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Bats of the Subgenus *Natalus*

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The geographical distribution of the bats in the subgenus *Natalus* is now known to be from Baja California, southern Sonora, southern Chihuahua, and Tamaulipas, Mexico, south through Central America to the Canal Zone in Panama. The only records for the mainland of South America are San Esteban, Venezuela, and Natal and Minas Gerais, Brazil. In the West Indies its range extends from Curaçao and Trinidad north to the Dominican Republic and Cuba.

With the exception of a difference in the size of *Natalus major* there is a close similarity in the external appearance of all the named forms in the group. Climatic conditions do cause some local variation in color; humid tropical regions produce a predominance of dark reddish specimens, while pale buffy specimens are characteristic of dry arid regions. Cranial characters, however, are sufficiently well developed to identify named forms.

Up to the present time no one has attempted to make a first-hand study of the named forms in the subgenus *Natalus* or to determine the status of the type species, *Natalus stramineus* Gray. Walter W. Dalquest (1950) published a comprehensive review of the genera in the family Natalidae and listed a brief summary of described forms derived from the literature.

Gray (1838, p. 496), in his six-line description of the genotype, gave no inkling of the source from which he derived the name *Natalus*. It can hardly have had any geographical significance, because he clearly indicated that the specimen on which he based his name was from an unknown locality. This suggests the possibility that he had in mind

"natal" as pertaining to the unknown birthplace or origin of his type.

All measurements are given in millimeters and are listed in table 1. The forearm measurement is taken from the elbow to the proximal extremity of the folded fingers of the wing; the length of the skull is taken parallel to the axis from the front of the incisors to the most posterior extension of the braincase; the condylobasal length is inclusive of the incisors. Capitalized names of colors used in descriptions are from Ridgway (1912).

Abbreviations representing names of museums from which specimens have been recorded are:

A.M.N.H., the American Museum of Natural History
 B.M., British Museum (Natural History)
 J.I., Jamaica Institute, Kingston, Jamaica, British West Indies
 L.M., Leyden Museum, Leiden
 M.C.Z., Museum of Comparative Zoölogy at Harvard College
 M.L., Museum Lundi, Copenhagen
 S., Natur-Museum und Forschungs-Institut Senckenberg, Frankfurt-am-Main
 T.A.M., Texas Agricultural and Mechanical College
 U.K., University of Kansas, Lawrence
 U.S.N.M., United States National Museum
 Z.M.A., Zoological Museum, Amsterdam

For the loan of comparative material and measurements of type specimens in other museums I am indebted to Dr. Charles O. Handley, United States National Museum; Dr. E. Raymond Hall, University of Kansas; Dr. R. W. Hayman, British Museum (Natural History); Dr. A. M. Husson, Rijksmuseum van Natuurlijke Historie, Leiden; Dr. Barbara Lawrence, Museum of Comparative Zoölogy at Harvard College; and Dr. C. B. Lewis, Jamaica Institute, Kingston, Jamaica. Acknowledgment is also due to Dr. K. F. Koopman of the Chicago Natural History Museum for bringing the material of *Natalus major jamaicensis*, new subspecies, to our attention.

Natalus stramineus stramineus Gray

Figure 1

Natalus stramineus GRAY, 1838, Mag. Zool. Bot., vol. 2, p. 496.

Natalus dominicensis SHAMEL, 1928, Proc. Biol. Soc. Washington, vol. 41, p. 67.

TYPE LOCALITY: Unknown, probably Antigua, British West Indies. Cabrera (1957, p. 73) fixed the type locality of *Natalus stramineus* as Lagoa Santa, Minas Gerais, Brazil, and based his selection of a locality on a specimen recorded from that locality by Winge (1893). Cabrera apparently followed Tomes (1856, p. 178) and Dobson (1878, p. 343)

