Article XI.—A PRELIMINARY STUDY OF THE NORTH AMERICAN 'OPOSSUMS OF THE GENUS DIDELPHIS.

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Plates XXII–XXV.

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Introduction.

The present paper relates primarily to the forms of the genus *Didelphis* occurring in Mexico and the United States, to which area my material is mainly limited. It embraces, however, a few specimens from Guatemala, Nicaragua, and Costa Rica, and many examples from the Cauca region of western Colombia, the Santa Marta region of eastern Colombia, and the island of Trinidad. For nearly all of the Mexican material, which forms the principal part of the collection, and much of that from the United States, I am indebted to the kindness of Dr. C. Hart Merriam, Chief of the Biological Survey of the United States Department of Agriculture, without the generous offer of which this paper would not have been undertaken. The Mexican specimens were nearly all taken by Messrs. E. W. Nelson and E. A. Goldman, so well known for their explorations in Mexico and Guatemala. I am also indebted to Mr. G. S. Miller, Jr., and the authorities of the National Museum for access to series of specimens from Yucatan, Guatemala, and Costa Rica.

The specimens examined number about 350 skins and nearly 100 additional skulls, of which 115 skins and 40 additional skulls

are from the United States, 187 skins and 34 skulls from Mexico and Guatemala, 10 from Costa Rica, 26 from Colombia, 3 from Venezuela, and 12 from Trinidad. While this material far exceeds that previously available for the study of the group, it is very inadequate for more than a preliminary survey of the field. Besides the lack of material, the study of the group is rendered exceptionally difficult in consequence of the wide range of individual variation these Opossums present, and also by the peculiar character of the pelage, and the lack of any well defined pattern of coloration.

Beginning with the Opossums of the United States and proceeding thence southward to northern South America, several well marked features of variation are prominent. While at the North the animal is at about its average size, judged especially by the skull, there is found in proceeding from the North southward a very marked increase in the length of the tail, which in the northeastern States is less than 70% of the length of the head and body, while in tropical latitudes its length often equals the length of the head and body, sometimes exceeds it, and generally falls but little short of it. The ears are small in the northern animal in comparison with its southern representatives, in tropical examples the ear having far greater superficial area than in extreme northern specimens.

The coloration also varies markedly, not only as regards the pelage but in respect to the ears and tail. In the United States (the *D. virginiana* group) the dark basal portion of the tail generally extends little if any beyond the portion covered by the long hair at its base. In the Mexican and South American forms the dark color usually occupies the basal third, often one half, and sometimes two thirds of its length. In the northern animal the ears are black, tipped more or less broadly with flesh color, the amount decreasing southward, even to some extent within the United States; while in tropical latitudes the ears are wholly black in all the forms of the *Didelphis* group, except in *D. aurita* of southeastern Brazil, in which they are again tipped with flesh color, and in *D. pernigra* of Peru, in which they are wholly white.

The color of the feet also varies geographically, at the north the toes on all the feet being usually white apically, but the white extends further up the toes on the fore feet than on the hind feet.

Northern specimens have the nails and outer joints of the toes on the hind feet usually white, but the amount of white varies, being often restricted to one or the other of the hind feet, while the opposite one is entirely black, or, in Florida and the Gulf States, both hind feet may be black. The fore feet are always more or less white in northern specimens; in New York and New Jersey examples the toes are often white for their whole length, while at more southern localities, as in Florida and along the Gulf Coast, only the nails and terminal phalanges are white. In Mexican and South American specimens the toes on both fore and hind feet are wholly black.

Geographical variation in the character of the pelage is strongly marked. The northern animals (*D. virginiana* and *D. v. pigra*) have a long, soft, thick coat of woolly underfur, which is whitish basally for about four fifths of its length, only the longer fibres being tipped with black. Over this underfur is a thin covering of long, coarse, more or less bristly white hairs, usually sufficiently abundant to give a whitish coloration to the animal, through which the black apical zone of the underfur is more or less visible, producing a general grizzled effect. The whole head is white except a blackish eye-ring and a very small dusky spot in front of the eye, and a dusky area on the top of the head, terminating about midway between the eyes and the ears. In the tropical forms the pelage is much coarser, the coat of underfur less soft and full, and the black tipping involves about one third of the length of the underfur, which forms a conspicuous element in the superficial coloration. The long bristly white hairs, so abundant in the northern animal, are often replaced in the southern forms by bristly black hairs, the animal then being essentially black, a black phase and a gray phase often occurring at the same localities. In other words, the Opossums at many points south of the United States are dichromatic.

In southern specimens (*D. marsupialis* and *D. karkinophaga*, with their respective subspecies) the pure white cheeks alone represent the almost entirely white head of the *D. virginiana* group of the North. The white color of the cheeks is sharply cut off above by a dark band running from the base of the ear through the eye to the nose; the dark color of the top of the head forms a rather prominent median stripe, while the rest of the upper

surface of the head is tinged more or less strongly with dusky. There is usually a more or less well defined white area at the inner base of the ears, this with the white cheeks constituting the only white areas on the head. Often, however, the ear patches are obscured by a dusky wash.

A study of the skulls reveals an amazing amount of variation, dependent partly upon age and sex, but in large measure due to individual variation; there is, however, a considerable amount of geographical differentiation, most strongly shown in the form of the nasal bones. The variation in the form and size of the skull as modified by age is so considerable that it has been deemed worth while to illustrate this feature, as well as to give a few illustrations of individual variation, and of certain abnormalities of dentition. The halftone figures here given (Plates XXII–XXIV) are, with two exceptions (later duly indicated), one half natural size, and are from excellent photographs kindly taken for me by Mr. Frank M. Chapman, Associate Curator of the Department of Mammalogy and Ornithology.

The extensive array of measurements given in Tables I–VI at the end of this paper include about 15 measurements each of some 200 skulls of the genus *Didelphis*, and 4 external measurements of about the same number of specimens, taken in the flesh by the collector. These measurements, with the accompanying ratios, so well illustrate variations due to age, sex, and locality, as well as affording means for comparison of five species and as many additional subspecies, that they seem entitled to permanent record.

While the amount of material at present available is too limited, as already said, for even a very satisfactory reconnoissance of the group as regards its geographic forms, its careful study has yielded some results of considerable interest relating especially to the skull, dentition, and external characters.

Skull and Dentition.

The skull in the Opossums of the genus *Didelphis* is remarkable for the great development of the sagittal and occipital crests, which become very highly developed in old age in both sexes. The deposition of bony matter appears to continue throughout the life of the animal, the skull increasing in its principal dimensions as long as the animal lives. At the time of the appearance

of the first upper true molar(m^1) the skull (then about 45 mm. long) is entirely smooth, without trace even of postorbital processes; by the time the third upper molar (length of skull now about 80 to 90 mm.) has come into use, the sagittal and occipital crests appear as low ridges about a millimetre in height. By the time the last upper molar has become functional the sagittal crest has attained a height of 4 or 5 mm. and the occipital ridges are proportionately developed. In middle-aged specimens the sagittal crest has usually attained a height of about 8 to 10 mm., which increases in old age to 12 to 14 mm., and the occipital ridges form a broad posteriorly projecting crest. (See Plate XXII.)

Sexual Variation in the Skull.

In the female the skull is of slighter build than in the male and averages about 10 per cent. smaller in external dimensions. It is narrower and slenderer, the zygomatic breadth decidedly less, the muzzle narrower, and the canines less strongly developed; nevertheless the sex cannot be distinguished with certainty from an examination of the skull, owing to exceptional variations in both males and females. Occasionally a female skull has the large size and heavy development ordinarily seen in the male, while, on the other hand, small male skulls are so slender and delicate as to exactly resemble the skull of the average female. In the general character of the dentition, aside from the usually weaker canines of the female, there is little difference in the sexes, and there is little or no difference in the relative development of the sagittal and occipital crests. While it thus happens that female skulls are sometimes larger than some male skulls strictly comparable with them as to age, it may be said that nearly all male skulls of the *D. virginiana*, *D. marsupialis*, and *D. karkinophaga* groups exceed 110 mm. in basal length, and that nearly all female skulls fall below this measurement. As indicating the relative size of males and females, and the geographical distribution of the larger skulls in the present series, the following tables may be of interest.

The 21 largest male skulls out of a series of about 200 are here listed, the two measurements given being the total length and the zygomatic breadth, with the ratio of breadth to length.

Total length. mm.	Zygomatic breadth. mm.	Ratio.	Locality.
139	68	49.2	Tumbala, Chiapas, Mexico.
136	69	50.7	Jico, Vera Cruz, "
134.5	68	50.5	Huehuetan, Chiapas, "
131	69	52.6	Hatteras, North Carolina.
131	69	52.6	Bay St. Louis, Miss.
131	65	49.6	Virginia Point, Texas.
131	67	51	Tehuantepec, Oaxaca, Mexico.
130	70	53.3	New Jersey.
130	67	51.5	Frontera, Tabasco, Mexico.
129	66	51	San Antonio, Texas.
128	72	56.2	Miller's Place, Long Island, N. Y.
128	68.3	53.3	Port Lavaca, Texas.
128	72	56.2	Vernon, Texas.
127	67.5	53	Armeria, Colima, Mexico.
125	63	50.4	Manzanillo, " "
124	66	53.2	Iowa Station, La.
124	60	48.3	Metlaltoyuca, Puebla, Mexico.
124	70	56.4	Hatteras, North Carolina.
123	64	52	Tuxtepec, Oaxaca, Mexico.
122.5	69	56.3	Danville, Tenn.
122	63	51.6	Lake Harney, Fla.

The 12 largest female skulls from the same series are the following:

Total length. mm.	Zygomatic breadth. mm.	Ratio.	Locality.
120	58	48.3	Tuxtepec, Oaxaca, Mexico.
119	61.6	51.7	San Antonio, Texas.
118.5	55	46.4	" " "
118	62	52.5	Garrettsville, Ohio.
118	57	48.3	Golden City, Mo.
117	57	48.7	Riceboro, Georgia.
117	59.3	50.7	Manzanillo, Colima, Mexico.
116	60.5	52	Matagorda, Texas.
116	58	50	Velasco, "
114	55	48.2	Greytown, Nicaragua.
114	62.5	55	Montauk Point, Long Island, N. Y.
114	56	49	Tumbala, Chiapas, Mexico.

A comparison of these two lists, which consist in both cases of skulls much above average size, shows that the largest female skull is decidedly smaller than the smallest male skull; in males

the range in total length being from 122 to 139 mm., and in zygomatic breadth from 63 to 69 mm.; the corresponding ranges for the females being, respectively, 114 to 120 mm., and 55 to 62.5 mm. The ratio of the two measurements ranges from 48.3 to 56.4 in the males, and from 46.4 to 55 in the females.

From the preceding tables it will be seen that the largest skulls are dispersed over a wide geographic area, and that most of the extremely large skulls are from Mexico. This is due in part doubtless to the fact that in the unsettled portions of that region they are subjected to less persecution from man and thus more frequently live to very old age, than in the more settled regions of the United States. At all events, skulls bearing the marks of extreme senility are more frequent in the Mexican material than in that from the United States; yet certain skulls from North Carolina, Mississippi, and southern Texas stand well toward the head of the list, as regards both size and age.

Taking the whole series of skulls into consideration, it is found that some obviously *very old* male skulls measure down to 112 X 58.5 mm. (Armeria, Colima), and even as low as 107.5 X 52 mm. (San Juan Capistrano, Zacatecas), while some 'young adult' males fall as low as 95 X 46 mm. (Brownsville, Texas). Very old female skulls sometimes measure as low as 103 X 47 mm. (Teapa, Tabasco), and 'young adult' female skulls as low as 90 X 44 mm. (Mazatlan, Guadalajara, and Papantla.) The extreme range in very old males is therefore from 112 to 139 mm. in total length, and from 58 to 69 mm. in zygomatic breadth; and in very old females from 90 to 120 mm. in length and 40 to 62 mm. in zygomatic breadth. This indicates the amount of normal individual variation in cranial measurements that may be expected in any large series of skulls, even, it may be added, from practically the same locality.

Variation due to Age, etc.

There is not only a wide range of sexual, individual, and age variation in size and proportions in the skull considered as a whole, but, as would be naturally expected, also in its various parts, as in the form and relative stoutness of the zygomatic arches, the length and form of the palate, the nasals, etc., and in the size of the teeth. Without going into details, except in

respect to the nasals, to be considered presently, it may be said that the palate varies greatly in respect to the ratio of its breadth to its length, and in the relative development and form of its posterior border, the latter varying, especially with age, from a deeply concave to a straight outline; in old age it becomes built out posteriorly by bony deposition, and at the same time tends to become narrower. This change is parallel to the increasing narrowness of the skull, with advance in age, at the postorbital constriction, this region being broader in young adults than in middle-aged specimens, and still narrower in very old examples; for while the skull continues to increase in extreme dimension from middle life onward to old age, the postorbital region becomes more and more constricted, as is the case generally in animals in which the skull is normally greatly constricted postorbitally.

The toothrow tends to become shorter, through normal processes of absorption, with great increase of age. There is, however, a rather wide range of variation in respect not only to its length, but in the size of the individual teeth in specimens from the same locality, strictly comparable as to sex and age, as shown later in the detailed tables of measurements. While in female skulls the teeth are generally smaller and more delicate than in the males, there are many exceptions to the rule, due to cases of marked individual variation in both sexes.

The lower jaw is as markedly subject to variation due to growth and age as is the skull in respect to size and the development of the sagittal and occipital crests. This is especially apparent in the angle formed by the coronoid process with the main axis of the jaw. During the evolution of the teeth the last molar appears, as usual, on the inner side of the anterior base of the coronoid, so that when the last lower molar has just come into use its posterior border is close to the anterior base of the coronoid. As the growth of the jaw continues after all of the teeth are in place, a space begins immediately to appear between the last molar and the anterior border of the base of the coronoid, which continues to increase with age as long, apparently, as the animal lives, so that in old age the last molar may be 6 to 10 mm. from the front border of the coronoid. With the increase in the length of the jaw, after practical maturity, and the coincident development of

the space on the alveolar border between the last molar and the front edge of the coronoid, a change occurs in the angle made by the coronoid with the horizontal portion of the ramus, the angle formed by the two axes becoming gradually more open or wider, due to the increased backward slope of the coronoid. This is a fact worthy of attention in comparing young adults with middle-aged or very old specimens. There is also often great individual variation in the slope of the coronoid in specimens of comparable age from the same locality.

