers for a young kinkajou.

48. *Nasua narica bullata* Allen. Three specimens, males, Laval, Oct. 12, Tuma, Nov. 29, 1907, and Ocot, May 7, 1908.

49. *Urocyon cinereoargenteus guatemalæ* Miller. One specimen, adult male, Matagalpa, April 20, 1906.

This is one of the smallest specimens of *Urocyon* that has thus far come under my notice, or of which measurements have been published. It is a male, fully adult, as shown by the skull. No external measurements were taken by the collector, and the occipital part of the skull, including most of the braincase, is lacking, rendering the skull measurements incomplete. The palatal length, zygomatic and interorbital breadth, and the breadth across the postorbital processes are practically the same as in the type of *Urocyon parvidens* Miller, from Merida, Yucatan, while the measurements of the teeth correspond exactly with those of *parvidens*. It is much smaller than a female of *U. guatemalæ* Miller (type locality, Nenton, Guatemala), of corresponding age, from Pozo Azul, Costa Rica.

While the present specimen may represent a dwarfed form peculiar to the interior of Nicaragua, it seems better to refer it to its nearest geographical ally rather than to the more distant Yucatan form (*parvidens*), or than to make it the basis of a new name.

50. *Blarina olivaceus* sp. nov.

Type, No. 28356, ♀ ad., San Rafael del Norte (altitude about 5000 feet), Nicaragua; W. B. Richardson.

One of the smallest known species of the genus. Total length, 80 mm.; tail, 17; hind foot, 10. Above grayish brown, with a distinct olivaceous reflection in certain lights; below much lighter, the surface whitish gray, with the same olivaceous reflection as above; feet whitish; ears small, concealed in the pelage; tail with a dusky median line above, sides and below gray.

The skull is imperfect, lacking the parietal and occipital portions. Compared with *B. orophilus* Allen, from Costa Rica, the rostral and interorbital portions of the skull are much narrower and more elongate, the toothrow straight instead of convex outward; the molariform teeth much narrower and the whole dentition weaker. The lower jaw is correspondingly more slender, with narrower and smaller teeth, and the coronoid portion noticeably more slender.

Represented by two specimens, one of them without label or skull, but without doubt from the same locality as the type.

Blarina olivaceus is very unlike any of the species known from Costa Rica and Guatemala; all of the Mexican species are much larger, and otherwise different, except *B. pergracilis* Elliot, from Ocotlan, State of Jalisco, Mexico, which it evidently much resembles in size, slenderness, and coloration, but for geographical reasons it can hardly be specifically the same.

51. *Rhynchiscus naso* (Wied). Seven specimens, Tuma, Nov. 22, 1907.

52. *Peropteryx canina* (Wied). One specimen, Lavalá, Oct. 17, 1907.

53. *Hemiderma perspicillatum aztecum* (Saussure). Eleven specimens, Volcan de Chinandega, May 6-12, 1907.

54. *Artibeus jamaicensis richardsoni* sp. nov.

Type, No. 28335, ♂ ad., Matagalpa, Nicaragua, Jan. 3, 1906; W. B. Richardson.

Similar in coloration to *A. intermedius* Allen, but very much smaller. Forearm 53 mm. (in *intermedius* 65); 3d metacarpal, 50 (in *intermedius* 57); tibia 20 (in *intermedius*, 22). A faint whitish stripe from base of nose-leaf to ear.

Skull long and narrow, the brain-case low, not high and vertically expanded as in *intermedius*; palatal region narrower and more depressed, the posterior nares consequently both narrower and shallower; middle incisors relatively larger than in *intermedius*, in comparison with the outer incisors. Total length of skull 29 mm. (as in *intermedius*); zygomatic breadth 17 (19 in *intermedius*); greatest depth of skull, 11 (12 in *intermedius*); mastoid breadth, 15 (16 in *intermedius*). Dentition weaker and teeth narrower. Lower jaw much weaker, less bowed outward, and the coronoid vertical instead of directed outward. Zygoma slenderer and less bowed

outward. The dorsal outline of the skull is much as in *Artibeus jamaicensis jamaicensis*; but the skull is narrower, and the dentition heavier, especially the upper incisors.

Represented only by the type, from Matagalpa. A well defined form, recognizable by its small size, and by the narrow, elongated form of the skull and low cranium.

55. **Desmodus rotundus** (*Geoffroy*). Two specimens, Volcan de Chinandega, May 6 and 9, 1907.

56. **Molossus rufus** *Geoffroy*. One specimen, Volcan de Chinandega, May 11, 1907.

57. **Cebus hypoleucus** (*Humboldt*). Four specimens, 2 males and 2 females, all adult, and the skull of another specimen, taken at Lavala, Oct. 6, 1907, Chontales, Feb. 18, and Ocotal, May 11, 1908.

58. **Ateles geoffroyi** *Kuhl*. Four specimens, — three old females and a nearly adult male, Lavala, Oct. 2 and 8, Tuma, Nov. 29, and Uluce, Dec. 31, 1907.

59. **Alouatta palliata matagalpæ** subsp. nov.

Type, No. 28426, ♂ ad., Lavala, Nicaragua, Oct. 13, 1907; William B. Richardson.