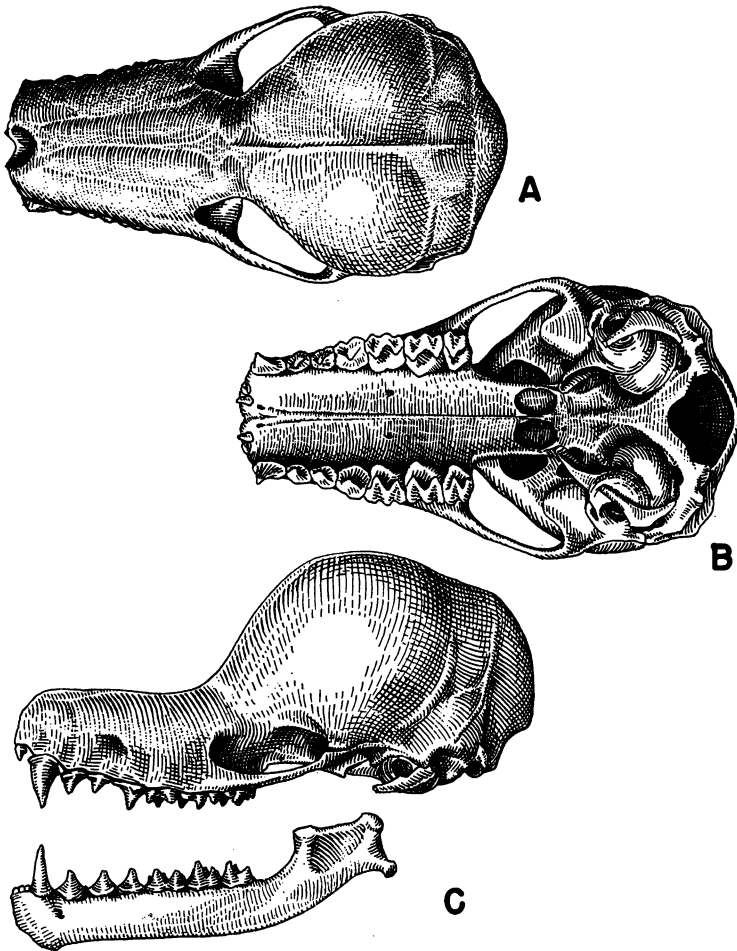


FIG. 1. *Natalus stramineus stramineus*, A.M.N.H. No. 72369. A. Dorsal view. B. Ventral view. C. Lateral view. All $\times 4$.

in their erroneous assumption that Gray's type of *Natalus stramineus* came from Brazil.

RANGE: Islands of the Lesser Antilles.

DIAGNOSIS: A relatively large form, occurring in red and gray color phases and without any special external characters. Color of two specimens from Anguilla: upper parts Wood Brown, lightened by the paler basal color of the hair; under parts Pinkish Buff. Skull normal for the subgenus but larger than any known form except *N. major*; braincase

large, globular, and sharply elevated above rostrum, rostrum tipped slightly downward; bony palate long and extending backward more than halfway to posterior border of pterygoid wings; basisphenoid pits deep and well defined; maxillary bones not swollen or enlarged, the outer surfaces of molar teeth visible when viewed from above; rostrum not sharply tapered and relatively broad anteriorly; maxillary tooth rows nearly parallel with each other and in a nearly straight line along inner border but with a slight angle at second upper premolar.

COMPARISON: The specimens of *Natalus* from the Lesser Antilles agree so exactly in measurements and cranial characters with the type of *Natalus stramineus* that they can be confidently identified as the typical form. Measurements and cranial characters of specimens from Brazil, Venezuela, Trinidad, Central America, and Mexico definitely rule out the possibility that Gray's type came from any one of these localities.

The natalid organ is a thin, floating, glandular, bell-shaped disk covering the entire frontal region of the head, lying between the skin and the underlying muscles. It is peculiar to the genus *Natalus*. In *N. stramineus* and subspecies this organ is tapered anteriorly to a narrow arm that is connected by a ligament to the cartilaginous portion of the nose; the posterior border is lunar shaped, convex, with a fine median spur. Greatest length of organ, 11.5 mm.; breadth, 7.8.

SPECIMENS RECORDED: Anguilla, two (A.M.N.H.); Antigua, five (B.M.); Island of Dominica, 22 (U.S.N.M.), including type of *N. dominicensis*; no locality, one (B.M.), type of *N. stramineus*.

REMARKS: Tomes (1856, p. 178) listed a specimen of *N. stramineus* from South America in the British Museum, and Dobson (1878, p. 343) listed a specimen of *N. stramineus* from Brazil, also in the British Museum. Both these references must refer to one specimen, Gray's type of *N. stramineus*, for there were no other specimens of *Natalus* that could have come from South America in the British Museum at that time. Gray specifically states that the type was without locality, and there is nothing in the catalogue or records at the British Museum to indicate where it was collected. Sanborn (1941, pp. 380-381) listed two specimens he identified in the British Museum from Trinidad, British West Indies, as *N. stramineus* and gives detailed cranial measurements to substantiate his diagnosis. The skulls of these two specimens actually were not removed and cleaned until recently and they prove to be *N. tumidirostris*.

Shamel (1928) named *Natalus dominensis* at a time when measurements of the type of Gray's *Natalus stramineus* were not available and

assumed that the specimens of *Natalus* in the United States National Museum from Natal, Brazil, were typical *stramineus*. Shamel was correct in recognizing the specimens from the island of Dominica, British West Indies, as distinct from the Natal specimens but should have put the new name on the Natal specimens.

Examination of topotypes of *N. dominensis* Shamel show that they agree in all essential characters and cranial measurements with the type of *N. stramineus* Gray.