Nasals.

Normally the nasals are narrow apically for a little more than half their length; then they abruptly expand, the expanded portion taking the form of a rhomboid, being diamond-shaped in outline; the expanded portion occupies a little less than one half the total length (about 42 to 48%). The transverse axis of this expanded portion varies from 75 to 100% of its longitudinal in different specimens from the same locality. The posterior half of the expanded portion may be pointed and symmetrical in outline, but usually it is shorter than the anterior half, and not infrequently the posterior border is abruptly truncated. The narrow anterior portion is of nearly equal width throughout, but the breadth varies in individuals from the same locality, the variation amounting to about 30% of the mean. (See Pl. XXIII, Figs. 1 and 2.)

The ratio of the nasals to the basal length of the skull varies in comparable specimens from the same locality from 46 to 58%. The ratio does not appear to be affected by age. The breadth varies proportionately more than the length, the breadth being correlated with the breadth of the rostral portion of the skull. Examples of narrow-nosed skulls and broad-nosed skulls from the same locality and of the same sex occur too frequently to render the difference of any importance as a trustworthy character in comparing small series of skulls from different localities. In two skulls from a single locality in Texas the nasals have a length respectively of 48.8 mm. and 52.9 mm., with a corresponding difference in the length of the rostrum, both specimens being middle-aged males. Yet, as will be shown later, the form of the nasals is sufficiently constant to afford a character of much importance in the discrimination of subspecies.

Supernumerary Teeth, and other Cranial Abnormalities.

In the present collection several cases of supernumerary teeth have been noticed, involving the true molars, premolars, and canines.

Molars.—Specimen No. 73492, adult male, Tehuantepec, has a supernumerary (fifth) true molar behind m^4 on both sides (see Pl. XXIII, Fig. 5); it is about half the normal height, and is patterned on the plan of m^4, from which it differs mainly in its smaller size. In No. 77688, adult male, Huehuetan, Chiapas, there is a well developed fifth molar in the left side, similar in character to m^4, but about one third smaller (Pl. XXIII, Fig. 6).

In No. 14614, adult female, Santa Marta, Colombia, m^4 on both sides is V-shaped, having two equal outer angles, and thus is practically of the same pattern as m^3, except that it is shorter, and the middle cone of the outer border is suppressed.

No. 33831, young adult male, has on the right side a minute tooth about the size and shape of a small incisor, situated between m^1 and m^2, in the outer border of the toothrow.

In several specimens teeth abnormal in position have been noticed, especially in the case of m^4, which may be thrown inward, or backward, in the latter case leaving a space nearly the width of the tooth between it and m^3. In general the outer edge of m^4 forms the most projecting portion of the toothrow, being even with or projecting slightly beyond the outer border of m^3. In quite a number of cases m^4 is placed inward, so that the outer edge of m^3 projects considerably beyond m^4.

Premolars.—Several instances have been noted of the occurrence of a minute supernumerary premolar, on one or both sides of the skull. Thus, in the skull last mentioned (No. 33831), there is a minute tooth on the left side between p^4 and m^1, and another between m^1 and m^2. No. 100507, young adult male, and No. 100508, young adult female, both from Frontera, Tabasco, each has a minute supernumerary tooth on the outer alveolar border between p^3 and p^4 on each side. There is also a similar development in No. 56857, adult male, and No. 58688, adult female both from Mirador, Vera Cruz. An old female from Rockport Texas, has a minute supernumerary tooth between p^3 and p^4 on each side, on the outer alveolar border.

Canines.— No. 45401, adult male, Bay St. Louis, Miss., presents a case of the nearly equal development of two canines on the left side (see Pl. XXII, Figs. 5 and 5a), not only similar in size, but also in form, standing close together, one behind the other. The two teeth have, at the alveolar border, nearly twice the longitudinal diameter of a normal canine.

Change in Color of the Ears with Age.

Perhaps the most interesting feature of color variation is the change in the ears from flesh-color in the nursing young to black in the adult. Very young animals, from whatever locality, have the ears at first entirely flesh-color or yellowish white. In the North this is gradually replaced by black until the whole ear becomes black, except the apical border, which varies from a mere edging to an area half an inch in extent; while further southward, from the Rio Grande region throughout Mexico and to northern South America, the ears in the adult are entirely black. The change from the flesh-colored ear of the young to the black of the adult is gradual, the black generally beginning at the base and extending upward, as illustrated by a number of young specimens that have passed beyond the first stage.

In this connection I may be allowed to correct an error based on an examination of young specimens from Costa Rica which, having particolored ears, I identified some years ago [1] as *Didelphis aurita.* In the light of the present material, these specimens prove to be merely in the intermediate stage of color change in the ears, and have no relation to the true *D. aurita* of southern Brazil, which in the adult has the apical portion of the ears flesh-color, as in the Virginia Opossum of the North.

Nomenclature.

The genus *Didelphis* of Linnæus is retained for the present group (*cf.* this Bulletin, XIII, 1900, pp. 185–190), the type being, by elimination, *D. marsupialis* Linn. The specific name *marsupialis* is restricted to the Mexican species, for reasons given beyond (pp. 163, 164); *D. karkinophaga* is retained for the forms occurring in northeastern South America, and *D. virginiana* for those of the United States.

[1] This Bulletin, III, No. 2, 1891, p. 217.

SYNOPSIS OF SPECIES AND SUBSPECIES.[1]

A. Posterior border of nasals forming a V-shaped point.
  a. Tail black only at extreme base; generally less than two thirds the length of head and body (tail ratio about 70).....*D. virginiana.*
  b. Tail black for basal third; generally four fifths the length of head and body, or more (tail ratio about 90–95).....*D. marsupialis texensis.*
  c. Tail black for basal one third to one half; generally as long as head and body or longer (tail ratio about 100–110).....*D. richmondi.*
B. Posterior border of nasals obtusely truncated. Tail black for basal one third to one half, or more.
  a. Nasals very short and very obtuse posteriorly; tail generally about nine tenths the length of the head and body (tail ratio about 85–95) *D. marsupialis.*
  b. Nasals much longer and less obtusely pointed posteriorly (tail ratio 95 105).....*D. marsupialis tabascensis.*

Didelphis virginiana *Kerr.*

VIRGINIA OPOSSUM.

Didelphis marsupialis LINN. Syst. Nat. ed. 10, 1758, 54. (In part only.)

Virginian Opossum, PENNANT, Hist. Quad. 1781, 301, no. 181, pl. xxxiv. (Excluding Mexican and South American references.)

Didelphis virginiana KERR, An. King. 1792, no. 386, p. 193. (Based on Pennant, as above.)

Didelphis virginiana SHAW, Gen. Zoöl. I, pt. 2, 1800, 473. (Based exclusively on the Virginia Opossum.) Also of most recent authors.

Didelphis woapink BARTON, Facts, Observations, and Conjectures relative to the Generation of the Opossum of North America, 1806, 2.

"*Didelphis pilosissima* and *illinensium* LINK," apud Gray, List Mamm. Br. Mus. 1843, 100. (*Cf.* Thomas, Cat. Marsup. and Monotr. Br. Mus. 1888, 325, footnote.)

Type locality.—Virginia.

Distribution.—Eastern United States, south to the coast region of Georgia and the Gulf States.

Adult.—Pelage of two kinds of hair, an outer long coat of rather coarse white overhair, sufficiently abundant to give tone to the general coloration; beneath this a coat of long, thick, soft woolly underfur about 40 to 50 mm. long, on the back, white (sometimes nearly pure snowy white in clean winter specimens, but usually with a slightly yellowish cast) for four fifths of its length, the apical fifth of the longer fibres of the underfur being blackish. The long white overhair varies in abundance in different specimens and on different parts of the body, being nearly obsolete on the ventral surface, longer on the back than on the sides, and longest on the lower back and at the base of the tail, where it attains a length of 60 to 80 mm. General color above mixed black and white, the blackish tips

[1] *Didelphis nelsoni*, sp. nov., is not included; see postscript, p. 185.

of the underfur showing through the long overhair; the white basal portion of the underfur also shows through the blackish surface of the underfur; ventral surface white with a slight wash of dusky formed by the blackish tips of the hairs. There is generally a large pectoral area in adult males suffused with sulphur yellow, varying from a faint shade of this tint to quite strong greenish yellow, and varying also in respect to the size of the area. This pectoral spot is generally absent in young males and apparently always absent in the females. The fur over this area is often saturated with an oily, highly odorous secretion from underlying sebaceous glands, which are probably especially active during the breeding season. There is often a median ventral line of clear white, in both males and females, extending from the breast posteriorly, irregular in outline and extent in different specimens. Whole head, including the throat and sides of the neck, soiled white, or yellowish white, excepting the chin, which is usually darker and like the rest of the ventral surface. The sides of the neck are sometimes strongly tinged with buff. There is also a slight extension forward on the top of the head of the general dusky color of the dorsal surface, which usually forms a V-shaped area, extending to a point midway between the ears and eyes. It is indistinct in outline and varies greatly in intensity and extent in different individuals, being often absent, the head then being practically pure white. Eyes with a very narrow blackish eyering, widening anteriorly into a small, usually indistinct, preocular spot, sometimes nearly as large as the eye but often obsolete. Fore and hind limbs black the whole length except the toes, which on the fore feet are white for half or two thirds of their length, and on the hind feet for about one fourth their length. As a rule there is much less white on the hind toes than on the front toes, the hind toes frequently lacking the white on one foot and occasionally on both feet. The nails and soles of all the feet are yellowish or flesh-color in life. Ears black, broadly tipped with flesh color (pale yellow in the dry skins), or narrowly edged with this color, occasionally nearly or quite lacking. Tail clothed for about two inches at the base with long hair like that of the body, the naked portion brownish flesh-color, except at the base, where it is blackish; the dark portion varies in extent in different individuals, but usually occupies only the part covered by the long hair. The pouch in the female is generally thickly lined with crinkled woolly hair, usually rufous brown.

Young.—Nursing young (250 to 350 mm. in total length) are blackish brown, finely grizzled with white hairs; under surface scantily clothed with very short blackish hairs; whole head clear white as far as the ears, with an incipient blackish eyering and anteorbital spot; ears, *wholly white;* feet and tail colored as in the adult. (See Plate XXV, Figs. 3, 4.)

Measurements.—Total length in middle-aged males, 750 to 875 mm.; head and body, about 450 to 520; tail, about 270 to 350; tarsus, 60 to 70; ears, about 50. Females somewhat smaller. Ratio of tail length to length of head and body, about 70 or less. For further detailed measurements, including measurements of skulls, see Table I.

Specimens examined.—The material available for examination has been received from the following localities:

New York: Schoharie, 2; Fort Montgomery, 3; Highland Falls, 1; Hastings, 1; South Nyack, 1; Long Island, 4; New York City markets and Central Park Menagerie, 4, and 16 additional skulls (probably from Long Island and New Jersey).

Northern New Jersey: 6 adults and 10 young.

Pennsylvania: Erie, 1; Markelton, Somerset Co., 1.

Ohio: Garrettsville, 1 skin and 4 skulls; Wooster, 3 skulls.

Illinois: Warsaw, 1.

Maryland: Bethesda, 2.

Virginia: Dismal Swamp, 1; Dunn Loring, 2.

North Carolina: Hatteras, 4; Magnetic City, 1.

Tennessee: Big Sandy, 1; Clarkville, 1 skull; Danville, 1 skull; Roan Mountain, 1 skull.

Arkansas: Fayetteville, 2 skulls.

Missouri: Golden City, 1; Marble Cave, 1 (very young).

Kansas: Fort Leavenworth, 1; Cedar Vale, 3.

Indian Territory: Hartshorne, 2 adult and 6 very young; Savanna, 1; Red Oak, 2.

Oklahoma: Oklahoma City, 1.

Texas: Vernon, 1 skull; Gainsville, 1 skull; Brazos, Palo Pinto Co., 2; Kerrville, Kerr Co., 1 skull; Mason, 4; San Antonio, 6; Washington County, 1; Matagorda, 1; Deming Station, Matagorda Co., 3, and 1 skull; Virginia Point, Matagorda Co., 2; Velasco, Brazoria Co., 2.

Total 86, and 32 additional skulls.

Geographical Distribution.—So far as known the Opossum did not formerly range to the eastward of the Hudson River,[1] but of late years it has spread over Long Island and up the Hudson Valley as far as Schoharie, and is apparently not rare locally at various points in the lower Hudson Valley. It occurs also in the western part of New York, and thence westward, south of the Great Lakes, to Iowa, and thence southward to Texas. There are specimens in the present collection from eastern Kansas, Indian Territory, Oklahoma, and the Panhandle region of Texas, and as far south in the interior of Texas as Mason and San Antonio, and on the coast to about Matagorda Bay.

In the eastern United States it occurs locally, or at favorable points, from the Great Lakes southward nearly to the Gulf Coast and Georgia, merging in the southern part of its range into the southern darker form recently described by Mr. Bangs under the name *D. virginiana pigra.* Its range in Texas extends, in the interior at least, as far as San Antonio.

[1] *Cf.* Miller, 'Preliminary List of New York Mammals,' in Bull. New York State Museum, Vol. VI, No. 29, Oct. 1899, pp. 293–295.

General Remarks.—Northern specimens (New York and New Jersey) are lighter in coloration and have softer and more abundant and whiter underfur than those from the Middle States and further southward; the blackish V-shaped area on the top of the head becomes better defined and the incipient dusky spot in front of the eye more pronounced in passing from northern localities southward. As shown by the tables of measurements given beyond (see Table I), there is apparently very little geographical variation in size; a large series of specimens might show a decrease in size toward the northern border of the range of the species. The specimens at hand show a wide range of variation in size, due apparently to age rather than to locality.

The few specimens from west of the Mississippi River (Kansas, Indian Territory, Oklahoma, and central and northern Texas) do not differ appreciably from specimens from New York, Ohio, Tennessee, Maryland, and North Carolina; but the material for comparison is too scanty to warrant positive conclusions.