In size similar to *A. palliata palliata* and *A. palliata mexicana*, but quite different in color from either, the flank stripes being dark rufous instead of pale rufous or golden (*palliata*), or pale fulvous or grayish fulvous (*mexicana*); suffusion of back dark rufous instead of fulvous or grayish fulvous.

Type, total length, 1120 mm.; tail vertebrae, 620; hind foot, 145. Skull, total length, 107; condylo-basal length, 92; basilar length, 85; zygomatic breadth, 76.

Two specimens, both males, one adult, the other not fully mature, Lavala, Oct. 13, 1907. These specimens differ markedly in color from any in a large series from Panama, and are equally different from any in a considerable series from Vera Cruz, Mexico, and are not intermediate between them, being very unlike either in the rufous suffusion of the lower back and the dark rufous of the flank stripes.

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Dinichthys terrelli. A large Arthrodiran "fish" with piercing and shearing mouth parts, from the Devonian of Ohio.

Mounted skull, Neg. 47 (8×10 in.). Right of reproduction reserved.

Titanichthys clarkii. The biggest of the Arthrodiran "fishes" — Upper Devonian, Ohio.

Skull, slab-mount, top view. Neg. 1004 (11×14 in.). Not published. Right of reproduction reserved.

Portheus molossus. A sixteen foot fish from the Cretaceous of Kansas.

Neg. 72, with Tarpon (8×10 in.).

Neg. 73, with Tarpon (11×14 in.).

Neg. 75-78 (conjoined), about 3 feet 6 inches long and 13 inches wide; price, \$10.00.

Published; credit to American Museum and Henry Fairfield Osborn.

REPTILES.

Stereosternum tumidum. A small aquatic reptile of the extinct order Proganosauria. Permian, Brazil.

Skeleton in slab, Neg. (8×10 in.); Neg. (11×14 in.).

Restoration, Neg. — (8×10 in.).

Published; credit to J. H. McGregor.

Naosaurus claviger. A predatory reptile of the extinct order Pelycosauria with the back surmounted by a fin-like series of elongate neural spines. Permian, Texas.

Mounted skeleton, side view, Neg. 837 (8×10 in.); Neg. 836 (11×14 in.).

Mounted skeleton, three quarters view, Neg. 832 (8×10 in.); Neg. 836 (11×14 in.). Model, Neg. 829 (8×10 in.). All published; credit to American Museum and Henry Fairfield Osborn.

Backbone, with ribs and girdles. Neg. 1076 (8×10 in.); 1077 (11×14 in.). Not published; right of reproduction reserved.

Dimetrodon incisivus. This genus of Pelycosaurs differed from *Naosaurus* in the shape of the long neural spines of the vertebræ, which ended in delicate rods, and lacked cross bars.

Skull, backbone and ribs, side view, Neg. 1074 (8×10 in.); Neg. 1075 11×14 in. Not published; right of reproduction reserved.

Champsosaurus laramiensis. A small gavial-like aquatic reptile from the Upper Cretaceous of Montana; allied to the *Sphenodon* or rock-lizard of New Zealand.



Fig. 1. Restoration of a thirty-foot marine lizard (*Tylosaurus dyspeltor*) from the Cretaceous of Kansas. By Charles R. Knight.
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Mounted skeleton, side view, Neg. 91A (8 × 10 in.); Neg. 91B (11 × 14 in.).
Mounted skeleton, top view, Neg. 90A (8 × 10 in.); Neg. 90B (11 × 14).
Published; credit to American Museum and Barnum Brown.

Ichthyosaurus quadriscissus. Skeleton, with remains of seven supposedly unborn young. Jurassic, Germany.

Skeleton in slab, Neg. 96 (8 × 10 in.); Neg. 97 (11 × 14 in.). Neg. 94, 95 conjoined (11 × 28 in.), price \$5.00.

Restoration, Neg. R30A.

Published; credit to American Museum and Henry Fairfield Osborn.

Tylosaurus dyspelor. A marine lizard of the order Mosasauria, about 30 feet long.

Skeleton in slab, Neg. 101 (6½ × 8½ in.). Published; credit to American Museum and Henry Fairfield Osborn.

Restoration, Neg. R25 (8 × 10 in.). Not published, right of reproduction reserved.

Elasmosaurus platyurus. The restoration represents Professor Cope's idea of the appearance of this Upper Cretaceous Plesiosaur, but the extreme sigmoid curvature of the neck may be exaggerated.

Restoration, Neg. R14 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Ornitholestes hermanni. A small carnivorous dinosaur called the "Bird-catching Dinosaur."

Mounted skeleton, Neg. 116 (8 × 10 in.); Neg. 115 (11 × 14 in.).

Restoration, Neg. R42 (8 × 10 in.).

Published; credit to American Museum and Henry Fairfield Osborn.

Allosaurus fragilis. The skeleton of this predatory dinosaur is mounted in life-like pose, as if feeding upon the carcass (here represented by a partial skeleton) of a Brontosaurus.

Mounted skeleton, Neg. 1086 (8 × 10 in.); Neg. 1087 (11 × 14 in.). Not published; right of reproduction reserved.