Antigua, British West Indies, is proposed here as a probable type locality for *Natalus stramineus*, because this bat is relatively common on the Lesser Antilles. Antigua is on the regular shipping lanes, and specimens from this island are typical. Dominica is the type locality for *N. dominensis*, and Anguilla is a small island with few big caves and never was used as a regular port for shipping.

Natalus stramineus natalensis, new subspecies

TYPE: U.S.N.M. No. 242830, skin and skull, adult female; Natal, Rio Grande do Norte, Brazil; collector E. C. Green, April, 1921. The type skin is preserved in spirits, and the colors are probably faded. The type skull is complete. Besides the type there are one male and one female topotypes in spirits, both with imperfect skulls.

RANGE: Eastern Brazil from Natal to Lagoa Santa, Minas Gerais.

DIAGNOSIS: Size small, forearm short, 37.0–37.3; skull short and broad, with a short, sharply tapered rostrum and a large, smoothly rounded braincase, sharply elevated above rostrum, maxillary tooth rows shorter than in any other named form in the *stramineus* group, 6.5–6.6.

DESCRIPTION OF TYPE: Color of upper parts Ochraceous Buff, the hairs Light Buff from base for most of their length; under parts white to roots of hairs. Skull short and broad, with a broad, tapered rostrum and high, broad braincase; molariform tooth rows with a relatively sharp angle at second premolar; zygomatic arches widely spreading; bony palate shortened posteriorly and ending about halfway along wings of pterygoids; pterygoid pits deep and well defined; bony palate from last molar to posterior border with two pairs of evenly spaced fenestra.

MEASUREMENTS OF TYPE: Length of forearm, 37.2. Skull: greatest length, 16.2; condylobasal length, 14.8; zygomatic breadth, 8.7; breadth of braincase, 8.2; interorbital breadth 3.2; width across canines, 3.6; width of palate across M^3 – M^3 , 5.5; maxillary tooth row, C– M^3 , 6.5.

COMPARISONS: *Natalus s. natalensis* can readily be distinguished

from typical *N. stramineus* Gray by its smaller size, shorter and more sharply tapered rostrum, relatively larger braincase, and shorter maxillary tooth row. It is about the size of *N. s. mexicanus* Miller from Baja California, Mexico, but has a much larger braincase, broader and shorter rostrum, and a shorter maxillary tooth row. It needs no comparison with the forms of *N. tumidirostris* from Trinidad and Venezuela, which is a larger bat with inflated maxillary bones and a deeply emarginated palate.

SPECIMENS RECORDED: Brazil: Natal, three (U.S.N.M.); Lagoa Santa, one (M.L.).

REMARKS: While the specimen from Lagoa Santa in the Museum Lundi has not been seen by this author, Winge's (1893) figure of the skull, reproduced natural size, corresponds so closely in measurements and characters with the type that it can be confidently referred to *natalensis*. Winge's figure, however, does show the palate as fractionally extended farther posteriorly than in the Natal specimens.

Cabrera (1957, p. 95) proposed Lagoa Santa as the type locality for *Natalus stramineus* Gray merely on the grounds that Winge (1893, p. 13) had identified a specimen from this locality as Gray's species.

Natalus stramineus mexicanus Miller

Natalus mexicanus MILLER, 1902, Proc. Acad. Nat. Sci. Philadelphia, vol. 54, p. 399.

TYPE LOCALITY: Santa Anita, Baja California, Mexico.

RANGE: Baja California and Sonora, Mexico.

DIAGNOSIS: A small subspecies with a relatively short rostrum, moderately large globular braincase; posterior border of bony palate extending two-thirds of the way to posterior border of pterygoid wings, general color pale buff. Color of specimens from Santa Anita: upper parts varying from Avellaneus to Cinnamon Buff.

COMPARISONS: *Natalus stramineus mexicanus* is smaller than typical *N. stramineus*, with a smaller skull and less elevated and smaller braincase; it also has straighter maxillary tooth rows and smaller molariform teeth. Compared with *N. s. natalensis*, the skull of *mexicanus* has a smaller braincase and narrower rostrum, and the molariform tooth rows are nearly straight instead of having a distinct angle at the second premolar.

SPECIMENS RECORDED: Baja California: Santa Anita, two (U.S.N.M.); northwest of Santa Anita, six (U.K.). Sonora: Tesia, four (A.M.N.H.); Alamos, 49 (U.K.).

REMARKS: Because there appear to be no characters of specific rank

that separate *mexicanus* from *stramineus*, and the actual differences are mainly in size, *mexicanus* is here recognized as a subspecies of *stramineus*. Hall and Kelson (1959, pp. 153-154) extended the range of *N. s. mexicanus* south on the west coast of Mexico to the state of Guerrero. Specimens from Amatlan, Nayarit, equal typical *N. s. saturatus* from Veracruz in size and cranial characters, though they are paler in color. Mexican specimens from localities south of Sinaloa are here referred to *saturatus*.