Nomenclature.—The nomenclature of this species, both generic and specific, has of late been the subject of considerable discussion. An attempt was recently made [1] to discard the generic name *Didelphis* on the ground that the species, *D. marsupialis* Linn.—necessarily its type through the process of elimination—was indeterminable. By this ruling *Didelphis* Linn. (1758) was replaced by *Sarigua* Muirhead (1819), and *D. marsupialis* Linn. (1758) was disallowed as being unrecognizable. To both of these rulings the present writer has taken exceptions.[2] Mr. Oldfield Thomas [3] supports the retention of the name *Didelphis*,[4] but expresses his preference for "retaining the familiar term *virginiana* for the Virginia Opossum."

As to the proper specific name, however, the case is more complex. I have heretofore favored restricting the name *Didelphis marsupialis* of Linnæus to the Virginia Opossum, on the ground that the only reference given by Linnæus that is positively identifiable is his citation of Tyson, whose account is not only detailed

[1] *Cf.* Rehn, Am. Nat., Vol. XXXIV, July, 1900, pp. 575–578.
[2] *Cf.* Allen, this Bulletin, Vol. XIII, 1900, pp. 185–190. In this article the date of Muirhead's genus *Sarigua*, as stated by Rehn, was claimed to be erroneous; that it should have been given as 1832 instead of 1819. As shown later, however, by Mr. Witmer Stone (Science, N.S. XII, No. 305, p. 685, Nov. 2, 1900), the correct date is 1819, as given by Mr. Rehn.
[3] Am. Nat., Vol. XXXV, Feb. 1901, pp. 144, 145.
[4] Mr. Rehn also in a late paper (Am. Nat., XXXV, Feb. 1901, pp. 147–149) admits the propriety of retaining *Didelphis* in place of *Sarigua*.

and accurate, but is known to have been based on specimens brought alive to England from Virginia. Besides this, there is no question of the applicability of his description and figures to this animal. On the other hand Mr. Thomas (*l. c.*, p. 144) claims that Seba's account, cited also by Linnæus and having precedence in the order of citation, is also identifiable and relates almost beyond question to the large Opossum of Guiana and northeastern South America, later named *Didelphis karkinophaga* by Zimmermann. Linnæus's *D. marsupialis*, as every one admits, was intricately composite, including all of the then known forms of the restricted genus *Didelphis* from both North America (including Mexico) and South America. Unfortunately the first form of the group to receive a new name was the Guiana species, as above stated. The next to receive a name was the Virginia Opossum, called *Didelphis virginiana* by Kerr in 1792. We have still left of the Linnæan references the Tlacuatzin of Hernandez, which undoubtedly relates to the form of *Didelphis* occurring in Mexico. It has, therefore, seemed best to restrict *D. marsupialis* to the large Mexican Opossum, as suggested by Rehn (*l. c.* p. 149), retaining *D. karkinophaga* as the specific designation of the large Opossums of northeastern South America, and *D. virginiana* Kerr for the Opossums of the eastern United States, this course being not only warrantable, but scarcely disturbing the current nomenclature of the group. (*Cf.* also postea, p. 169.)

Kerr's name *Didelphis virginiana* was fortunately based on the "Virginian Opossum" of Pennant's 'History of Quadrupeds' and not on that of his 'Synopsis of Quadrupeds,' as in the latter case it would have been a pure synonym of *D. marsupialis* Linn. In the 'Quadrupeds' he so far modified the description first given in the 'Synopsis' as to make it not only strictly applicable to the Virginia Opossum, as regards coloration and the relative length of the tail, but he substituted a copy of Tyson's excellent plate of this animal for the very "indifferent" one in the 'Synopsis,' which represents a dark-headed, long-tailed South American form. There is, therefore, no ground for questioning the availability of Kerr's name, who simply paraphrased Pennant, even to his erroneous statement of its distribution.

Relationships.—*D. virginiana* merges gradually into *D. v. pigra* of the coast of Georgia, the Florida Peninsula, and the Gulf

Coast, diverging more perceptibly in Florida from the northern form, and reaching its extreme differentiation in the southern half of the Peninsula. South Florida specimens are, as already said, readily distinguished from New York and New Jersey specimens by strongly marked color differences, and perhaps by a slight average increase in the length of the tail.

In the Lower Rio Grande region of southern Texas there is apparently a rather abrupt transition from the *D. virginiana* type to the dichromatic form of the Lower Rio Grande region, both in coloration and in the relative length of the tail. Nevertheless it evidently diverges from the typical northern toward the southern animal near the southern border of its distribution in Texas.

Didelphis virginiana pigra *Bangs.*

Didelphis virginiana pigra BANGS, Proc. Boston Soc. Nat. Hist. XXVIII, 1898, 172. March, 1898.

Type locality, "Oak Lodge, on the east peninsula, opposite Micco, Brevard Co., Florida"

Distribution.—Florida, coast of Georgia, and Gulf Coast west to Texas.

Darker, but in all other respects similar to *D. virginiana*. The underfur has a much broader apical zone of black, the covering of white overhair is generally much reduced, the blackish face markings are more pronounced, the median extension of dusky on the head often extending as far forward as the front of the eyes, and the anteorbital spot is much larger. The white on the toes is much reduced, being often entirely absent on the hind toes, and the white on the apical border of the ears is often reduced to a mere trace; on the other hand the black at the base of the tail often extends considerably beyond the covered portion, particularly in South Florida examples, where there is also a tendency to melanism.

In measurements and proportions (see Table II of measurements) quite similar to *D. virginiana* of the northern States. In a series of 4 specimens from Kissimmee River, Fla., the ratio of tail length to length of head and body is 74.5.

D. virginiana pigra is not sharply or very strongly differentiated from *D. virginiana* (*typica*), but South Florida and Louisiana coast specimens are quite unlike the northern form through their much darker general coloration, the increase in extent and distinctness of the facial markings, a tendency to a greater extension of black on the base of the tail, and the reduction of white on the toes and ears.

Geographical Distribution.—*D. v. pigra* may be considered as

occupying the whole of Florida, the lower coast region of Georgia, and the low Gulf Coast belt as far as western Louisiana. Specimens from the coast and interior of Texas, from about Matagorda Bay northward, seem better referable to true *D. virginiana.*

Specimens examined:

Georgia: Riceboro, 1; Beaufort Co., 5.

Alabama: Sylacuga, 4 skulls.

Mississippi: Bay St. Louis, 3.

Louisiana: Houma, 1; Lafayette, 1 skin and 1 adult skull.

Florida: Gainesville, 2; Lake Harney, 4; Fort Kissimmee, 2; Kissimmee River, 4—1 black; Little Marco, 1; Sebastian, 1; Key West, 1.

Total, 26, and 5 additional skulls.

Didelphis marsupialis *Linn.*

Tlacuatzin, HERNANDEZ, Anim. Mex. 1651, 330.

Didelphis marsupialis LINN. Syst. Nat. ed. 10, 1758, 54. (By elimination and restriction; see antea, p. 164.).

Didelphis californica BENNETT, P. Z. S. 1833, 40. Also of Baird and others.

Didelphis breviceps BENNETT, P. Z. S. 1833, 40.

Didelphys pruinosa WAGNER, Suppl. Schreber's Säug. III, 1843, 40 (footnote), and V, 1855, 224 (as a syn. of *D. californica*).

Type locality.—Mexico; exact point not known. Valley of Mexico, by restriction.

Gray Phase.—An outer long coat of white bristly overhair, 60 to 80 mm. long over the middle of the back and on the rump; beneath this a coat of soft long underfur, white for about two thirds of its length, the apical portion black, the long white overhair and the black outer zone of the underfur giving a dark grizzled general effect. Cheeks pure white, with generally a whitish spot over each eye, and a whitish area surrounding the base of the ears; whole top of the head and nose dusky brown, varying in intensity in different individuals, with a blackish stripe running from the ear through the eye to the nose. Fore and hind limbs black, including the feet except the nails, which are yellowish white; upper part of the limbs more or less grizzled with long white overhair. Beneath the pelage consists mainly of the soft underfur, which is much shorter and thinner than on the upper surface, with the tips of the fur more or less tinged with dusky, and with a few long bristly overhairs. Ears entirely black. Tail black at the base, usually for one half or more of its length, the apical portion flesh-color.

Black Phase.—Long bristly overhair black instead of white, beneath which is the usual soft long underfur, white for its basal two thirds and tipped with black. In other respects as in the gray phase.

During the breeding season the pouch of the female is lined with fine,

crinkled, woolly hairs of a rusty chestnut brown color. During the non-breeding period the pouch hairs are often gray or even whitish.

In fresh pelage the underfur is nearly clear white or grayish white. Later it takes on a yellowish cast, sometimes becoming decidedly yellowish white, particularly on the head and anterior half of the body. The sides of the neck are often buffy, varying from pale buff to orange buff.

Young.—Above uniform black with generally a few white bristly hairs scattered over the dorsal surface. In very young specimens the underfur is dingy gray; as the animal increases in size and the pelage becomes longer, the underfur becomes white at base with a broad terminal zone of blackish. The head has a distinct color pattern, being white with a broad brownish black stripe running from the ear to beyond the eyes, and an extension forward over the top of the head of the blackish color of the body, terminating in a pointed area about opposite the eyes. In other words, the cheeks are white; there is a broad white spot at the inner posterior base of the ears, and a white band above the black band that runs through the eyes. The ears are entirely flesh-color to the base, changing gradually to black in the adult, the black usually beginning at the base and spreading toward the tips, but sometimes first appearing as dusky blotches irregularly dispersed. The feet and the basal portion of the tail are black as in the adults. (See Plate XXV, Figs. 1, 2.)

Measurements.—As shown by the measurements given in Table III, the total length of the animal ranges in adult specimens from 820 to 940 mm. in the male, and from 725 to 850 in the female. The adult skull ranges in total length from 112 to 136 in the male, and from 103 to 120 in the female. The ratio of length of tail to that of the head and body is generally between 85 and 90.

Specimens examined:

Tamaulipas: Alta Mira, near Tampico, 4 specimens—2 in black phase, 2 in gray phase; also 1 additional skull.

Nuevo Leon: Monterey, 4,—1 black, 3 gray.

Chihuahua: Batopilas, 1, black.

Sonora: Hermosillo, 1, black.

Sinaloa: Sierra de Choix, 1, gray; Culiacan, 1, black; near Mazatlan, 2—1 black, 1 gray; Rosario, 1, gray; Escuinapa, 1, black.

Durango: Chacala, 1, black.

Zacatecas: San Juan de Capistrano, 1, gray.

Tepic: Tepic, 2—1 black, 1 gray.

Jalisco: Ameca, 2 skulls; Atemajac, 2, gray; Zapotlan, 1, gray; San Sebastian, 1, black; Etzaplan, 11,—all very young, in first (black) pelage; Guadalajara, 8, all gray, and 29 young, one fifth grown, in alcohol.

Colima: Armeria, 6—4 black, 2 gray; Manzanillo, 9, all black; also 3 additional skulls from Armeria and 7 from Colima.

Michoacan: Querendaro, 3, gray; Patzcuaro, 1, gray; Hacienda El Motino, 2, gray.

Guanajuato: Celaya, 1, black.

Queretaro: Jalpan, 1.

Hidalgo: Pachuca, 2, and 3 additional skulls; Rio del Monte, 1; Ixmiquilpan, 1; Tulancingo, 1, young; all the adults are in gray phase.

Mexico: Tlalpan, 3; Ameca, 1; Salazar, 1; all in gray phase.

Morelos: Yautepic, 1, gray.

Puebla: Atlixco, 2; Metlaltoyuca, 2; Chalchicomula, 1; Huanchinango, 1; San Marten, 1 (and 1 additional skull); all in gray phase.

Vera Cruz: Jico, 1, black; Las Vegas, 1, gray; Maltrata, 1; Minatitlan, 2; Orizaba, 2, gray, and 2 additional skulls.

Guerrero: Acapulco, 6—4 black, 1 gray, and 1 pure albino.

Oaxaca: Tuxtepec, 2 gray, 2 very young, and an additional skull; Cuicatlan, 1, gray; Oaxaca, 1, gray; Reyes, 3 gray, and 1 skull; San Domingo, 1, black; Tehuantepec, 2—1 black, the other gray.

Total, 106 skins, 22 additional skulls, and 29 young in alcohol.

Geographical Distribution.—The northern limit of the range of the *D. marsupialis* (= *californica* auct.) group begins on the coast of Texas near Nueces Bay, and doubtless occupies the coast region thence southward to Guatemala, and the interior tablelands across Central Mexico to the Pacific Coast, ranging on the west coast from the southern part of Sinaloa to Guatemala. The northern limit of its range in Mexico has not been definitely ascertained, but there are no specimens in the present collection from the northern tier of States, except from near their southern border. The most northerly points represented are Monterey, in Nuevo Leon; Hermosillo, in central western Sonora; and Sierra de Choix in the extreme northern part of Sinaloa. There is no record of the occurrence of any form of Opossum along the southern border of the United States west of Texas, the early vague references to the occurrence of *D. californica* in California being unsupported by modern research.

The number of specimens of this group at present available for study is about 220. Large portions of Mexico that are doubtless inhabited by this animal are entirely, or almost entirely, unrepresented, as, for example, the State of Tamaulipas, from which there are only a few specimens, from the vicinity of Tampico. Nuevo Leon is represented by only four specimens, from Monterey. There are none from Coahuila. Chihuahua is represented by a single specimen from near Batopilas, and Sonora by a single specimen from Hermosillo. The specimens from Sinaloa are all but one from near the coast of the southern portion. Several of the interior States also are practically unrepresented, as San Luis

Potosi, Durango, Guanajuato, and Queretaro, these States being each represented by a single specimen. There are numerous specimens from several points along the western coast, as Acapulco, Manzanillo, Colima, Armeria, and Mazatlan.

As shown later, a separable form occupies the Lower Rio Grande Valley, and another the coast region of Vera Cruz, Tabasco, and Chiapas.

Nomenclature.—As already shown (p. 164), it seems best to adopt, by the usual method of elimination for composite groups, Linnæus's name *D. marsupialis* for the large Mexican Opossums, considering the name as tenable on the basis of the Tlacuatzin of Hernandez, cited by Linnæus. While no definite type locality can be assigned, we may assume it to be that portion of Mexico known to Europeans at the middle of the seventeenth century, and hence assume as the type locality the region about the city of Mexico. The name heretofore usually employed has been *Didelphis californica* Bennett, based on a specimen "from that part of Mexico which adjoins California." The specimen was collected by Douglass on his journey across Mexico, but no definite localities have ever been given for the types of the various species of mammals based on the collections made by him during this trip. If they were taken in northwestern Mexico, as generally supposed, they must have been obtained from localities quite remote from the present State of California.