Skull, Neg. 125 (8 × 10 in.).

Restoration, Neg. R28B (8 × 10 in.).

Published; credit to American Museum and Henry Fairfield Osborn.

Tyrannosaurus rex. The last and greatest of the carnivorous dinosaurs. Upper Cretaceous, Montana. The restoration also represents the three-horned dinosaur Triceratops.

Mounted pelvis and legs, Neg. 1088 (8 × 10 in.); Neg. 1089 (11 × 14 in.).

Mounted skull, Neg. 1091 (8 × 10 in.).

Restoration, Neg. R51 (8 × 10 in.). Not published; right of reproduction reserved.

Brontosaurus excelsus. The mounted skeleton of this great amphibious dinosaur measures 67 feet along the curve of the backbone. Upper Jurassic, Wyoming.

Mounted skeleton, Neg. 1094 (8 × 10 in.); Neg. 1095 (11 × 14 in.). Right of reproduction reserved.

Model, Neg. 149 (8 × 10 in.).

Restoration, Neg. R24 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Diplodocus longus. This dinosaur was larger and more slender than the Brontosaurus. The skull was even smaller and quite different in proportions. Upper Jurassic, Wyoming.

Model, Neg. 190 (8 × 10 in.).

Restoration, Neg. R29 (8 × 10 in.).

Published; credit to American Museum and Henry Fairfield Osborn.

Trachodon mirabilis. Two well preserved skeletons of the Duckbill Dinosaur (closely related to the well-known Hadrosaurus) are shown, mounted together in lifelike pose. Upper Cretaceous Montana and South Dakota.

Mounted skeleton, Neg. 1092 (8 × 10 in.); Neg. 1093 (11 × 14 in.). Not published; right of reproduction reserved.

Restoration, Neg. R17 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Triceratops serratus. Palatal view of a fine skull of a three-horned dinosaur, about six feet long. Upper Cretaceous Montana.

Neg. 197 (8 × 10 in.); Neg. 198 (11 × 14 in.). Published; credit to American Museum and R. S. Lull.

Triceratops. Model of animal.

Neg. 196 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Stegosaurus. A herbivorous quadrupedal dinosaur with a small head and with the back arched and surmounted by vertical triangular plates of bone. Upper Jurassic, Wyoming.

Restoration, Neg. R48 (8 × 10 in.). Published; credit to U. S. National Museum and F. A. Lucas.

MAMMALS.

EDENTATA.

Propalæohoplophorus minor. Carapace of a small Glyptodont from the Santa Cruz Miocene of Patagonia.

Neg. 245 (8 × 10 in.); Neg. 246 (11 × 14 in.). Published; credit to American Museum and W. B. Scott.

Glyptotherium texanum. A North American (Texas) representative of the Glyptodonts of the South American Pleistocene.

Neg. 248 (with armadillo) (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Metacheiromys tatusia. A Middle Eocene North American Armadillo.

Mounted skeleton, with armadillo. Neg. 814 (5×7 in.). Not published; right of reproduction reserved.

CARNIVORA CREODONTA.

Oxyæna lupina. A predaceous Creodont from the Lower Eocene of Wyoming, structurally ancestral to *Patriofelis*. In the restoration, an *Oxyæna* crouches over a prostrate Eohippus.

Mounted skeleton, Neg. 264 (8×10 in.); Neg. 265 (11×14 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Restoration, Neg. R32 (8×10 in.). Right of reproduction reserved.

Patriofelis ferox. A jaguar-like Creodont of the Middle Eocene of Wyoming, with highly specialized shearing teeth and short clawed feet.

Mounted skeleton, Neg. 268 (8×10 in.); Neg. 270 (11×14 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Restoration, Neg. R1 B. Not published; right of reproduction reserved.

Mesonyx obtusidens. A large Middle Eocene Creodont, with heavy wolf-like skull, bluntly tuberculated cheek teeth, and feet of the compressed running type. The restoration shows a *Mesonyx* feeding upon the skull of a *Uintatherium*.

Restoration, Neg. R10 (8×10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Harpagolestes sp. A much larger animal than *Mesonyx*, with a skull as large as that of a Grizzly Bear. Upper Eocene, Uinta.

Skull Neg. 1096 (8×10 in.). Not published; right of reproduction reserved.

Hyænodon horridus. An Oligocene Creodont with a long skull, long shearing cheek teeth, and feet of cursorial type.

Mounted skeleton Neg. 289 (8×10 in.); Neg. 290 (11×14 in.). Not published; right of reproduction reserved.

Sinopa rapax. A more primitive relative of *Hyænodon*, from the Middle Eocene of Wyoming. *Sinopa rapax* Leidy was the first Eocene carnivore described from the United States.

Mounted skeleton, Neg. 1084 (8×10); Neg. 1085 (11×14 in.). Not published; right of reproduction reserved.

Apterodon sp. An Upper Eocene Egyptian representative of the *Hyænodon* family.

Skull, side view, Neg. 1097 (8×10). Right of reproduction reserved.

CARNIVORA FISSIPEDIA.

Borophagus ("Dinocyon") gidleyi. A great Amphicyonine dog of the Upper Miocene of Texas.