Natalus stramineus saturatus Dalquest and Hall

Natalus mexicanus saturatus DALQUEST AND HALL, 1949, Proc. Biol. Soc. Washington, vol. 62, p. 153.

TYPE LOCALITY: Three kilometers east of San Andreas Tuxtla, Veracruz, Mexico, altitude, 1000 feet.

RANGE: From Tamaulipas on the east coast to Nayarit on the west coast of Mexico south to the Canal Zone in Panama.

DIAGNOSIS: Very similar to *N. s. mexicanus* but averaging larger and darker in color. Color in the red phase ranging from dark Amber Brown to Burnt Sienna and deep Chestnut, in the gray phase from near Clay color to Cinnamon Buff.

COMPARISONS: There do not appear to be any actual characters separating *saturatus* from *mexicanus* except for an average difference in size, and even this character is not always consistent. Specimens from Tamaulipas are scarcely any larger than *mexicanus* from Baja California, while those from Nayarit equal Veracruz specimens in size. Oaxaca specimens, which are deep Chestnut in color, and Progreso, Guatemala, specimens, which are Cinnamon Buff, equal Veracruz specimens in cranial measurements, while those from Flores, Peten, Guatemala, have small skulls about the size of the skull of typical *mexicanus*. The skull of one female from Oaxaca is actually smaller than that of any female in the Baja California series of *mexicanus*. The skull of one out of three males from Penonome, Panama, has a braincase as large as any in the series from Progreso, Guatemala, while the skulls of the other two males in the same series are as small as those of females in the typical *mexicanus* series from Baja California.

SPECIMENS RECORDED: Mexico: Campeche: Apazote, one (U.S.N.M.); La Tuxpena, two (U.S.N.M.). Guerrero: Colotlipa, two (T.A.M.); Acahuizotla, five (T.A.M.). Jalisco: Itzatlan, one (U.S.N.M.); El Arado, one (U.K.). Morelos: Tequesquitengo, four (A.M.N.H.). Nayarit: Amatlan, nine (A.M.N.H.); Las Varas, one (U.K.). Oaxaca: Bisilana, one (A.M.N.H.); Dani Liesa, one (A.M.N.H.); El Salado, three (A.M.N.H.);

Guengola, six (A.M.N.H.). San Antonio, eight (A.M.N.H.); Tapantepec, one (A.M.N.H.); Tehuantepec, one (A.M.N.H.); Tequesquitengo, four (A.M.N.H.). Tamaulipas: Antigua Morelos, one (U.K.); El Pachon, nine (A.M.N.H.), one (U.K.). Veracruz: San Andres Tuxtla, 89 (U.K.). Central America: El Salvador: 65 (S.), Hacienda, Santa Rosa, Cueva Hedionda, Laguna de Guija. Guatemala: Flores, four (A.M.N.H.); Progreso, six (A.M.N.H.). Panama: Chilibrillo, one (A.M.N.H.); Coiba Island, one (A.M.N.H.); Penonome, five (M.C.Z.).

REMARKS: Unfortunately the only satisfactory series of typical *N. s. mexicanus* available for comparison does not include a male. Additional material from Baja California may show that the relative difference in size between *N. s. mexicanus* and *N. s. saturatus* is even less than was originally supposed. The small series from Progreso, Guatemala, a dry region, have a relatively low broad braincase and a heavy broad rostrum, but these differences do not represent anything more than a local variation.

Natalus major major Miller

Natalus major MILLER, 1902, Proc. Acad. Nat. Sci. Philadelphia, vol. 54, p. 398.

TYPE LOCALITY: Near Savaneta, Dominican Republic.

RANGE: Dominican Republic and Haiti.

DIAGNOSIS: Size large, length of forearm, 43–44.5 mm. General color Drab, the hair Light Cinnamon Buff from base for most of its length, a patch of darker hair on top of head between ears; under parts paler than back; skull large and broad, rostrum relatively short and broad, tapered anteriorly; braincase large, broad, and relatively low, bony palate normal and extending posteriorly two-thirds of the way to the posterior border of the pterygoid wings. Except for larger size, the natalid organ in *major* is very similar to that of *N. stramineus*.

COMPARISON: *Natalus major* and its subspecies are the largest known forms in the genus *Natalus*. *Natalus major major* is nearest in size and general characters to *Natalus m. jamaicensis* from Jamaica but differs from the latter in having a shorter forearm, a considerably shorter, heavier, and more tapered rostrum, and a longer, broader, and noticeably lower braincase.

SPECIMEN RECORDS: Dominican Republic: Savaneta, two (U.S.N.M.); Los Patos, one (A.M.N.H.); Maniel Viejo, one (A.M.N.H.). Haiti: Port-au-Prince, one (B.M.).