Mr. Bennett described in the same paper a *Didelphis breviceps*, also based on a specimen collected by Douglass. The alleged differences in respect to the proportions of the head with reference to the position of the ear might easily be due to bad taxidermy. In other respects the two alleged species agree very well for animals of this group. *D. pruinosa* Wagner was described from a specimen from "Mexico," no definite locality being indicated.

The specimens on which these supposed species were based were all in the gray phase of pelage, and are characterized by the great length of tail peculiar to the large Mexican Opossum. *D. breviceps* and *D. pruinosa* must apparently be construed as pure synonyms of *D. californica*, which name is here referred to *D. marsupialis* Linn. (restr.).

The *D. marsupialis* group, as thus restricted, is separable into several geographical races or subspecies, some of which can be

predicated on the basis of the present collection, while doubtless others will be made known later when a much larger amount of material, covering more completely the range of the group, and embracing proper series from a large number of localities, becomes available for elaboration. None of the names above cited can refer to any of these forms, but should the animal of the west coast of Mexico prove to be separable from that of the interior, as seems not improbable, Bennett's name *californica* may be employed for it, as it seems likely that Bennett's specimens were obtained there by Douglass.

Relationships.—It seems preferable to treat the Mexican *D. marsupialis* group as specifically separable from *D. virginiana* of the United States, although the characters that distinguish the two are mainly differences of degree, or comparative rather than absolute. The chief features of distinction between the two forms, are (1) the greatly increased length of tail in the *D. marsupialis* group, with the basal half, instead of only the extreme basal portion, black; (2) absence of white on the toes; (3) absence of white on the ears, although a slight white edging seems liable to crop out sporadically throughout the range of the species; (4) the increased width of the apical black zone of the underfur, which gives even in the gray phase a darker general effect to the coloration; and (5) the grayish dusky color of the whole front of the head, including the top and sides of the nose, and the presence of a well developed ocular stripe. In respect to the characters of the skull, the Texas specimens of the *D. marsupialis* group do not seem to differ appreciably from specimens of *D. virginiana* from central and northern Texas and elsewhere in the United States.

The relationship of *D. marsupialis* to the southern forms of the genus cannot be satisfactorily determined, owing to insufficient material from Central America. A series of four specimens from Nicaragua, however, and a few from Costa Rica, indicate an animal quite different from *D. marsupialis*, through its more slender form, as shown in the total length of the animal, in the higher ratio of tail length to that of the head and body, and in the narrower and longer skull, and also in the pointed form of the posterior border of the nasals. (See Plate XXIII, Fig. 5, and Plate XXIV, Fig. 3.)

Moult, and Variation with Age and Season.— In young specimens the first pelage consists of very short woolly hair, at first almost wholly blackish. As the hair increases in length it becomes lighter at the base, and later nearly pure white for about two thirds of its length. When the animal is a few weeks old the long coarse overhair begins to appear, being white or black according to the phase. By the time the animal is one fifth grown its pelage is similar to that of the adult and there is no further change except what results from fading and wear.

The present series of specimens does not afford satisfactory material for a complete study of the moult. From October till February the pelage is generally full and long. In March it often shows signs of wear, and by April becomes exceedingly worn and ragged. At the same time new hair can be seen coming in, at first in patches where the old pelage has been removed by accident. April and May specimens generally show new hair coming in, but whether a full summer dress is acquired remains uncertain. Through individual idiosyncrasy specimens occur sporadically from January to July that are very much worn, but in general there appears to be a renewal of the coat in April and May. August to September specimens also show new growth of hair, which continues to come in, at least in certain specimens, till late in October. By the end of October the full winter coat has generally been attained. It is interesting to note that the underfur in the new fresh coat is often nearly clear white, this condition occurring at widely separated localities. Later the underfur commonly takes on a slightly yellowish cast, which becomes more pronounced as the season advances, so that specimens in worn condition often have the underfur decidedly yellowish white, and the white overhair is often soiled or stained dingy yellowish. Quite a number of specimens, from various and widely separated localities, have the underfur of the head, neck, and shoulders quite deep buff, and the rest of the underfur more buffy than usual, due apparently to adventitious staining.

Dichromatism.—The large Mexican Opossums of the *Didelphis marsupialis* group are, like those of the *D. karkinophaga* group, subject to dichromatism, they presenting a gray phase and a black phase similar to the gray and black phases so well known to occur in various species of Squirrels. While the two phases

appear to be somewhat localized, they often occur together, specimens of each being collected at the same localities at practically the same dates. In the black phase the long overhair is black, but of about the same length and coarseness as the white overhair in the gray phase. The white overhair is more conspicuous owing to its contrast with the black surface of the underfur. In only a few instances do we meet with a mixed condition in which both coarse black and white hairs are intermixed. In such instances the white hair is very scanty and scattered. The gray phase appears to predominate throughout the interior of Mexico, including the whole tableland region, whence very few black specimens are represented in the present series. On the other hand, in the lower Rio Grande region of Texas, and along the eastern coast of Mexico, from southern Tamaulipas southward, and along the whole west coast from Guatemala to Mazatlan, the black phase is common, and at some localities appears to predominate.

Didelphis marsupialis texensis, subsp. nov.

Type, No. $\frac{88188}{45187}$, Biol. Surv. Coll. U. S. Nat. Mus., ♂ ad., Brownsville, Texas, April 13, 1892; F. B. Armstrong.

Similar in coloration to *D. marsupialis* (*typica*), but with a relatively longer tail, longer nasals, usually terminating posteriorly in an acute angle, instead of being rounded or more or less abruptly truncated on the posterior border.

Measurements.—Type, total length, 820 mm.; head and body, 410; tail, 410; tarsus, 70; ear, 50. Adult males range in total length from about 780 to 820 mm., and adult females from about 700 to 730 mm. The ratio of tail length to the length of head and body ranges, in normal specimens, from about 85 to 100. (For additional measurements see Table IV.)

Skull.—The nasals, with individual exceptions, terminate posteriorly in a pointed angle, the portion anterior to the point of greatest expansion being as long as, or a little longer than, the anterior half of the basal rhomboid.

Geographical Distribution.—The coast region of Texas, from Nueces Bay southward, and the Lower Rio Grande Valley, as far up the valley at least as Del Rio, Val Verde County. Sporadically northward to San Antonio, at which point *D. m. texensis* occurs with *D. virginiana*, the latter greatly predominating. It doubtless ranges somewhat to the southward of the Rio Grande, but there are no specimens available for examination from between Brownsville and Tampico.

Dichromatic, the black phase, in the material examined, prevailing in the ratio of five to one of the gray phase, as shown by the following record of

Specimens examined:

Texas: San Antonio, 2, black phase; Rockport, 3—2 in black phase, 1 in

gray phase; Corpus Christi, 4, black phase; Nueces Bay, 2, black phase Alice, 1, black phase; Sycamore Creek, 1, black phase; Del Rio, 2—1 in black phase, 1 in gray phase; Eagle Pass, 1, black phase; Fort Clark, Kinney Co., 8—4 black and 4 gray; Brownsville, 6—3 in black phase and 3 in gray phase. Also additional skulls.

Mexico: Matamoras, 1.

Total, 31, and 7 additional skulls.

Didelphis marsupialis texensis differs markedly from *D. virginiana* in the color and markings of the head, and in its much longer tail, but presents no notable cranial differences. It differs from *D. marsupialis* in the form of the nasals, in its somewhat longer tail, and in the great predominance of the black phase, the prevailing phase in *D. marsupialis* being gray.

Didelphis marsupialis tabascensis, subsp. nov.

Type, No. 100512, Biol. Surv. Coll. U. S. Nat. Mus., Teapa, Tabasco, Mexico, April 7, 1900; E. W. Nelson and E. A. Goldman.

A long-tailed form, with very long nasals, terminating posteriorly in a somewhat pointed angle. Apparently not very different in coloration from *D. marsupialis* (*typica*). Based primarily on seven specimens from Teapa and Frontera, Tabasco, to which are typically referable two from Papantla, three from Catemaco, and five from Mirador, Vera Cruz; also 25 from various localities in Chiapas and Guatemala, and 5 from Merida, Yucatan. Of these specimens rather more than one half represent the black phase. The February specimens are in fairly good winter pelage; the others, which were nearly all taken in April, are more or less worn. In many of the specimens the underfur, the sides of the neck, and the cheeks are more or less yellowish, in some of them strongly so, and in the Mirador specimens the buff tinge is especially strong, being deep buff on the head, neck, and front half of the body, and pale buff on the posterior half. Apparently, however, this strong buff tint is due to adventitious staining.

Measurements.—Type, total length, 902 mm.; head and body, 460; tail, 442; tarsus, 69; tail ratio, 96. Six males range from 850 to 919 in total length, and 415 to 463 in tail length, with a tail ratio of 95 to 107. Four females range in total length from 811 to 886, and from 368 to 431 in tail length, with a tail ratio of 95 to 112. (For further measurements, including measurement of skulls, see Table V,

Specimens examined:

Tabasco: Teapa, 5—3 black, 2 gray; Frontera, 2, black, and 1 skull.

Vera Cruz: Mirador (near Vera Cruz), 5—1 black, 4 gray, and 1 skull; Catemaco, 2—1 black, 1 gray, and 1 skull; Papantla, 2, gray.

Chiapas: Tumbala, 4, gray; San Cristobal, 1, gray; Ocozuatlan, 1 gray; Tajalon, 1, gray; Valley of Comitan, 1, gray; Ocuilapa, 1, gray;

Huehuetan, 7—3 black, 4 gray, and 3 additional skulls; Tuxtla, 5—1 black and 4 gray.

Guatemala (near Chiapas border): Jacaltenango, 3, black; Nenton, 1, gray; Escondido River, 1, very young; "Guatemala," without special locality, 4—3 gray, 1 black.

Total, 46 and 5 additional skulls.

Didelphis marsupialis tabascensis is a very strongly marked form, ranging, so far as present material shows, from the vicinity of Vera Cruz to Frontera, Tabasco, and across the State of Chiapas to northern Guatemala. The character of the long nasals, terminating posteriorly in a V-shaped angle, runs throughout the series with a small number of exceptions, while the specimens from the immediately adjoining localities to the northward and westward, in the States of Vera Cruz and Orizaba, are almost uniformly characterized by short nasals more or less truncated posteriorly. The form of the nasals is thus much as in *D. virginiana* and *D. m. texensis*, or even in *D. richmondi* from Nicaragua and Costa Rica. The increase in the length of the nasals, in this as in other forms with long nasals, is not due to any increase in the length of the rostral portion of the skull but to the greater posterior extension of the nasal bones.

The variation in the form of the nasals in *D. marsupialis* and its subspecies is summarized, in comparison with *D. virginiana*, in the following tabular statement:

RATIO OF NASALS TO THE BASAL LENGTH OF SKULL.

	No. of Specimens.	Locality.	Ratio.
D. virginiana	32	Northern United States	51
D. v. pigra	16	Florida	50.4
D. marsupialis	4	Tamaulipas	47
" "	7	Oaxaca	45.6
" "	1	Puebla	48.7
" "	6	Hidalgo	49.1
" "	7	Guerrero and Michoacan	47.9
" "	15	Colima	47.5
" "	10	Jalisco	46.3
" "	6	Sinaloa	49
D. m. texensis	15	Rio Grande Valley, Texas	50.5
D. m. tabascensis	14	Vera Cruz (coast region)	50.8
" " "	7	Tabasco	51.2
" " "	9	Chiapas	51.3

Didelphis richmondi, sp. nov.

Type, No. $\frac{88186}{48140}$, U. S. National Museum, ♀ adult, Greytown, Nicaragua, Feb. 7, 1892; collected by Dr. Charles W. Richmond.

Adult.—The long bristly overhair is black and yellowish white, that of the nape and shoulders mainly black, in contrast with that of the rest of the dorsal surface; generally the white overhair is more abundant than the black; underfur coarse, yellowish white for the basal two thirds tipped with black; extreme basal half dingy greenish orange; sides of the head to the posterior base of the ears soiled pale buffy white, separated by a distinct median stripe of black running forward to a little beyond the eyes; an ocular band of blackish, running from the ear to the base of the whiskers; cheeks soiled buffy white; underparts with the pectoral area, including the sides of the neck, buffy at the surface, with the pelage brownish yellow of the basal two thirds; legs and feet black; nails yellowish white; ears wholly black; tail with the basal half black, the rest flesh-color.

Young.—A young specimen, about one fourth grown, is similar to the adult, except that the coarse overhair is more abundant, and it presents the same contrast of black predominating anteriorly and yellowish white posteriorly. The underfur is stained deep orange buff as in the adult; lower parts deeper buff than in the adults without the dusky tipping to the hairs.

Measurements of type.—Total length, 948 mm.; head and body, 471; tail, 477; tarsus, 70. Skull, total length, 114; basal length, 104; nasals, 54; zygomatic breadth, 55; length of palate, 65; upper toothrow, 37.4. (For additional measurements see Table V.)

This species is based on four skins with skulls and two additional skulls, from Greytown, Nicaragua, collected by Dr. Charles W. Richmond, for whom the species is named. The skins comprise three adult females and a young male about one fourth grown. Three of the specimens are quite similar in coloration, having a well defined median black stripe on the head and a dusky stripe from the ear through the eye to the base of the whiskers, between which markings the color is pale buffy white. Another adult in very worn pelage is similar in markings, but almost entirely lacks the long overhair, which has apparently been worn off. I also refer here two very young specimens from Costa Rica, formerly identified by me as *D. aurita*, on account of the yellow color of the ears, and also six adults from Costa Rica, collected by the late Dr. Gabb near San José.