Skull and neck, Neg. 294 (8×10 in.). Published; credit to American Museum and W. D. Mathew. Restoration of head Neg. —. Not published; right of reproduction reserved.

Dinictis squalidens. A Sabre-tooth "Tiger" of the Oligocene epoch somewhat resembling the modern Cheeta (*Cynælurus*) in proportions and probably also in habits. In the spirited restoration a *Dinictis* is seen pursuing a *Protoceras*.

Mounted skeleton (partial), Neg. 296B (8×10 in.). Published, credit American Museum and W. D. Mathew.

Restoration, Neg. R38 (8×10 in.). Not published; right of reproduction reserved.

Hoplophoneus primævus. This genus was an Oligocene forerunner of the great Sabre-tooth "Tiger" of the Pleistocene epoch.

Mounted skeleton, Neg. 299 ($6\frac{1}{2} \times 8\frac{1}{2}$ in.).

Restoration, Neg. R22. Right of reproduction reserved.

Smilodon neogæus. This South American Sabre-tooth "Tiger" of the Pampæan Pleistocene is represented by exquisite photographs of the mounted skeleton and by a striking restoration.

Skeleton, Neg. 305 (8×10 in.); Neg. 308 (11×14 in.).

Skull, Neg. 310 (8×10 in.); Neg. 311 (11×14 in.).

Restoration, Neg. R 31A (8×10 in.).

Right of reproduction reserved.

CETACEA.

Prozeuglodon. Restoration of a genus of Cetaceans related to the Zeuglodonts of the American Eocene and believed to represent the ancestors of the existing Dolphins and Whales, from the Upper Eocene of Egypt.

Restoration, Neg. —. Right of reproduction reserved.

CONDYLARTHRA.

Phenacodus primævus. This is the lower Eocene genus that the late Professor Cope regarded as representing the five-toed "atavus" of all the hoofed mammals.

Mounted skeleton, Neg. 326 (8×10 in.); Neg. 328 (11×14 in.). Restoration, Neg. R20 (8×10 in.). Both published; credit to American Museum and Henry Fairfield Osborn.

Phenacodus wortmani. This smaller species of *Phenacodus* was contemporaneous with, and allied to, *Phenacodus primævus*.

Mounted skeleton, Neg. 332 ($6\frac{1}{2} \times 8\frac{1}{2}$ in.). Right of reproduction reserved.

Meniscotherium terrærubræ. This Lower Eocene Condylarth was distinguished from *Phenacodus* by the much more elaborate pattern of the cheek teeth.

Mounted skeleton, Neg. 1065 (8 × 10 in.); Neg. 1066 (11 × 14 in.). Not published, right of reproduction reserved.

AMBLYPODA.

Pantolambda bathmodon. This Basal Eocene forerunner of *Coryphodon* retains evidences of derivation from some Creodont-like ancestor in the arched back, long tail, skull with powerful jaws and occipital crest. The skeleton is so far the only mounted skeleton of a Basal Eocene mammal.

Mounted skeleton, Neg. 335 (8 × 10 in.); Neg. 336 (11 × 14 in.).

Mounted skeleton, (with *Coryphodon*), Neg. 342 (8 × 10 in.); Neg. 343 (11 × 14 in.).

Model (with *Coryphodon*) Neg. 334 (8 × 10 in.).

All published; credit to American Museum and Henry Fairfield Osborn.

Coryphodon testis. A Lower Eocene hornless Amblypod of Europe and America, a forerunner of *Uintatherium*. These pachyderms suggest the Hippopotamus in the head and general proportions, but structurally were of a very different and archaic type.

Mounted skeleton (with *Pantolambda*, see above), Neg. 342 (8 × 10 in.); Neg. 343 (11 × 14 in.).

Model (with *Pantolambda*, see above), Neg. 334 (8 × 10 in.). Both published; credit to American Museum and Henry Fairfield Osborn.

Restoration, Neg. R 21 (8 × 10 in.). Right of reproduction reserved.

Uintatherium mirabile. The Uintatheres (Dinocerata of Marsh) of the Middle Eocene were the last and most specialized representatives of the small-brained, short-footed ungulate order Amblypoda. The long skull was surmounted by six bony protuberances; sabre-like canine tusks protruded from the upper jaw. The size was that of a large rhinoceros.

Mounted skeleton (of *Uintatherium mirabile*). Neg. 1070 (8 × 10 in.); Neg. 1071 (11 × 14 in.). Not published; right of reproduction reserved.

Restoration (of "*Loxolophodon*" *cornutus*), Neg. R 8 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

EMBRITHOPODA.

Restoration of the great pair-horned *Arsinoitherium zitteli* of the Upper Eocene of Egypt. The animal is shown confronting a herd of the contemporary carnivores called *Pterodon*.

Neg. — (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Arsinoitherium zitteli. Skull of a young individual of this great pair-horned pachyderm from the Upper Eocene of Egypt.

Neg. 1098 (8 × 10 in.). Right of reproduction reserved.

PROBOSCIDEA.

Mærittherium lyonsi. A very small and generalized structural ancestor of the elephants, scarcely falling within the limits of the order Proboscidea. Upper Eocene Egypt.