REMARKS: The differences between species in the *N. major* and *N*

stramineus groups are more than relative and are sufficiently well characterized for specific separation.

***Natalus major jamaicensis*, new subspecies**

TYPE: A.M.N.H. No. 182000, skin and skull, adult male; St. Clair, St. Catherine Parish, Jamaica, British West Indies. Collected by C. B. Lewis, March 5, 1954. The type skin is in good condition and is preserved in spirits; the type skull is complete. Besides the type there are three topotype skins in spirits with three complete skulls, one topotype study skin without a skull, and one partial ramus from Balaclava Cave, Jamaica.

DIAGNOSIS: A large, buffy-colored, funnel-eared bat of the subgenus *Natalus*; length of forearm, 44.0–45.2. Skull very large, with a high, greatly inflated braincase sharply elevated above rostrum; rostrum broad, low, and tapered anteriorly; interorbital space very narrow; sagittal crest well developed for the genus; molariform teeth broad; second lower premolar longer and higher than first premolar, first lower premolar larger than the third lower premolar; bony palate long and extended posteriorly more than two-thirds of the distance to posterior border of pterygoid wings; natalid organ large, bell shaped, and normal for the subgenus, length 11.0, breadth 7.3.

DESCRIPTION OF TYPE: Fur moderately long, soft, and slightly woolly at the base; color of upper parts Tawny Olive, the hairs Pinkish Buff from base for most of their length; under parts uniform Pinkish Buff to base of hairs; flying membranes Saccardo's Umber. Skull slender, with a high globular braincase; rostrum slender, long, and tapered anteriorly, its sides (maxillary bones) depressed and concave above tooth rows. Interorbital region very narrow posteriorly, sagittal crest well developed, especially anteriorly. Other characters about as in typical *major*.

MEASUREMENT OF TYPE: Total length, 108.5 (110.0)¹; length of tail, 56.0 (61.0); tibia, 23.7 (22.4); hind foot, 10.2 (9.0); forearm, 45.2 (42.0). Skull: greatest length, 18.3 (18.0); condylobasal length, 16.8 (16.7); zygomatic breadth, 9.5 (9.5); breadth of braincase, 8.8 (8.8); interorbital breadth, 3.1 (3.6); width across canines, 4.1 (4.4); width across molars, 6.1 (6.3); maxillary tooth row, C–M³, 8.1 (8.0); height of braincase above basisphenoid, 7.6 (7.3).

¹ Measurements of an adult male *N. m. major*, A.M.N.H. No. 97590, from the Dominican Republic, Santa Domingo, given in parentheses for comparison.

COMPARISONS: *Natalus m. jamaicensis* is only slightly larger than typical *Natalus major* but can always be distinguished from the latter by its higher, shorter, and more globular braincase, more slender, longer, and flatter rostrum, the sides of which are concave instead of inflated and convex as in *major*, and by the noticeably narrower inter-orbital space. The ratio of the length of the rostrum to the length of the braincase is 0.9 in *jamaicensis* as compared with 0.7 in typical *major*. The crown of the second lower premolar in *jamaicensis* is 0.2 mm. higher than that of the third lower premolar, these two teeth being nearly subequal in typical *major*. Compared with the ramus of *Natalus major primus* that of *jamaicensis* is smaller and shorter, but the larger size of the second lower premolar relative to the third lower premolar is about the same in both forms.

SPECIMENS RECORDED: Jamaica: Saint Clair, St. Catherine Parish, two (A.M.N.H.), three (J.I.); Wallingford Cave, Balaclava, Elizabeth Parish, one ramus (A.M.N.H.).

Natalus major primus Anthony

Natalus primus ANTHONY, 1919, Bull. Amer. Mus. Nat. Hist., vol. 41, p. 642.

TYPE LOCALITY: Cueva de los Indios, Daiquiri, Oriente, Cuba.

RANGE: Known only from mandibular remains from cave deposits on the island of Cuba.

DIAGNOSIS: Largest of all known bats in the genus *Natalus*, with a long, slender mandible and large, heavy, second lower premolar and relatively large, broad, mandibular teeth. Second lower premolar considerably larger than third lower premolar.

MEASUREMENTS: (Of the type, a topotype, and a specimen from Las Villas, Cuba, with those of the type of *N. m. major* given in parentheses). Length of rami, 14.4, 14.6, 14.9 (14.0); alveolar length of mandibular tooth row exclusive of incisors, 8.9, 8.9, 9.3 (8.4); length from PM_2 to M_3 , inclusive, 7.2, —, 7.3 (6.2).

COMPARISON: *Natalus m. primus* is larger than *N. m. major* from Hispaniola and has a longer and more slender mandible and larger and heavier mandibular teeth; PM_2 is relatively longer and higher in *primus* than in typical *major*.