Didelphis richmondi differs from *D. marsupialis* in the more slender form of the skull, which is long and narrow, with very long nasals, and in the great length of the tail. It also differs in

the dull greenish orange-buff color of the basal portion of the underfur; also in the very strongly defined median black stripe running over the top of the head from a point a little in front of the eyes to the occiput, and in the nape and shoulders being nearly black in contrast with the rest of the dorsal surface, the coarse overhair being almost wholly black on the anterior portion of the body and mainly whitish on the posterior. The amount of black at the base of the tail varies from about one third to two thirds of the total length of the tail. The ratio of tail length to the length of head and body averages, in the three adult specimens, 112, while the ratio of the length of the nasals to the basal length of the skull is 53.5.

In short, *D. richmondi* is much more closely related to the *D. karkinophaga* group than to *D. marsupialis*, sharing with the members of the *karkinophaga* group the dingy orange-buff color at the base of the underfur. In general features *D. richmondi* most closely resembles *D. k. caucæ* from the upper Cauca Valley of western Colombia, but differs from this form in its much larger size and slenderer form, the relative length of the nasals and tail in *D. caucæ* being nearly the same as in *D. marsupialis*.

Note on *Didelphis pernigra*.

In this connection it may be added that the distinctness of *D. pernigra* from all other forms of *Didelphis* is emphasized by this further study of the group, its distinctive features being, as already stated, its small size, very long tail, peculiar coloration and pelage. The black overhair of the pelage in *D. pernigra* is less stiffened than in the other forms of *Didelphis* and hardly corresponds in coarseness and harshness to the overhair in the other forms of the genus. To emphasize its differences in size and proportions, a table of measurements (see Table VI) and also illustrations (Pl. XXIV, Figs. 1–1*a*) are added for comparison with the other forms.

It has also become evident that dichromatism prevails in the various forms of the *D. karkinophaga* group, at least so far as those of northern South America are concerned, though not before recognized. It occurs in the Trinidad form, provisionally taken to represent *D. karkinophaga*, in the absence of satisfactory material from Guiana; it occurs also in *D. k. colombica*,

where, however, the black form prevails; and also in *D. k. caucæ*, where the two phases are about equally represented. It has heretofore been very difficult to account, for example, for the occurrence of black and gray specimens among the very young specimens as well as among the adults, but from this point of view the matter becomes very simple. The type of *D. caucæ*, it may be added, is a specimen in the gray phase, while the type of *D. colombica* is a worn specimen in the black phase.

Explanation of the Tables of Measurements, etc.

All the measurements are in millimetres. In measuring skulls the total length is taken from the front border of the premaxillaries to the posterior border of the occipital crest. In young animals, which have just acquired m^4, this is often less than the basal length, but in animals more advanced in age, and especially in very old individuals, it exceeds by about 10% the basal length. Basal length, in the present paper, is the basal length of Hensel, and is taken from the inner base of the upper incisors to the front border of the foramen magnum. The other skull measurements require no special explanation.

In all skulls of which measurements are tabulated the fourth molar has reached its full development. In the 'sex and age' column ad. y. = young adult; ad. m. = middle-aged adult; and ad. o. = very old adult.

The external measurements are in every case those taken by the collector from the fresh specimen. In most cases only three measurements appear to have been taken, namely, the total length, the length of the tail, and the length of the tarsus. For purposes of comparison, and in the computing of ratios, it has been found convenient to separate the length of the head and body, which is found by subtracting the tail length from the total length.

The source of the material used is indicated by prefixing to the numbers the letter A to distinguish the specimens from the American Museum of Natural History. All those not thus distinguished are from the Biological Survey Collection in the United States National Museum, Washington, D. C.

In the case of fractional numbers, the number above the line refers to the skull and the number below the line to the skin.

Postscript

Since this paper was put in type I have received through the kindness of Dr C. Hart Merriam, Chief of the Biological Survey of the United States Department of Agriculture, five specimens of *Didelphis* collected by Messrs. E. W. Nelson and E. A. Goldman, at Chichenitza, Yucatan, and Apozote, Campeche, during January and February, 1901. These specimens, with others from Merida, Yucatan, indicate a form distinctly separable from any heretofore recognized. It may be characterized as follows :

Didelphis yucatanensis, sp. nov.

Type, No. 100299, Biol. Surv. Coll., U. S. Nat. Mus., ♂ adult, Chichenitza, Yucatan, Jan. 29, 1901 ; E. W. Nelson and E. A. Goldman.

Nearest in size and external features to *D. caucæ*, but much smaller. Coloration and character of pelage not especially distinctive. Dichromatic, both the black, and the gray phase being about equally represented. Nose and nails flesh color ; ears, feet, and basal half to three-fourths of tail black. Size, very small, intermediate between that of *D. caucæ* and *D. pernigra*, and hence a pigmy in comparison with *D. richmondi* and the various members of the *D. marsupialis* group, which widely separate it geographically from *D. caucæ*, which latter is also much larger than *D. yucatanensis*.

External Measurements.

Nat. Mus. No.	Locality.	Sex.	Total length.	Head and body.	Tail.	Tarsus.	Tail ratio.
108296	Apazote, Campeche..	♂ juv.	685	373	312	58	83
108297	" " ..	♂ juv.	634	312	322	54	103
108298	Chichenitza, Yucatan.	♂ ad.	756	363	393	60	108
108299	" "	♂ ad.	680	364	316	60	87
108300	" "	♀ ad.	697	327	370	55	113

Measurements of Skulls.

Nat. Mus. No.	Sex.	Total length.	Basal length.	Nasals, length.	Zygom. breadth.	Mastoid breadth.	Palatal length.	Tooth-row.	Molar series.
108298 [1]	♂	100	90	46	48	29.4	52	34	19
108299 [1]	♂	99.5	89.5	42	51.6	30	55	34.6	19
108300 [1]	♀	88	81.5	40	42	26	52.5	33	19.3
13476 [2]	♂ ad.	106	95	46.5	56	31	54	36	20
$\frac{27988}{11425}$ [2]	♂ ad.	104.6	—	46	57.6	32.3	55	32	18
$\frac{27989}{11426}$ [2]	♂ ad.	103.3	—	46.3	53	30	55.6	34	19

[1] Chichenitza, Yucatan. [2] Merida, Yucatan.

This species is based on three specimens from Chichenitza, Yucatan (the type locality), four from Merida, Yucatan, two from Apazote, Campeche, and one labeled simply "Campeche." All are fully adult, with the crests of the skull highly developed and the teeth more or less worn, except the Apazote specimens, in which m 4 is in sight but not fully grown. Of these ten specimens five are in the gray phase and five in the black phase of coloration. The skins give the impression of a small, slender, delicately formed animal, a feature well borne out by the skulls.

Didelphis yucatanensis appears to be a very distinct form, characterized especially by its small size, as compared with *D. tabascensis*, found in the adjoining portions of Mexico and in Guatemala, and *D. richmondi* of Nicaragua, by which it is geographically isolated from the small forms occurring in western Colombia and Peru. It differs in the form of the nasals from true *D. marsupialis*, which are pointed posteriorly instead of being bluntly obtuse or more or less truncated on the posterior border. In other words, they are of the usual or normal form for the genus, as seen in *D. virginiana*, *D. richmondi*, and *D. tabascensis*, etc.

I.—Didelphis virginiana.

Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. br'dth.	Postorb. proc.	Postorb. constric.	Mastoid br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m^4, outside	Palate. Br'dth at m^4, inside.	Toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
A 7378/6671	Elizabeth, N. J.	♂ ad. y.	113	101	53	18	5.3	63.5	26	12	35	21	62	35	21	38.5	21	—	—	—	—	—	52.5	61	62.9
A316	Miller's Place, N. Y.	♂ ad. m.	128	115	62	22	7.5	72	29	11.5	37	24	68	35	21.5	40	21	—	—	—	—	—	54	59	62.6
A2855	Long Island, "	♂ ad. m.	114	104	53	17	5.4	62.5	25	12	33	20	63	34	22	39.5	22	—	—	—	—	—	51	65.8	60
56569	Montauk Point, "	♀ ad. m.	114	104	54	17	5.5	56.5	23.7	11.3	32	18	63	34	21	39	21.5	730	475	255	65	63	52	65.8	54.3
A317	Miller's Place, "	♀ ad. y.	105	94	51	18	5.3	56	22	11	31	18	58	34	20	38.5	22	—	—	—	—	—	54	62	59.5
A16608	Schoharie, "	♂ ad. m.	118	105	56	21.5	6	—	26	11.5	34.6	21.7	65	34	21.5	—	—	—	—	—	—	—	51	62	59.5
A16664	Fort Montgomery, N. Y.	♂ ad. m.	115	104	54	19	6	60	24.3	11	33.4	20	65	34	19.5	41.6	23	—	—	—	—	—	52	62.5	57.7
A1175	Garrettsville, O	♂ ad. y.	115	106	56	22	7	65	27.4	11	35	20	64	34	20	40	22	—	—	—	—	—	51	60	61.3
A1176	" "	♂ ad. m.	118	110	58	19	6	63.5	24.5	11	36	21	65	35	20	41	23	—	—	—	—	—	52.7	59	56.8
A1173	" "	♀ ad. m.	118	109	54	17	6	62	24	12	37	20	67	36.5	24	42	21	—	—	—	—	—	50	61.5	57
47137/47137	Golden City, Mo.	♀ ad. m.	118	108	48	17.5	5.5	57	24	11.6	32.5	18	61	32	19	38	20.7	774	469	305	69	61	44.4	56.5	50
38678/38678	Hartshorne, I. T.	♀ ad. m.	105	96	50	16	5.4	56.3	24	13	32	17.5	60	34	20	39.5	21.3	750	435	315	65	73	52	62.4	59
A16594	Hatteras, N. C.	♂ ad. m.	131	116	61	20	6	69	27.5	11	39.5	23	70	37	24	41	23	871	518	353	65	64	52.6	60.3	59.5
A16595	" "	♂ ad. m.	124	—	56	22	7	70	29	12	38	22	67.5	33	20	40	21	640	370	270	65	73	—	—	—
42068/33666	Riceboro, Ga.	♀ ad.	117	100	51	18.5	5	57	25	13	33	18	61	33	20.5	40	22	747	437	310	66	70	51	61	57
46895	Danville, Tenn.	♂ ad. o.	122.5	111	56	20.5	5	69	28	11.5	34.3	22.3	65	35	21	39	22	785	465	320	52	71	50.4	58.6	62
47768	Clarkville, Tenn.	♀ ad. m.	111	102	51	18	5.5	59	25	12	34	20	64	35	22	40	21	750	440	310	60	70	50	62.7	57.8
47122/47122	Big Sandy, "	♀ ad. m.	106	99	49	17	5.7	57	23	12	33	19	60	34	20.5	38	21	740	430	310	66	72	49.4	61.6	57.5
A 8852/10339	San Antonio, Texas	♂ ad. m.	120	113.5	55	20	7.5	69	26	13	36.6	24	64	33	19	38	21.3	—	—	—	—	—	48.4	56.3	66.6
A 8852/10340	" "	♂ ad. m.	129	118	60	21	7	66	30	12	38	23.7	71	32	20	42.5	22	864	472	394	75	71	50.8	60	56
A 8851/10338	" "	♂ ad m.	125	114	59	22.3	6	63	30	12	38	24	70	36	21	41	22	787	482	305	70	70	52	61.4	55.2
A14827	" "	♀ ad. m.	118.5	100	50	17	6	55	22	11.5	33.5	20	61	33	22	39	21	—	—	—	—	—	50	61	55
A 8854/10341	" "	♀ ad. m.	117.5	103.6	54	18	6	62	24	11	35	20	63	33	19.5	34.5	21	—	—	—	—	—	52	60.8	59.8
A8804	" "	♀ ad. m.	119	109	56	22	8	61.6	28	12	34	20	67	34	19	39.5	22	—	—	—	—	—	51.4	61.5	56.5
97149	Virginia Point, Galveston Co., Texas	♂ ad. m.	131	119	59	20	8	65	26	11	36	26	70	35	21	40	22	830	480	350	80	73	50	59	54.6

I.—Didelphis virginiana (concluded).

Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m^4, outside.	Palate. Br'dth at m^4, inside.	Upper toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	External measurements. Ear.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
44961	Dickinson Bay, Galveston Co., Texas	♀ ad. m.	116	105.5	55	20	6	61	28	11.4	35	24.5	66	—	—	40.5	21	820	500	320	62	—	64	52	62.5	57.9
65057	Vernon, Wilbarger Co., Tex.	♂ ad. m.	128	116.5	58	22	7.7	72	29	11	39.5	24	68	35	21	41.5	23	—	—	—	—	—	—	50	58.4	61.8
44833	Velasco, Brazoria Co., "	♀ ad. o.	116	105	52	16.5	5	58	22	12	34	19	65	32	19	37	20	—	—	—	—	—	—	49.4	62	55.2
44285	Deming Station, Tex.	♂ ad. y.	112	103	52	17	6	60	24	11	34	21	61	34	—	41	22	770	470	300	66	—	64	50.5	59.2	58.2
44286	" "	♂ ad. y.	111	103	50	18.6	6.5	59	23.7	11.5	33.5	20.7	61	33	20	39.5	21	770	450	320	76	—	71	48.5	59.2	57.2
44289	" "	♀ ad. m.	109	98	50	18	6	55.5	21.4	12	32.5	18	60	33	19	38.3	21	770	468	302	70	—	65	51	61.2	56.6

II.—Didelphis virginiana pigra.

Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m^4, outside.	Palate. Br'dth at m^4, inside.	Upper toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	External measurements. Ear.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
97096	Iowa Station, La.	♂ ad. m.	124	112	57	20	6	66	29.3	11.4	37	24	66	34	21	40	22	—	—	—	—	—	—	51	50	50
99970	Calcasieu Pass, La.	♂ ad. m.	120	100	50	16	6	55	23	11	33	18.6	62	32.5	19	39	21	—	—	—	—	—	—	50	62	55
46043	Houma, La.	♂ ad. m.	115	107	51.5	11	6	62	22	10.5	35	22	64	32.5	20	37	20	—	—	—	—	—	—	48	60	58
42289	" "	♀ ad. y.	107	97	48	18	6	54	23	12	30	19	60	32	20	38.5	21	690	404	286	60	—	71	49.6	62	55.6
46381	Lafayette, La.	♀ ad. m.	108	97	47	16	5.5	52	21.7	11.5	31.5	17	61	30	18	39.5	21	751	417	334	66	—	80	47.4	63	53.6
41401	Bay St. Louis, Miss.	♂ ad. m.	131	115	60	20.7	7	69	26	11	35.9	24	68	35	20	40	22	825	495	330	75	—	67	52	59.2	60
41402	" " "	♀ ad. m.	110	101	52	17	6	56	20	11.8	31	19	61	33	20	38	21	765	445	320	70	—	74	51.5	60.4	55.4
44057	Sylacuga, Ala.	♂ ad. m.	117	107	55	17	6.5	62	25	12	35.5	20	68	33	—	41	22	—	—	—	—	—	—	51.4	63.5	58
44058	" "	♀ ad. m.	105	96	49	16	6	—	22	11	35	22	59	31	—	40	21	—	—	—	—	—	—	51	61.5	—
71753	Key West, Fla.	♀ ad. m.	103	95	45.5	17	6.5	54	22	11	33	19	53	31	19.5	38	22	714	422	292	66	—	70	48	55.8	51.6
63998	Fort Kissimmee, Fla.	♂ ad. m.	121	111	54	19	6.5	62	27	12	35	19.5	67	34	20.5	39.5	21	—	—	—	—	—	—	49.6	60.4	55.9
63997	" "	♂ ad. m.	122	110	58	19	6	61	25.5	12	35	22	67.5	33.5	20	41	22	—	—	—	—	—	—	52.7	61.4	55.5
79116	Lake Harney, "	♂ ad. m.	122	111	58	19	6	63	24	12	37	22	66	34	20	40.5	22	793	482	311	63	56	64	52.2	60	56.8
79113	" "	♂ ad. m.	115	105	55	15	5.7	52	22.3	11	33.7	19	65	32	19	39	21	816	480	336	63	53	70	52.4	62	49.6
79114	" "	♀ ad. m.	106	96	48	16	5	51	21.5	11.7	30	17	60	31	19.5	38.5	21	718	431	287	63	56	67	50	61.5	53
A14335	Henderson Camp, Fla.	♂ ad. m.	121	—	55	21	7	64.5	25	11.5	35	22	67.5	33	18.5	39	22	—	—	—	—	—	—	—	—	—
A1165	Gainesville, Fla.	♂ ad. m.	121	110	54	20	6	61.5	26.7	12	35	21	65	35	21	41	22	860	515	345	—	—	67	49	59	55

III.—Didelphis marsupialis.

Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m 4, outside.	Palate. Br'dth at m 4, inside.	Upper toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
48740	Hermosilla, Sonora, Mex.	♀ ad. o.	121	108	51	17	7.6	55	25	10	36	20	65	33	20	35.5	21	912	497	415	76	84	47.2	60.2	51
33705	Monterey, Nuevo Leon, Mex.	♂ ad. m.	116	111.5	51	17	7	59	26	10.5	34	20	62.5	32.5	19	36	20	816	426	390	70	91	45.8	56	53
33136	" " " "	♀ ad. m.	103	95	45	20	5.6	50	24	12	32	18	59	31	20	35	19	645	349	296	56	84	47.4	62	52.7
32951	Altamira, Tamaulipas, "	♂ ad. o.	116	104	49	17	6	60	24	11.5	34	22.5	63	33.6	—	37	20	802	442	360	70	81	47	60.6	57.7
25558	" " "	♂ ad. m.	108	99	47	14	6.5	62	22	11.5	32.5	20	59	31	19	34	20	885	448	437	70	98	46	59.6	52.5
94092	" " "	♀ ad. m.	100	94	44	13	5	48	22	12	30	17.8	59.5	30.7	18	37	20.7	756	411	345	66	84	47	63.3	48
92963	" " "	♀ ad. o.	108	100	47	15	5	50	27	11	32	20	62	31	18.4	37	21	—	—	—	—	—	47	62	50
92964	" " "																								
95962	" " "																								
90988	San Juan Capistrano, Zacatecas, Mex.	♂ ad. m.	107.5	96	47.5	14	6	52	22	10	31	18	58	26	16.5	34	19	805	403	402	65	100	49	60.4	54
96820	Culiacan, Sinaloa, Mex.	♂ ad. m.	118	105	53	18	7	59	26	10.5	37	21.5	64	31	18.5	36	19	849	427	412	69	96	50	61	56
91170	Rosario, " "	♀ ad. o.	109	99	48	17	6.4	52	24.5	11	33	20.4	62	31	20	36.5	20	835	433	400	66	94	47.3	62.6	52.5
96821	Mazatlan, " "	♀ ad. m.	105	94	46	14	5	49.6	21	10.5	32	18.5	54	30.4	20	36.5	20	840	435	405	65	93	49	57.4	51.7
96822	" " "	♀ ad. y.	90	83	41.5	11.5	4.5	44	21	11	28	15.3	53	28.5	17	34	19	—	—	—	—	—	50	64	53
98077	Escuinapa, " "	♀ ad. o.	114	102	49	15	6.5	52.6	24	10	35	20	63	31	19	36	19.6	830	460	366	—	80	48	61.7	51.6
96225	Sierra de Choix, Sinaloa, Mex.	♀ ad. y.	91.5	84.4	42	13	6	41.5	20	11	28	15.5	52.5	29	17.5	34	19.5	752	395	357	61	90	50	62.2	49.2
96819	Chacala, Durango, Mex.	♂ ad. m.	117	106	51	19	9	62	26	11	35	22	62	31.5	20	33	19	843	429	414	64	96	48	58.5	58.5
51506	Amecameca, Fed. Dist., Mex.	♂ ad. m.	115	107	51	17	6	60	25	11	38	21	65	31	18.5	37	20.5	850	455	395	76	87	47.3	60.8	56
33832	Pachuca, Hidalgo, Mex.	♂ ad. m.	98	90	44	12.6	6	50	21	10.5	31	16.3	58	31	18	36	20	805	435	370	63	85	49	64.4	55
36416	Real del Monte, Hidalgo, Mex.	♂ ad. m.	92	84	41	12.6	4.5	48	18	11.4	29	17	53	24	18	32	19.4	693	361	332	60	96	49	63	57
38833	Pachuca, Hidalgo, Mex.	♀ ad. m.	102	92.5	47	14	5	46.5	20	10	31.5	17	57	29	17.5	35	20	—	—	—	—	—	50	62	50
38426	" " "	♀ ad. m.	96	90	44	14	5	47.5	20	10.7	30	16	55	28.5	17	36	20	—	—	—	—	—	49	61	52.7
52699	Pachuca, Hidalgo, Mex.	♂ ad. o.	124	111	54	17	6.5	60	27	11	36	22	68	33	21	40	21	855	460	395	73	86	48.7	61.3	54
51865	" " "	♀ ad. m.	105	92.5	45	14.5	5	50	23	12	32	18	61	30.7	20	37.3	20	773	441	332	64	75	48.7	66	54
92978	Metlaltoyuca, Puebla, Mex.	♂ ad. m.	123	115	52	17.3	7	64	26	11	37	25	70	36	20	39	20	802	435	367	66	82	45.2	60.8	54
55579	San Martin, " "	♀ ad. o.	120	111	53	16.5	6	58	26	13	36	20	68	34	20	41	21	850	465	385	70	83	47.7	61.3	52
65954	Tuxtepec, Oaxaca, Mex.	♀ ad. m.	112	105	51	14	6.5	53.5	21	11.5	34	19.5	65	34	20	40.5	21	—	—	—	—	—	—	62	—
65955	" " "	♂ ad. m.	131	118	56	18.5	7	67	30	12	41	23	71	33.5	21	40	22[1]	930	484	446	80	92	47.5	60	—
65542	" " "																								
73490	Tehuantepec " "																								
73708	San Mateo del Mar, Oaxaca, Mex.	♂ ad. m.	113	96.5	42	16	6.5	59	24	9.6	33.6	20	58	32	19	35	20.5	—	—	—	—	—	—	—	—
73491	Guichecovi, Oaxaca, Mex.	♀ ad. m.	113	106	52	16	6	56.5	25.3	12	34.3	19.5	66	34	21	39	21	853	483	370	70	76.5	49	62	50
73492	" " "	♂ ad.	106	96	42.5	16	6	56	23	12	32	21	60	31	19	39	22	755	370	385	69	104	44.3	62.4	53
69798	Cuicatlan " "	♀ ad. m.	102	95	45.5	16	6	51	25	11.5	30.5	18.6	60	30.3	18.5	35	19.5	805	393	412	69	105	48	64.2	54
69799	" " "	♂ ad. m.	118	109	52	18	7.5	65	28.6	11	38	24	64	32.6	20	37	21	—	—	—	—	—	47.7	59	60

[1] *Five* molars.

III.—Didelphis marsupialis (continued).

Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m^4, outside.	Palate. Br'dth at m^4, inside.	Upper toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
45300	Armeria, Colima, Mex.	♂ ad. o.	127	114	52	20	8	67.5	30	12	38.5	26	67	34	21	37	20	—	—	—	—	—	45.6	59	59.2
35574	" " "	♂ ad. o.	117	109	45	18	6	61	26.6	10	31	22.5	64	31	19	37	20	855	439	416	79	95	41.3	59	56.5
35573	" " "	♂ ad. o.	117	108	48.5	16.5	7	58	24	10.5	35	22	67	32.5	20	39	21	882	463	419	71	90.5	45	66.7	53.7
35568	" " "	♀ ad. o.	111	100	48.5	16.2	6	53	24	11	34.5	20	62	30.5	19	35.5	19.5	870	448	432	67	96	48.5	62	53
45270	" " "	♂ ad. m.	109	101	50	14	5.3	55	24	11	33.5	20	61	30	18	20	20	—	—	—	—	—	49.5	60.4	54.4
45294	" " "	♂ ad. o.	112	101.6	48	18	7.5	58.5	26	19.5	34	20	63	31.3	19	36	—	—	—	—	—	—	47	62	57.6
45296	" " "	♂ ad. m.	106	96	48	16	6	53	24	10.3	34	19	59	30	17.4	37	20	—	—	—	—	—	47.2	61.4	55.2
45298	" " "	♂ ad. y.	105	95	46.5	15.5	6	57.3	25	11	32.3	19	58.5	31	16	36	21	—	—	—	—	—	49	61	60.3
45297	" " "	♂ ad. m.	105	95	46	15	5.7	54	22	11	31	18	58	32	18	36	20.3	—	—	—	—	—	48.8	61.6	56.8
45295	" " "	♂ ad. y.	102	94	45.6	15	6	51.3	22	10	31.3	17	57	30	17	35.4	20.5	—	—	—	—	—	48.5	60.6	54.6
45293	" " "	♂ ad. m.	100	91.5	41.6	13.5	5.8	46	21.6	12	30	16.5	58	31	17	38	21.3	—	—	—	—	—	45.7	63.4	50.3
45260	Manzanillo "	♂ ad. o.	125	111	58.7	15	8	63	27	10	36	22	66	30	19	36.5	20	932	487	445	73	91	52.9	59.5	56.8
45257	" " "	♂ ad. o.	122.5	108.5	53	17.6	7.6	65.5	27	10.5	38	24	66	33.5	19	36	20.2	690	425	365	56	87	48.8	60.8	60.4
45259	" " "	♂ ad. m.	117	—	43	14	6	52.5	22	11	32	19	60	30.6	18	36	20	780	405	375	62	92	—	—	—
45258	" " "	♂ ad. y.	100	91	44	16	6	53	22	12	32	18	56	33.5	—	33.6	19.7	792	412	380	67	92	48.3	61.5	58
45262	" " "	♀ ad. o.	107	97	44	16.5	7	59.3	23	11.4	32	19.5	59	31	19.6	35.5	19	812	414	398	62	93	45.3	60.8	61
45263	Atemajac, Jalisco, Mex.	♀ ad. o.	117	109	52	19	6.5	61	25	10	36	21.5	63.5	30	19	35	20	872	474	398	72	84	47.7	58.3	64
45330	" " "	♂ ad. y.	110	92	46	15	5.5	55	23	11	32	19	57	31.5	19	35	20	728	367	361	66	98	50	62	60
35677	Zapotlan, "	♀ ad. o.	96	88.5	41	18.5	5	50	22	11	30	17	55	31	20	35	19	755	383	372	62	97	46.3	62.2	56.5
88142	San Sebastian, "	♀ ad. m.	93	85	40	18.5	5	47	21	11.5	30	15	55	30	17.5	34	19	718	348	370	60	106	47	64.7	55.3
A16625	Guadalajara, "	♀ ad. m.	92.5	89	41	14	5	47.3	21.5	11.3	29	16	56	29	19	36	20	—	—	—	—	—	46	64	53
A16626	" " "	♀ ad. m.	96	90	41	16	5.3	50.5	21	11.3	30	18	56	30.5	19	35	19.7	—	—	—	—	—	45.5	62.2	56
A16627	" " "	♀ ad. o.	98	91	39.5	14.3	6	48.7	21	11	31.3	17	57	30	18	35	20.6	—	—	—	—	—	44	62.6	53.5
A16628	" " "	♀ ad. m.	100	93	41	15	6	48	21	11.6	31	16.5	52	30	18	35	20	—	—	—	—	—	44.2	56	51.6
A16629	" " "	♀ ad. m.	95	89	42	14.5	6.5	50	22	10.5	30	18	54	29.5	18	33.5	19	—	—	—	—	—	47.2	60.7	56
A16630	" " "	♀ ad. o.	97	88.5	40	15	6	51	22	11	31	16.5	56	31	18	34	19.5	—	—	—	—	—	45.2	64.4	57.6
47912	Querendaro, Michoacan, Mex.	♂ ad. m.	115	105	48	15	7.3	53	24	11	34	20.3	64	32	20	37	20.7	850	449	401	67	87	45.7	61	50.5
47911	" " "	♀ ad. m.	102	93	45	16	5.5	52	22.5	11.2	33	17	57	31	18.5	36	20	750	385	365	63	94	48.4	61.3	56
35527	" " "	♀ ad. o.	104	94	45	16	6	52	23	12	33	20	60	30	19	36	20	755	413	342	65	83	48.5	63.8	50
47910	" " "	♀ ad. m.	98	91	45	15	6	52	23	11	32	19	56	30	18	36	20	910	508	402	73	80	49	60	56.4
35528	" " "	♂ ad. o.	122	110	54	20	8	62	30	12	36.5	24	66	31	20	37.5	20	804	435	369	66	85	48.4	63	53.7
70617	Acapulco, Guerrero, Mex.	♂ ad. y.	110	95	46	16	6	51	23	11	31	18.5	60	31	19	37	20.4	839	439	400	64	84	49	64.6	52
70619	" " "	♀ ad. o.	105.5	96	47	16	6	50	23	11	32	19	62	30.5	18.5	36.3	20.3	835	455	380	65	84	46.5	60	51
70620	" " "	♀ ad. m.	108	100	46.5	16.3	7	51	24.6	10.7	32	18	60	30.5	19.3	35	20	845	387	458	70	82	49	60	59.6
70618	" " "	♂ ad. o.	130	114	56	20	8.5	67	25	10.4	38.7	24	68	34	23	37	19	—	—	—	—	—	47	61.5	53
58415	Orizaba, Vera Cruz, Mex.	♀ ad. m.	111	97.5	46	15	6.3	52	23	10	33.5	23	59	31.6	20	37	20.5	—	—	—	—	—	48	64.5	57.5
58165	" " "	♂ ad. y.	107	98	47	16.4	6	53.5	25	10.3	34.6	20	61	33	20	37.5	21	830	338	492	67	69	48.4	69	57
58162	" " "	♀ ad. m.	110	99	48	16	7	56	22	12	33	20.3	61	34	21	37	20	940	405	535	78	76	45.3	60	54
58416	" " "	♂ ad. o.	136	128	58	19	8	69	28	10.5	42	28	76	34.5	22	39	20.5	889	364	515	78	70	46	67.5	60.8
54989	Jico, " "	♂ ad. o.	122	113	52	16	7	62	25	11.3	35	22	69	—	—	37	21								
78123	Minititlan, " "																								

IV.—D. MARSUPIALIS TEXENSIS.

	Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. breadth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m^4, outside.	Palate. Br'dth at m^4, inside.	Upper toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
Didelphis m. texensis	45137	Brownsville, Tex.	♂ ad. m.	121	110	52	18.5	6	57	27	11.4	36.5	21	64	32	20.5	37	20	820	410	410	70	100	46	58	51.8
	35134	" "	♂ ad. y.	111	100	52	16	6.7	59	25	11.6	35.3	20	60	30	18.5	35	19.3	810	460	350	68	80	52	60	59
	35135	" "	♂ ad. y.	95	87	41.5	15	5	46	27.7	10	29	17.3	53	30	19	35	20	700	380	320	60	84	48	60.9	53
	35136	" "	♀ ad. y.	99	89	43	14.7	6	46	21	10	28.3	16	56	29	18	35	20	800	400	400	60	100	48	63	51.7
	35138	Matagorda, "	♀ ad. y.	96	90	42	15	5	47	23.4	11.3	30 5	17.5	54	30	18	33.5	20.6	710	360	350	60	97	46.6	60	52.2
	35137	" "	♀ ad. m.	116	107	50	19	7	60.5	28	12	35	20	66	36	21	38	21.6	820	505	315	66	62	46.7	61.7	56.5
	32431	" "	♂ ad. o.	120	109	54	20	6	70	27	12	34.5	23.5	65	35	21	37	20.6	—	--	—	—	—	49.5	59.6	64.2
	44235	Port Lavaca "	♂ ad. m.	128	117.5	57	21	6.5	68.3	27.6	11	38	24	70.5	35.5	20.5	40.5	23	—	—	—	—	—	48.5	60	58
	30708	Sycamore Creek, Tex.	♂ ad. y.	112	103	57	17	6	52	26.7	11.3	31.5	19	62	31	19	38	20.6	730	370	360	71	97	55	60.1	50.4
	31765	Del Rio, Val Verde Co., Tex.	♂ ad. m.	108	96	48	17	6	54	24.5	11	32	20	58	32	20	36	20	—	—	—	—	—	50	60.4	56.2
	25223	Corpus Christi, Tex.	♂ ad. m.	110	98	48	16	6.5	58	26	10	33	20	59	33	—	36	20	800	430	370	64	85	49	60.2	60
	99008	" " "	♂ ad. m.	109	95	50	16	7	54	25.3	10.5	34	20	59	31	19	36	19	800	430	370	64	86	52.6	62	56.8
	32280	" " "	♀ ad. m.	104	97	50	17	7	54	23	12.5	31	19	59	32.6	19.5	36	20.5	730	475	255	65	56	51.5	60.8	55.6
	31815	" " "	♂ ad. y.	111	98	49	17	6	56	26	11	33	21	61.7	32.5	20	36.5	21	820	460	360	73	80	50	63	57
	43805	" " "	♀ ad. o.	103	92	45	16	7	50	23	12	29.5	18	58	30.5	19	33.5	20	698	418	280	58	69	49	63	54
	43779	" " "																								
	31699	" " "																								
	A 7274	Rockport, Tex.																								

V.—Didelphis marsupialis tabascensis and D. richmondi.

	Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m^4, outside.	Palate. Br'dth at m^4, inside.	Upper toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
D. marsupialis tabascensis.	100510	Teapa, Tabasco, Mex.	♂ ad. o.	122	111	58	17	6.3	62.5	25	12	35	25	66	32.5	21	37	20	919	456	463	71.5	102	52.3	60	56.3
	100511	" " "	♂ ad. m.	119	108	55	15	6	61	23	11.5	33	21.5	65	31	20	36.5	20	914	465	449	69.5	97	51	60.2	56.5
	100512	" " "	♂ ad. m.	115	105	53.5	15.5	7	60	24	11.3	34.3	20.5	64	32	19	37	20	902	460	442	69	96	51	61	57
	100509	" " "	♀ ad. m.	108	99.5	49	16	6.2	54	26	12	31.5	19	61	33.4	20	37	20	783	398	385	65	97	50	61.2	54.3
	100513	" " "	♀ ad. o.	103	94	49	13	6	47	20	11	29	16.5	60	29	—	36	—	835	421	414	62.5	98	52	61.7	50
	100507	Frontera, " " "	♂ ad. m.	116	103	55	15	6	57	23	10	33	15	61	29	17.5	35.6	19.3	846	429	417	66.5	97	53.4	59.2	55.3
	100508		♀ ad. y.	96.5	88	43.6	13.6	5.7	48	20	11.3	29	17	55	30	19	36	20	763	362	401	61	110	49	60.2	54.5
	58687	Mirador, Vera Cruz, Mex.	♂ ad. m.	108	98	53	15	6	58	24	11.5	32	20	61	31	20	36.5	20	870	420	450	70	107	54	62.3	59
	58688	" " "	♀ ad. m.	101	94	48	16	6	57	26	12	31	18.3	59	29	19	36	20	823	388	435	63	112	51	62.7	60.6
	56890	" " "	♂ ad. y.	104	92	50	13	5.5	49	23	12	31	18	59	31	19	38	20.6	825	410	415	65	104	—	—	—
	65543	Catemaco, " "	♀ ad. y.	109	100	53	15	5	50	26	12	32	18	62	32	—	39	20	—	—	—	—	—	53	62	50
	65957	" " "	♀ ad. y.	105	96	50	19	5.7	48	23	12	31.5	18	60	30	20	37	20	886	455	431	64	95	52	62.5	50
	65956	" " "	♂ ad. o.	121	109	55	18	6	58	25	10	34	22	66	32	21	40	—	856	488	368	72	75	50.5	60.6	53
	93044	Papantla, " "	♀ ad. m.	101	92	46	15	6	49	22.5	11.5	29	17.5	59	29	17.5	35	19	811	415	396	60	95	50	64	53.3
	93043	" " "	♂ ad. y.	90	82	45	11.5	5	45	18.3	10.5	26	15.6	53	27	16	33	18.4	684	349	335	57	96	54.9	59	54.9
	76207	Tuxtla, Chiapas, Mex.	♀ ad. m.	91.6	87.8	46	14.6	5	47	21	12	28.3	16.5	56.5	30	19.5	36	20	783	417	366	59	86.5	52	64.3	51.3
	76214	Tumbala, Chiapas, Mex.	♂ ad. y.	122	101	55	16.5	6.3	59	26	12	36	22	66	34	21	37.5	21	830	448	382	68	88	55	65	58.4
	76211	" " "	♂ ad. o.	139	125	59	22	8	68	32	11.3	42	25	76.5	34	21	41	22	930	494	436	75	88	47	61	54.5
	76213	" " "	♀ ad. o.	114	104	52	15	6	56	22	13.3	34.6	20	63	34	21.5	35	20	794	444	350	68	80	50	61	53.8
	76212	" " "	♀ ad. m.	98.3	91	43.5	14	4.5	50	24	12	31.5	17	58	31	18	35	20	—	—	—	—	—	—	—	—
	76209	San Christobal, Chiapas, Mex	♀ ad. m.	99.5	91	45	13	5	50	21	12	29	18	58	32	19	36	20	725	407	318	58	79	50	63.7	50.5
	76202	Ocozocuantla, " "	♀ ad. m.	99	91	45	14.5	4.7	50	23.7	12	31.5	17.3	58.3	30.3	18.6	35	20	780	418	362	67	87	50	64	55
	76203	Ocuilapa, " "	♂ ad. m.	116.5	105	54	17	6.8	58	28	11	34	20.5	66	31	20	38	20	845	501	344	73	68	51.7	63	55
	77688	Huehuetan, " "	♂ ad. o.	134.5	122.5	63	19	7.5	68	27	12.5	41.7	24.7	74.5	34.5	—	44	25[1]	1017	581	436	—	74	51.3	60.8	55.5
	77687	" " "	♀? ad. m.	120	111	51	16	7	53.3	25	11.8	33.3	20	61	30.7	19.3	38	20.6	—	—	—	—	—	—	—	—
	77997	" " "	♀? ad. o.	122	109.5	60	16.5	6	57	25.5	11.7	34.5	21	67	33	21	40	22.5	—	—	—	—	—	54.8	61.5	52
D. richmondi.	33140	Greytown, Nicaragua.	♀ ad. m.	114	104	54	15	7	55	25	11.5	32.5	20	65	31	19	37.4	15	948	471	477	70	100	52	62.5	52.6
	33136	" "	♀ ad. o.	106	96	52	17	6.5	52	22	11	30.3	18	62	30	19	38	15	874	394	480	65	122	54.2	64.6	54
	33134	" "	♀ ad. y.	102.5	92	50	13.3	5	47	23	11	28	17	60.5	30.7	19	38.6	16.7	853	400	453	65.5	113	54.3	64.7	51
	42137																									
	42141																									

[1] *Five* molars.

VI.—Didelphis karkinophaga, D. k. colombica, D. k. caucæ, and D. pernigra.

	Mus. No.	Locality.	Sex and age.	Total length.	Basal length.	Nasals. Length.	Nasals. Gr. br'dth.	Nasals. Least br'dth.	Zyg. br'dth.	Postorb. br'dth.	Postorb. constr.	Occip. br'dth.	Br'dth at canines.	Palate. Length.	Palate. Br'dth at m 4, outside.	Palate. Br'dth at m 4, inside.	Upper toothrow.	Molar series.	External measurements. Total length.	External measurements. Head and body.	External measurements. Tail.	External measurements. Tarsus.	Ratios. Tail to head and body.	Ratios. Nasals to basal length.	Ratios. Palate to basal length.	Ratios. Zyg. br'dth to basal length.
D. karkinophaga.	A[illegible]	Island of Trinidad	♂ ad.	110	100	49	14.5	5.5	61	22	10	32	20	61	28	17	36	20	920	455	465	66	102	49	61	61
	A[illegible]	" " "	♂ ad.	110	101	50	16	5.5	63.5	24	11	32	20	61	30	—	34.5	19.5	910	470	440	57	91	49.5	61	62.8
	A[illegible]	" " "	♂ ad.	101	91	47	13	6	—	21	11	30	19	56	31.5	20.5	33	19	955	500	455	57	90	51.7	61.5	—
	A[illegible]	" " "	♀ ad.	109	101	51	18	6	55	23	11	34	18	63	34.5	21.5	39	20	830	400	430	57	107	50.5	62.4	54.5
	A[illegible]	" " "	♀ ad.	111	100	46	15	6	59	24	10.7	33	20	60	30	20	34	19.5	740	350	390	55	112	46	60	59
	A[illegible]	" " "	♀ ad.	100	90	48	13	5.6	50	23	11	28	17	57	30	18	35	20	850	468	382	58	100	53	63.3	55.5
D. k. colombica.	A14613	Santa Marta, Colombia	♂ ad.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	710	355	355	57	100	—	—	—
	A15456	" " "	♂ ad.	118	109	55	17	7	60.5	20	10.5	35	22	66	30	20	37	20	980	497	483	68	97.2	50.5	60.6	55.5
	A15452	" " "	♀ ad.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	812	406	406	57	100	—	—	—
	A15454	" " "	♂ ad.	104	—	48	20	6	—	23	11	—	20	58	31	20	37	20.5	—	—	—	—	—	—	—	—
	A14615	" " "	♂ ad.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	786	456	330	57	75	—	—	—
D. k. caucæ.	A15452	" " "	♂ ad.	95	—	45	13	6	54.5	20	11.5	28	19	55	28.5	18	32	18	824	371	453	57	123	—	—	—
	A15456	" " "	♀ ad.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	980	497	483	68	97.2	—	—	—
	A14614	" " "	♀ ad.	96	89	45	14	6.5	48.5	25	11	28.5	17	55	29	18	33	19	863	406	457	54	113	50.5	62	54.4
	A15455	" " "	♀ ad.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	673	318	355	57	111	—	—	—
	A15451	" " "	♀ ad.	97	88	44	13	5	51	21	11	29	18	55	29	18	34	19	—	—	—	—	—	50	62.5	58
	A14206	Cali, Colombia	♂ ad.	107	99	50	16	6.4	57	21	10	31	21	60	29	18	36	20	—	—	—	—	—	50.5	59.9	57.5
	A14196	" "	♂ ad.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	770	410	360	53	87.8	—	—	—
	A14199	" "	♂ ad.	94	—	42	15	6	52.7	21	11.5	29.3	20	55	31	19	34	19.5	—	—	—	—	—	—	—	—
	A14198	" "	♂ ad.	96	87	44	15	5.3	48.5	21	12	28	16	56.5	30	18	36	19	—	—	—	—	—	50	65	55.7
	A14201	" "	♂ ad.	94	85	44	14.5	5	50	19	11	28	18	54.5	28	17	34	19	740	370	370	48	100	51.7	64	58.8
	A14192	" "	♀ ad.	93	88	46	14	5.8	50	20	11	23	17.5	55	30	19	35	18.5	—	—	—	—	—	52.3	62.5	57
	A14202	" "	♀ ad.	107	97	50	18	5.5	56.5	25	11.7	30	19	61	31	21.5	35	20	740	370	370	58	100	51.6	62.9	58
D. pernigra.	A16470	Inca Mines, Peru	♂ ad. y.	81	74	38.5	13	5.5	40.5	20	11	25	15	—	—	—	—	—	698	336	362	57	100	52	—	54.7
	A16467	" "	♂ ad.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	635	305	330	57	108	—	—	—
	A16471	" "	♂ ad.	80	74	39	12	5.5	40	20	11	25	14.8	47	27	—	29.5	16	660	317	343	57	108	52.7	63.5	54
	A16071	" "	♀ ad.	87.3	81	43	13.5	5.4	42	21	11	28	15.6	53	26.3	18	32	17	749	381	368	63	99.5	53	65.4	51.8
	A15798	" "	♀ ad.	84	78	42.5	12	5	—	20	11.3	26	15	51	25.3	16	31.5	17	711	443	368	60	82	53.2	65.4	—
	A16469	" "	♀ ad.	85	78	42	14	6	43	22	11	27	14.5	51	26	16	31	17	737	343	394	57	112	53.8	65.4	55
	A16468	" "	♀ y.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	660	300	360	57	120	—	—	—

EXPLANATION OF THE PLATES.