Skull, palatal view, Neg. 1104 (8×10 in.); side view, Neg. 1111 (5×7 in.). Right of reproduction reserved.

Palæomastodon wintoni and **Trilophodon productus.** Skulls (representing two stages in the evolution of the elephants) from the Upper Eocene of Egypt and the Upper Miocene of Texas.

Neg. 1039 (8×10 in.). Side view. Right of reproduction reserved. Published; credit to American Museum and Henry Fairfield Osborn.

Evolution of the Elephant. A group of restorations representing (1) *Mærittherium* and (2) *Palæomastodon*, ancestral Proboscideans from the Middle and Upper Eocene of Egypt, and (3) the Mammoth from the Pleistocene of the northern world.

Neg. — (8×10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Evolution of the head (tusks, trunk, etc.) in the Elephant. A group of restorations of the heads of *Mærittherium*, *Palæomastodon* and *Elephas* (Mammoth).

Neg. — (8×10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Trilophodon productus. A primitive four-tusked Mastodon from the Upper Miocene of Texas.

Skull and jaw, side view, Neg. 353 (8×10 in.). Not published; right of reproduction reserved.

Trilophodon productus and **Elephas imperator.** Models of two typical American Elephants, from the Miocene and Pleistocene respectively.

Neg. 368 (8×10 in.). Not published; right of reproduction reserved.

Mastodon americanus. The "Warren Mastodon" (mounted in 1907) is the most complete Mastodon skeleton known.

Skeleton, Neg. 1037 (8×10 in.).

Model, Neg. 1099 (8×10 in.).

Not published; right of reproduction reserved.

The "Whitfield Mastodon" is another well preserved skeleton.

Neg. 361 (8×10 in.); Neg. 364, mounting removed, (11×14 in.). Not published; right of reproduction reserved.

Elephas imperator. A very long pair of tusks and partly restored skull of the great Imperial Mammoth from the Pleistocene of Texas.

Skull and tusks, three quarters front view, Neg. 371 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Skull, palatal view with molars, Neg. 373 (8 × 10 in.). Right of reproduction reserved.

Model (see also *Trilophodon* above), Neg. 369. Published; credit to American Museum and Henry Fairfield Osborn.

Elephas columbi. A mounted skeleton of the Columbian Mammoth from the Pleistocene of Indiana, mounted in 1906. In this skeleton, as well as in the *Mastodon americanus* and *Elephas imperator* skeletons, the tusks are correctly mounted with the points turning more or less *inward*.

Mounted skeleton, Neg. 838 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

HYRACOIDEA.

Megalohyrax. Restoration of a large Hyracoid from the Upper Eocene of Egypt, with figures of the modern Hyrax and Black Rhinoceros (*Rhinoceros bicornis*).

Neg. — (8 × 10). Published; credit to American Museum and Henry Fairfield Osborn.

ARTIODACTYLA.

Elothierium imperator. A giant suilline Artiodactyl from the Upper Oligocene of South Dakota.

Restoration, Neg. R 6. (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Platygonus leptorhinus. A large Pleistocene Peccary from Kansas.

Mounted skeleton, Neg. 392 (8 × 10 in.); Neg. 393 (11 × 14 in.).

Restoration, Neg. R33 (8 × 10 in.).

All unpublished; right of reproduction reserved.

Hippopotamus madagascariensis. A skeleton of the Pigmy Hippopotamus of the Pleistocene of Madagascar is shown with a skull of a large *Hippopotamus amphibius*.

Neg. 395 (8 × 10 in.), 394 (11 × 14 in.). Not published; right of reproduction reserved.

Merycoidodon ("Oreodon") culbertsoni. Joseph Leidy, the discoverer of this well-known Oligocene genus, characterized it as a "ruminating hog." The cheek teeth are of the type seen in modern ruminants but the proportions of the body are more pig-like. The fore feet retain four complete digits and a reduced pollex, and thus in number as well as other characters realize the ancestral pattern of all even-toed hoofed mammals.

Mounted skeleton, Neg. 397 (8 × 10 in.); Neg. 396 (11 × 14 in.). Right of reproduction reserved.

Fore foot, Neg. 399 (4 × 5 in.). Published; credit to American Museum.

Merycochærus proprius. A large block, containing the scattered remains of a bull and four calves of this species, illustrates the condition in which fossil mammals are sometimes unearthed. *Merycochærus* was an even-toed hoofed mammal of the family Agriochæridæ ("Oreodontidæ") from the Miocene of the West. It was about as large as a pig, but with a more or less tapir-like proboscis and with cheek teeth of the ruminating type. Neg. 400 (8 × 10 in.). Published; credit to American Museum and W. D. Mathew.

Promerycochærus macrostegus. This John Day Oligocene Oreodont differed from *Merycochærus*, especially in its more elongate skull without proboscis.

Skull and jaw, side view, Neg. 408 (8 × 10 in.) ; skull, palatal view, Neg. 409 (8 × 10 in.).

Both published; credit to American Museum and W. D. Mathew.

Alticamelus altus. Skull, neck and limbs of a large Giraffe-like Camel of the Middle Miocene of Colorado.

Neg. 417 (8 × 10). Published; credit to American Museum and W. D. Mathew.