SPECIMENS RECORDED: Cuba: Cueva de los Indios, two rami (A.M.-N.H.). Camaguey, one ramus, one fragmentary rostrum (M.C.Z.); Las Villas, one ramus (A.M.N.H.).

REMARKS: While *N. m. primus* is separable from *N. m. major* on definite mandibular characters, these differences, as shown by the present available material, seem to rate no more than subspecific rank.

Cuba is not more than 50 miles from Haiti, and up to the present no living specimens of the subgenus *Natalus* have been recorded from Cuba. The discovery of a cranium or living specimens on Cuba would help to establish the true status of this skeletal material.

Natalus tumidirostris tumidirostris Miller

Natalus tumidirostris MILLER, 1900, Proc. Biol. Soc. Washington, vol. 13, p. 160.

Phodotes tumidirostris MILLER, 1906, Proc. Biol. Soc. Washington, vol. 49, p. 85.

Natalus tumidirostris DALQUEST, 1950, Jour. Mammal., vol. 31, no. 4, p. 442.

TYPE LOCALITY: Hatto, Curaçao, Netherlands West Indies.

RANGE: Known only from the type locality.

DIAGNOSIS: Size small, about the size of *N. s. mexicanus*; length of forearm in 16 females, 27.4–37.4, in eight males, 34.5–37.3. Color of upper parts Cream Buff, tips of hairs gradually darkened by pale Drab, under parts more yellowish than back. Skull with braincase more sharply elevated above rostrum than in *mexicanus*, rostrum conspicuously swollen on sides so that the maxillaries are semitransparent, the swollen region extending so far laterally that the outer sides of the molar teeth cannot be seen when the skull is viewed from above; posterior border of palate deeply emarginated to level of middle molars.

COMPARISON: There are no external characters by which *N. tumidirostris* can be distinguished from forms in the *N. stramineus* group. In cranial characters *N. tumidirostris* can always be recognized by the swollen maxillary bones and emarginated palate.

SPECIMENS RECORDED: Curaçao: Cave near Hatto, two (U.S.N.M.), one (L.M.); Cueba di Ratin, one (L.M.); Roai Santae, one (L.M.); Plantation Noordbant, 20 (Z.M.A.); Willemstad, one (Z.M.A.)

REMARKS: Dalquest (1950) reviewed the genera in the family Natalidae and placed *Phodotes* in synonymy under *Natalus* on the grounds that the swollen rostrum and emarginated palate of *Phodotes* were characters of specific rather than generic rank.

Natalus tumidirostris continentis (Thomas)

Phodotes tumidirostris continentis THOMAS, 1911, Ann. Mag. Nat. Hist., ser. 8, vol. 7, p. 513.

TYPE LOCALITY: San Esteban, Carabobo, Venezuela.

RANGE: Definitely known only from the type locality.

DIAGNOSIS: Resembling typical *N. tumidirostris* in all external and cranial characters but averaging larger in size.

SPECIMENS RECORDED: Venezuela: San Esteban, Carabobo, four (B.M.), six (A.M.N.H.).

REMARKS: The specimen from British Guiana in the Leyden Museum referred to in the literature as *N. stramineus* has now been examined by Dr. Husson (not published) who identified it as *Furipterus horrens*. The references to a British Guiana specimen by Jentink (1893, p. 79), Young (1896, p. 44), and Beebe (1919, p. 219), all refer to this same specimen in the Leyden Museum.

The actual difference in size between *N. t. continentis* and typical *N. tumidirostris* is small, and material from the mainland is too scanty for the exact relationship to be determined.

When Thomas named *Phodotes t. continentis* he followed Miller in the use of *Phodotes* for the generic name of the species with a swollen rostrum and emarginated palate.

Natalus tumidirostris haymani, new subspecies

Figure 2

TYPE: A.M.N.H. No. 176590, skin and skull, adult male; cave on the northwest side of Mt. Tamana, Trinidad, British West Indies; altitude between 600 and 700 feet; collector Arthur M. Greenhall, November 20, 1957. The type skin is in good condition and was prepared from a specimen in spirits; the skull is complete. Besides the type there are 17 topotypes, including six skins, 11 in spirits, and 13 cleaned skulls.

DIAGNOSIS: Largest form in the *tumidirostris* group and almost equaling typical *N. stramineus* in size; length of forearm, 39.0–41.5. Skull large, greatest length, 10.1–17.3; braincase large and smoothly rounded but not so large or so sharply elevated above rostrum as in typical *N. stramineus*; maxillary bones conspicuously inflated over tooth rows, posterior palatal emargination extending forward to middle upper molar; maxillary tooth rows long, 6.9–7.4. Natalid organ about the same size and shape as that of *N. stramineus*.