PLATE XXII.

VARIATION DUE TO AGE IN DIDELPHIS VIRGINIANA.

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

Fig. 1.—No. 48598, U. S. Nat. Mus., ♀, Cedar Vale, Kan. Side view.

Fig. 1*a*.—Same specimen from side.

Fig. 1*b*.—Same specimen, from below. Milk premolar and m^1 in place.

Fig. 2.—No. 47498, U. S. Nat. Mus., ♀, Cedar Vale, Kan. Side view.

Fig. 2*a*.—Same specimen, from below. Milk premolar and m^1 and m^2 in place.

Fig. 3.—No. 49364, U. S. Nat. Mus., ♂, Brazos, Texas. Side view.

Fig. 3*a*.—Same specimen, from below. The milk premolar has been shed and p^4 is just appearing; m^{1-2} in place, the latter about half grown.

Fig. 4.—No. 79117, U. S. Nat. Mus., ♂, Sebastian, Florida. From side.

Fig. 4*a*.—Same specimen from below. Permanent p^4 and m^2 nearly full grown; m^4 not yet developed.

Fig. 5.—No. 45401, U. S. Nat. Mus., ♂, Bay St. Louis, Miss. From side.

Fig. 5*a*.—Same specimen from side. Fully adult, but teeth very little worn.

This specimen is of further interest on account of the double canine on the left side.

PLATE XXIII.

DIDELPHIS MARSUPIALIS, D. M. TABASCENSIS, AND D. VIRGINIANA.

All figures $\frac{1}{2}$ nat. size, except figs. 6 and 7, which are natural size.

Fig. 1.—*Didelphis marsupialis tabascensis*, ♀ ad., No. 100509, U. S. Nat. Mus., Teapa, Tabasco, Mexico.

Fig. 2.—*Didelphis marsupialis tabascensis*, ♂ ad., No. 100513, U. S. Nat. Mus., Teapa, Tabasco, Mexico. Figures 1 and 2 illustrate individual variation in the form of the posterior border of the nasals.

Fig. 3.—*Didelphis marsupialis*, ♂ ad., No. 45274, Colima, Colima, Mexico, showing the usual or normal form of the nasals in *D. marsupialis*, for comparison with Fig. 2, which illustrates the normal form of the nasals in *D. m. tabascensis*, and Fig. 4, which shows the normal form of the nasals in *D. virginiana*.

Fig. 4.—*Didelphis virginiana*, ♂ ad., No. 316, Miller's Place, Long Island, N. Y., illustrating a normal old male skull, for comparison with the other forms of the genus.

Fig. 5.—*Didelphis marsupialis*, ♂ ad., No. 73492, U. S. Nat. Mus., Tehuantepec, Oaxaca, Mexico. To show the pair of supernumerary molars (m^5).

Fig. 6.—*Didelphis marsupialis tabascensis*, ♂ ad., No. 77688, U. S. Nat. Mus., Huehuetan, Chiapas, Mexico. To show supernumerary m^5 on left side.

PLATE XXIV.

DIDELPHIS PERNIGRA, D. MARSUPIALIS TABASCENSIS, AND D. RICHMONDI.

All figures $\frac{1}{2}$ nat. size.

Figs. 1–1*a*.—*Didelphis pernigra*, ♀ ad., No. 16071, Am. Mus., Inca Mines, Peru. Type of the species.

Figs. 2–2*a*.—*Didelphis marsupialis tabascensis*, ♀ ad., No. 5 8687, U. S. Nat. Mus., Mirador, Vera Cruz.

Figs. 3–3*a*.—*Didelphis richmondi*, ♀ ad., No. 45140, U. S. Nat. Mus., Greytown, Nicaragua.

PLATE XXV.

YOUNG OF DIDELPHIS VIRGINIANA AND D. MARSUPIALIS, TWO STAGES.

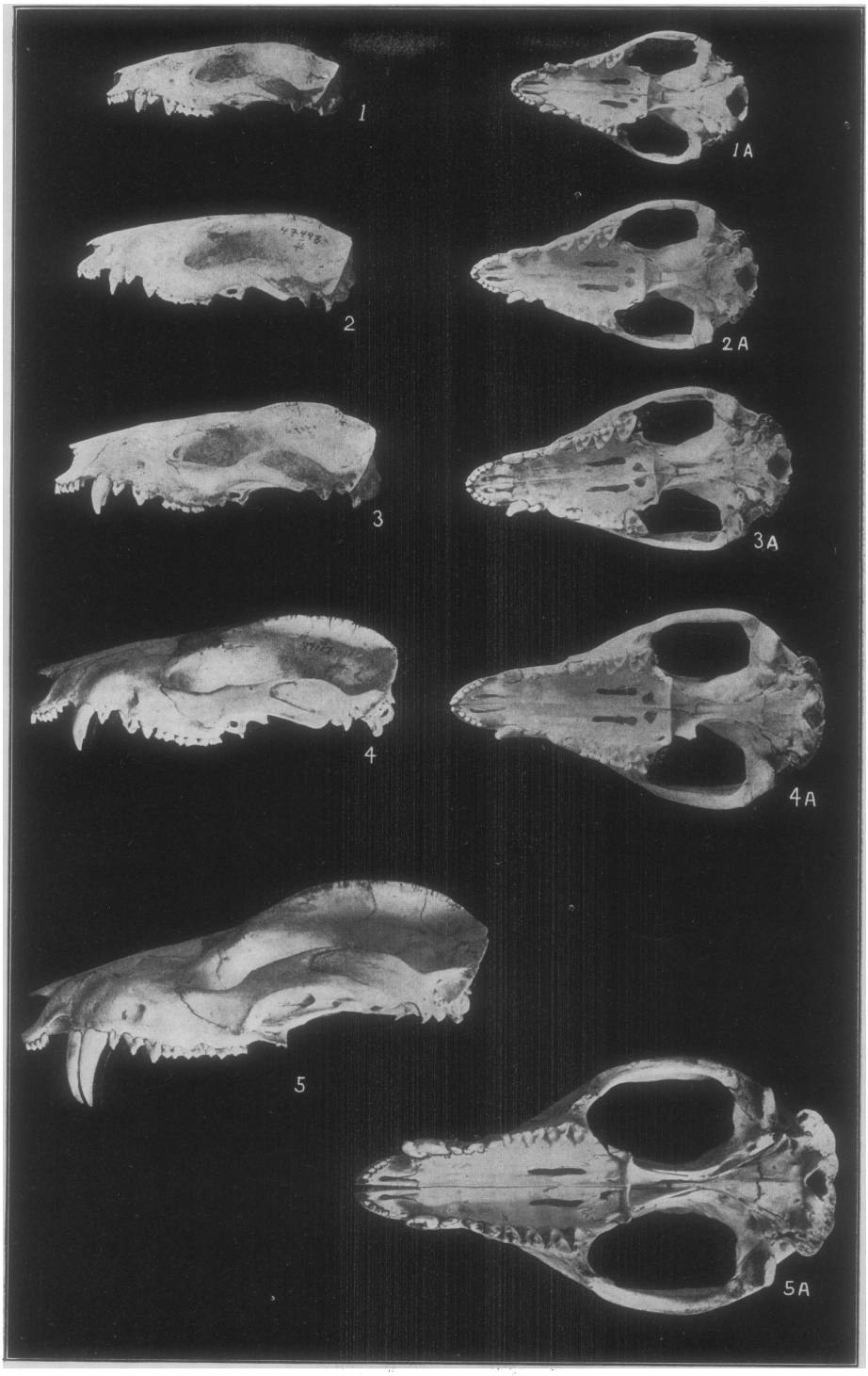
Figures $\frac{1}{2}$ nat. size.

Fig. 1.—*Didelphis marsupialis*, very young. No. 34502, U. S. Nat. Mus., Etzaplan, Jalisco, Mex. Comparable with Fig. 3, *D. virginiana*.

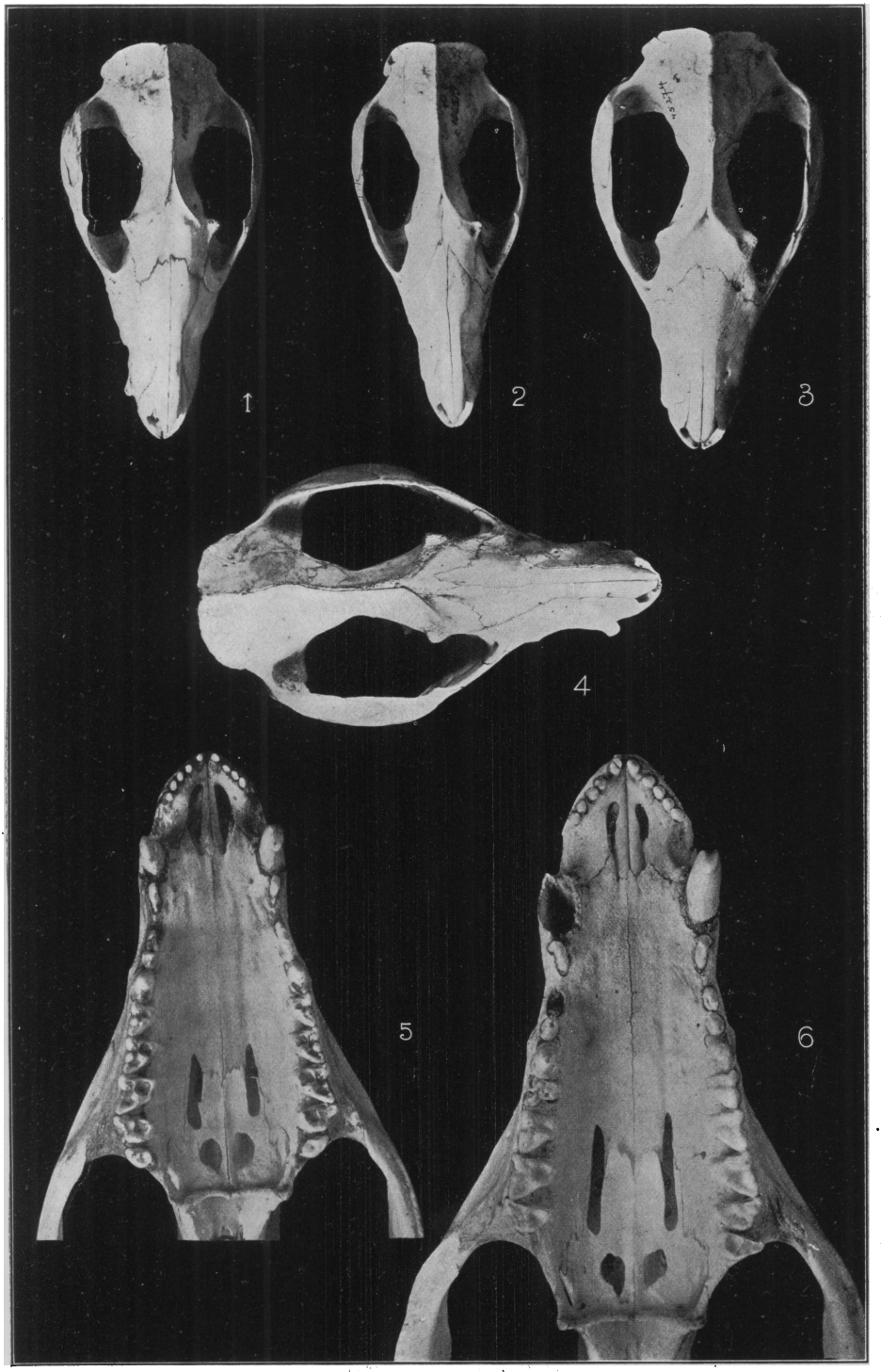
Fig. 2.—*Didelphis marsupialis*, somewhat older than the specimen illustrated in Fig. 1, and comparable with Fig. 4. No. 34560, U. S. Nat. Mus., Tulancingo, Hidalgo, Mex.

Fig. 3.—*Didelphis virginiana*, very young, corresponding in age to the specimen illustrated in Fig. 1. No. 36142, U. S. Nat. Mus., Hartshorne, Ind. Ter.

Fig. 4.—*Didelphis virginiana*, somewhat older than the specimen shown in Fig. 3, and comparable with Fig. 2. No. 34560, U. S. Nat. Mus., Marble Cave, Mo.



STAGES OF GROWTH IN DIDELPHIS VIRGINIANA.



1, 2, 6, Didelphis marsupialis tabascensis; 3 and 5, D. marsupialis; 4, D. virginiana.
Figs. 5 and 6 show supernumerary molars

1–1*a*, Didelphis pernigra ; 2–2*a*, D. marsupialis tabascensis ; 3–3*a*, D. richmondi.

1 and 2, Didelphis marsupialis ; 3 and 4, D. virginiana.