Protoceras celer. In this curious six-horned deer-like Artiodactyl of the Upper Oligocene of South Dakota the fore feet are of the primitive type, with four separate digits, while in the hind foot the number of toes is reduced to two.

Mounted skeleton, Neg. 419 (8 × 10 in.); Neg. 420 (11 × 14 in.). Right of reproduction reserved.

Restoration, Neg. R4 (8 × 10 in.). Published; credit American Museum and Henry Fairfield Osborn.

Restoration (with *Dinictis*), Neg. R 38 (8 × 10 in.). Not published; right of reproduction reserved.

Merycodus osborni. This delicately formed Miocene "deer-antelope" combined characters of the modern deer and antelopes, since it bore a pair of deciduous antlers like those of deer, but in its skull, teeth and skeleton resembled the antelopes.

Mounted skeleton, Neg. 427 (8 × 10 in.); Neg. 426 (11 × 14 in.). Published; credit to American Museum and W. D. Mathew.

Cervalces americanus. This American Pleistocene genus combined characters of the Moose (*Alces*) and of the Wapiti or "American Elk" (*Cervus canadensis*). It is distinguished from both by its peculiar antlers, which branched in three planes: outward, forward, and upward.

Restoration, Neg. R19 (8 × 10 in.). Right of reproduction reserved.

Megaceros hibernicus. A careful and beautiful restoration of the Irish Elk of the Pleistocene of Great Britain.

Restoration, Neg. R26B (8 × 10 in.). Right of reproduction reserved.

PERISSODACTYLA.

Adaptive radiation of the molar teeth in the Perissodactyla. In the centre of a series of concentric circles representing the different epochs from Eocene to Recent, is placed a small restoration of *Phenacodus primævus* which represents the probable appearance of the common ancestors of all the odd-toed hoofed mammals. From this radiate lines of fossil teeth showing the successive stages of modification in the Horse, Tapir, Lophiodont, Rhinoceros and Titanotheres families.

Neg. 1062 (8 × 10 in.). Right of reproduction reserved.

TITANOTHERIIDÆ.

***Palæosyops robustus*.** This genus represents one of the Middle Eocene stages of evolution of the Titanotheres family. The animal resembles a Tapir in proportions, but was larger and more robust, and lacked a long proboscis.

Mounted skeleton, Neg. 442 (8 × 10 in.); Neg. 444 (11 × 14 in.). Right of reproduction reserved.

Restoration, Neg. R11 (8 × 10 in.). Right of reproduction reserved.

***Brontotherium gigas*.** The Titanotheres were the dominant pachyderms of the Oligocene epoch and the larger varieties exceeded the largest Rhinoceroses in size. Above the eyes (which were very far forward) were two bony outgrowths from the skull, which in the largest species formed a pair of broad, flattened "horns."

Mounted skeleton, Neg. 531 (8 × 10 in.); Neg. 532 (11 × 14 in.).

Restoration, Neg. R. 7 (8 × 10 in.).

Skull, Neg. 537 (8 × 10 in.).

Published; credit American Museum and Henry Fairfield Osborn.

Four genera of Oligocene Titanotheres. Models of heads of *Megacerops*, *Titanotherium*, *Brontotherium*, *Symborodon*.

Side, front and top views. Neg. 448 (8 × 10 in.). Right of reproduction reserved.

Heads of four genera of Eocene Titanotheres. Models of heads of *Palæosyops*, *Telmatherium*, *Manteoceras*, *Dolichorhinus*.

Side view, Neg. 1055 (8 × 10 in.).

Top view, Neg. 1056 (8 × 10 in.).

Right of reproduction reserved.

RHINOCEROTIDÆ.

***Hyrachyus agrarius*.** This small Middle Eocene rhinoceros was of the light-limbed, swift-running type. It was more primitive than some

later Rhinoceroses in retaining four toes in the fore feet and relatively simple, short-crowned cheek teeth.

Mounted skeleton, Neg. 1100 (8×10 in.); Neg. 1101 (11×14 in.). Right of reproduction reserved.

Hyracodon nebrascensis. This Oligocene successor of *Hyrachyus* was also of the swift-running type, but the cheek teeth have longer crowns and are more decidedly of the Rhinoceros type.

Restoration, Neg. R9 (8×10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Amynodon intermedius. An Upper Eocene hornless Rhinoceros with four toes in the fore-foot.

Mounted skeleton, Neg. 560 (8×10 in.); Neg. 561 (11×14 in.). Right of reproduction reserved.

Metamynodon planifrons. This Oligocene Rhinoceros, related to *Amynodon*, is thought to have been semiaquatic on account of its adaptative resemblances to the Hippopotamus.

Mounted skeleton, Neg. 1102 (8×10 in.); Neg. 1103 (11×14 in.).

Restoration, Neg. R5 (8×10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Cænopus occidentalis. This characteristic Rhinoceros of the Middle Oligocene of South Dakota, formerly referred to *Aceratherium* of the European Oligocene, is represented by a well preserved mounted skeleton. The number of toes in the fore and hind feet is reduced to 3-3 as in later Rhinoceroses, whereas in more primitive Rhinoceroses the formula is 4-3 as in other ancient types of Perissodactyla.