DESCRIPTION OF TYPE: Fur relatively long, fine, and lax; color of upper parts bright rich Cinnamon Buff; under parts paler and slightly more buffy than back. Skull long and narrow, rostrum broad, braincase small, relatively low, and not sharply elevated above rostrum, molariform teeth relatively large; longitudinal axis of the second premolar not in a plane parallel to that of the first and third premolars, but with outer edge turned in so that there is a distinct angle in the line of the tooth row at this point; the first premolar is in line with the canine, and the third premolar is in line with the first, second, and third molars.

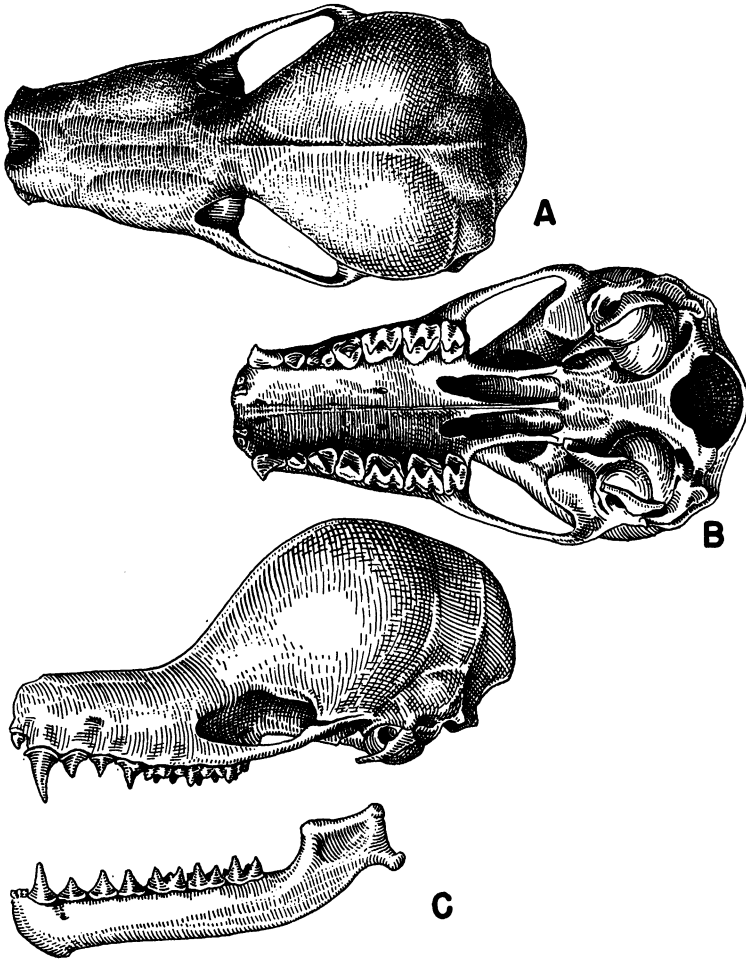


FIG. 2. *Natalus tumidirostris haymani*, A.M.N.H. No. 176590, type. A. Dorsal view. B. Ventral view. C. Lateral view. All $\times 4$.

MEASUREMENTS OF TYPE: Before skinning, total length, 104.0; length of tail, 55.0; hind foot, 10.0; ear from meatus, 12.2; tibia, 21.4; lower leg and claws, 29.0; forearm, 40.5; third metacarpal, 36.4. Weight: 5.8 grams. Skull: greatest length, 16.9; condylobasal length, 15.7; inter-orbital constriction, 3.3; zygomatic breadth, 8.6; mastoid breadth, 7.5; breadth of braincase, 8.2; width across canines, 4.1; width across molars, 5.8; maxillary tooth row, C-M³, 7.4.

COMPARISONS: *Natalus t. haymani* can be readily distinguished from

N. t. continentis by its larger and more massive skull, heavier molariform teeth, and by the distinct break in the line of the tooth row at the second premolar. In *continentis* there is scarcely any indication of an angle in the tooth at this point. From all forms in the *stramineus* group *haymani* can be distinguished by the swollen maxillary bones and the deep posterior emargination of the palate.

SPECIMENS RECORDED: Trinidad: Guacharo Caves, two (M.C.Z.); heights of Guamapo, one (A.M.N.H.); Platanal, two (A.M.N.H.); Tamana Caves, 18 (A.M.N.H.), two (B.M.).

POSTSCRIPT

Since this paper was sent to press, Dr. Philip Hershkovitz of the Chicago Natural History Museum has forwarded to me for examination five specimens of *Natalus* from Macaregua, Barichara, Santander, Colombia, altitude 1700 meters. These specimens not only extend the known range of the genus but are of special interest because they have the emarginate palate and swollen maxillary bones of *N. tumidirostris* and agree so closely with *continentis* that they can be confidently referred to this subspecies. Measurements of these specimens are included in the table on pages 21-22.