Mounted skeleton, Neg. 570 ($6\frac{1}{2} \times 8\frac{1}{2}$ in.). Not published; right of reproduction reserved.

Cænopus tridactylus. A successor of *Cænopus occidentalis*, from the upper portion of the White River Oligocene, approximately ancestral to the pair-horned rhinoceros *Diceratherium* of the Miocene epoch.

Mounted skeleton, Neg. 573 (8×10 in.); Neg. 574 (11×14 in.).

Restoration, Neg. R3 (8×10 in.).

Teleoceras fossiger. A very short-legged and stout-bodied Rhinoceros of the Upper Miocene, resembling the Hippopotamus in proportions. The narrow nasals probably bore a rudimentary horn.

Mounted skeleton, Neg. 577 ($6\frac{1}{2} \times 8\frac{1}{2}$ in.).

Restoration, Neg. R23 (8×10 in.).

Published; credit to American Museum and Henry Fairfield Osborn.

EQUIDÆ.

American Tertiary and Quaternary members of the Horse family. A group of outline restorations.

Eohippus, Lower Eocene, North America.

Orohippus, Middle Eocene, North America.

Mesohippus, Oligocene, North America.

Hypohippus, Middle Miocene, North America.

Neohipparion, Upper Miocene, North America.

Hippidion, Pampæan Pleistocene, South America.

Equus scotti, Pleistocene, North America.

Neg. — (8×10 in.). Right of reproduction reserved.

Evolution of the grinding teeth of the Horse family.

Euprotogonia (a Condylarth), Basal Eocene.

Eohippus, Lower Eocene.

Mesohippus, Oligocene.

Parahippus, Miocene.

Merychippus, Pliocene.

Equus, Pleistocene.

Neg. 599 (8×10 in.). Right of reproduction reserved.

Evolution of the hind foot in the Horse family.

Eohippus, Eocene.

Mesohippus, Oligocene.

Anchitherium, Miocene.

Neohipparion, Pliocene.

Equus, Pleistocene and Recent.

Front view, Neg. 600 (8×10 in.).

Side view, Neg. 601 (8×10 in.).

Published; credit to American Museum and Henry Fairfield Osborn.

Evolution of the fore foot in the Horse family, illustrated by comparison with the human hand in different positions.

Neg. 603 (4×5 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Euprotogonia (a Condylarth), five toes; *Eohippus*, four toes; *Mesohippus*, three toes and a splint; *Neohipparion*, three toes; *Equus*, one toe and splints.

***Eohippus* ("Protorohippus") venticolus.** This genus is the earliest American representative of the Horse family, from the Lower Eocene, with four toes on the fore foot and three on the hind foot.

Restoration, Neg. R2C (8×10 in.).

Model (three animals), Neg. 612 (8×10 in.).

Published; credit to American Museum and Henry Fairfield Osborn.

Eohippus ("Protorohippus") venticolus, with Mesohippus bairdi.

Mounted skeletons, Neg. 614 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Eohippus ("Protorohippus") venticolus, with Hypohippus equinus.

Mounted skeletons, Neg. 615 (8 × 10 in.); Neg. 616 (11 × 14 in.). Right of reproduction reserved.

Orohippus osbornianus Cope. A four-toed ancestor of the Horse from the Middle Eocene (Bridger) of Wyoming.

Mounted skeleton, Neg. 1063 (8 × 10 in.); Neg. 1064 (11 × 14 in.). Not published; right of reproduction reserved.

Eohippus ("Protorohippus") venticolus with Equus scotti.

Mounted skeletons, Neg. 617 (8 × 10 in.); Neg. 618A (11 × 14 in.).

Published; credit to American Museum and Henry Fairfield Osborn.

Eohippus ("Protorohippus") venticolus, model, with skull of modern horse.

Neg. 619 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Eohippus venticolus, skeleton with skeleton of Whippet hound.

Neg. 624 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Mesohippus bairdi. A three-toed Oligocene representative of the Horse family (with *Eohippus*).

Neg. 614 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Restoration, Neg. R 49 (8 × 10 in.). Not published; right of reproduction reserved.

Hypohippus osborni. A Middle Miocene representative of the Horse family, called the "Forest Horse," with well developed side toes, which would have been useful in progressing over soft or uneven ground, and with short-crowned cheek teeth that may point to a habit of browsing upon twigs and softer shrubs. The animal is about 3 feet, 4 inches high at the shoulders.

Skeleton, Neg. 635 (8 × 10 in.); Neg. 634 (11 × 14 in.).

Skeleton (with *Eohippus*) Neg. 615 (8 × 10 in.); Neg. 616 (11 × 14 in.).

Restoration, Neg. R40 (8 × 10 in.).

Right of reproduction reserved.

Neohipparion whitneyi. A light-limbed three-toed horse of the Upper Miocene of Texas. The slender side toes were much more reduced than in *Hypohippus*, and the general build was swift and graceful, like that of the modern deer and antelopes. The animal may have used its long-crowned cheek teeth in grazing on the plains.

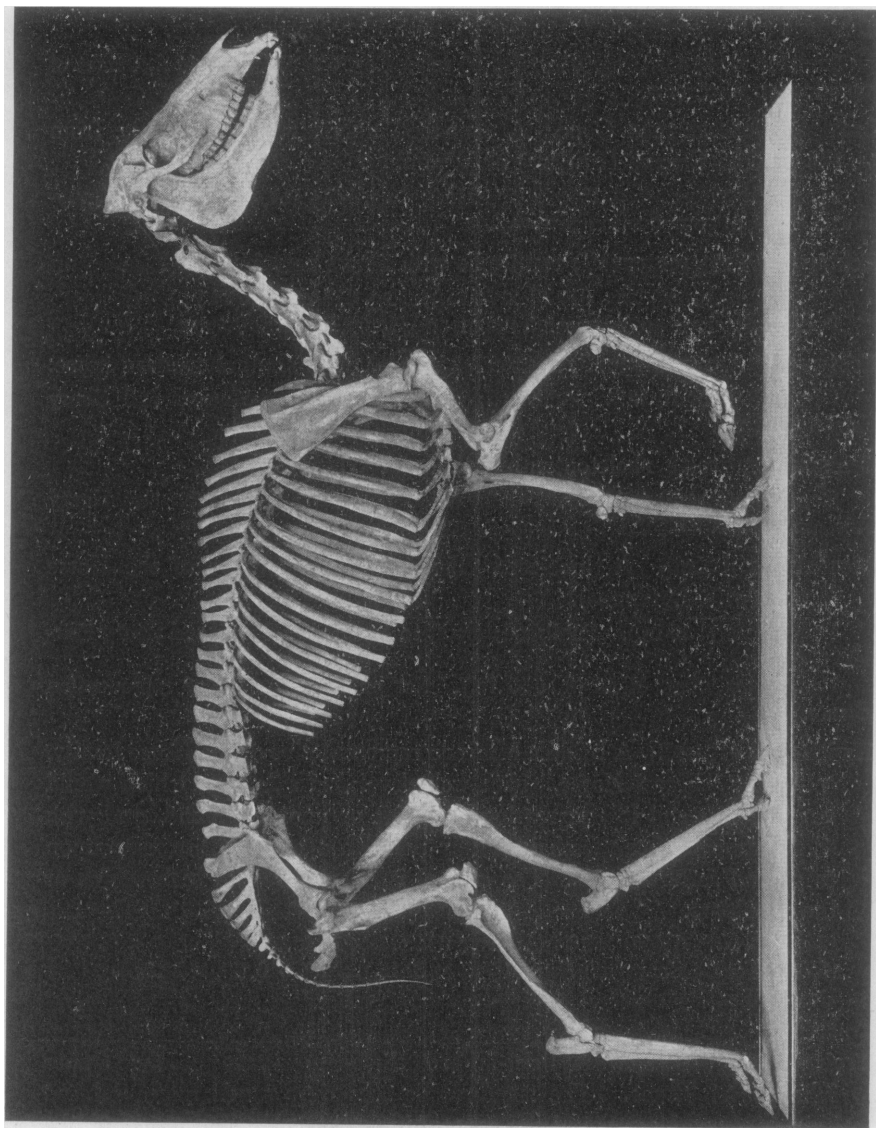


Fig. 2. Complete mounted skeleton of a three-toed horse (*Neohipparion whitneyi*) from the Miocene of South Dakota.
Right of reproduction reserved.

Mounted skeleton, Neg. 644 (8 × 10 in.); Neg. 645 (11 × 14 in.). Right of reproduction reserved.

Restoration, Neg. R45 (8 × 10 in.). Right of reproduction reserved.

Equus scotti. An American Horse of the Pleistocene epoch, one of numerous native species which, so far as known, all died out before the advent of the white man in America.

Mounted skeleton, Neg. 658 (8 × 10 in.).

Mounted skeleton, (with *Equus scotti*) Neg. 617 (8 × 10 in.); Neg. 618A (11 × 14 in.).

Both published; credit to American Museum and Henry Fairfield Osborn.

Restoration, Neg. R50 (8 × 10 in.). Right of reproduction reserved.

Hippidion neogæum. A one-toed horse from the Pampæan Pleistocene of South America. This was a curiously stocky and short-limbed horse.

Cast of skeleton, Neg. 666 (8 × 10 in.).

Skull of a domestic Horse, prepared to show the teeth embedded in their sockets.

Neg. 771 (8 × 10 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Skeleton of a Draught Horse.

Side view, Neg. 774 (8 × 10 in.); Neg. 775 (11 × 14 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Skeletons of rearing horse and man.

Side view, Neg. 780 (8 × 10 in.); Neg. 781 (11 × 14 in.). Published; credit to American Museum and Henry Fairfield Osborn.

Skeleton of a very small adult Shetland Pony. Height at shoulder, 33½ inches.

Side view, Neg.— (8 × 10 in.). Right of reproduction reserved.

Skeleton of a desert bred Arab Horse.

Side view, Neg. 788 (8 × 10 in.). Right of reproduction reserved.

Skeleton of an American race horse, "Sysonby."

Side view, Neg. 1080 (8 × 10 in.); Neg. 1081 (11 × 14 in.). Right of reproduction reserved.

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