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TABLE 1
MEASUREMENTS (IN MILLIMETERS) OF SPECIES OF THE SUBGENUS *Natalus*

Species and No.	Sex	Locality	Forearm	Length of Skull	Condylabasal Length	Zygomatic Breadth	Breadth of Braincase	Interorbital Width	Width Across Canines	Width Across Molars	Tooth Row
<i>N. stramineus stramineus</i>											
B.M.*	♂	—	38.0	16.6	15.0	8.6	8.29	3.3	4.0	5.8	7.4
A.M.N.H. No. 72368	♂	Anguilla, B. W. I.	38.0	16.6	15.1	8.4	7.9	3.0	4.0	5.8	7.2
A.M.N.H. No. 72369	♂	Anguilla, B. W. I.	38.0	16.5	15.5	8.4	8.0	3.3	4.0	5.8	7.2
U.S.N.M. No. 113601	♂	Dominica, B. W. I.	39.5	16.7	15.6	8.9	7.6	3.35	3.7	5.8	7.2
U.S.N.M. No. 113602	♂	Dominica, B. W. I.	39.5	16.8	15.5	8.2	7.8	3.35	3.5	5.8	7.3
B.M. No. 18.4	♂	Antigua, B. W. I.	38.0	16.6	15.5	8.7	8.1	3.4	4.1	5.9	7.35
B.M. No. 1.1	♂	Antigua, B. W. I.	38.8	16.6	15.7	8.8	8.0	3.5	4.2	5.9	7.5
<i>N. stramineus natalensis</i>											
U.S.N.M. No. 242830*	♀	Natal, Brazil	37.2	16.2	14.8	8.7	8.2	3.2	3.6	5.5	6.5
U.S.N.M. No. 242828	♀	Natal, Brazil	37.0	15.7	14.6	—	7.6	3.0	3.4	—	6.6
U.S.N.M. No. 242829	♂	Natal, Brazil	37.3	15.9	14.6	—	7.9	3.1	3.5	—	6.65
U.S.N.M. No. M.L.	?	Lagon Santa, Brazil	—	16.2	14.9	8.6	8.2	3.1	3.6	5.4	6.5
<i>N. stramineus mexicanus</i>											
U.S.N.M. No. 96496*	♀	Santa Anita, Baja California	35.4	16.0	—	8.0	7.6	3.0	—	—	7.0
K.M. No. 27315	♀	Santa Anita, Baja California	37.8	16.1	14.8	7.8	7.7	3.4	3.4	5.2	6.8
K.M. No. 27316	♀	Santa Anita, Baja California	37.2	15.6	14.5	8.0	7.7	3.3	3.4	5.3	6.8

TABLE 1—(Continued)

Species and No.	Sex	Locality	Forearm	Length of Skull	Condylobasal Length	Zygomatic Breadth	Breadth of Braincase	Interorbital Width	Width Across Canines	Width Across Molars	Tooth Row
K.M. No. 27317	♀	Santa Anita, Baja California	37.5	15.6	14.4	7.7	7.5	3.2	3.3	5.1	6.8
K.M. No. 27318	♀	Santa Anita, Baja California	37.9	15.7	14.6	—	7.5	3.3	3.5	5.4	6.7
K.M. No. 27319	♀	Santa Anita, Baja California	37.3	15.3	14.2	7.8	7.5	3.3	3.5	5.6	6.6
K.M. No. 27320	♀	Santa Anita, Baja California	37.0	15.4	14.4	7.7	7.3	3.3	3.3	5.4	6.7
A.M.N.H. No. 172023	♂	Tesia, Sonora	37.0	16.0	14.35	7.8	7.8	3.2	3.3	5.3	6.8
A.M.N.H. No. 172024	?	Tesia, Sonora	39.0	15.5	14.5	7.9	7.6	3.2	3.4	5.3	6.6
A.M.N.H. No. 172025	?	Tesia, Sonora	38.0	15.5	14.8	7.8	7.6	3.2	3.5	5.3	6.6
A.M.N.H. No. 172026	?	Tesia, Sonora	38.0	—	—	—	—	3.1	3.6	5.1	6.7
<i>N. stramineus saturatus</i>											
A.M.N.H. No. 25102	♂	Amatlán, Nayarit	37.5	16.5	15.4	8.1	7.8	3.2	3.7	5.2	6.9
A.M.N.H. No. 25104	♂	Amatlán, Nayarit	37.7	16.0	14.9	7.9	7.6	3.3	3.5	5.4	6.7
A.M.N.H. No. 25105	♂	Amatlán, Nayarit	37.0	16.1	15.0	7.6	7.5	3.2	3.5	5.4	7.0
A.M.N.H. No. 25106	♂	Amatlán, Nayarit	36.3	15.8	15.0	7.9	7.7	3.3	3.5	5.2	6.8
A.M.N.H. No. 25107	♂	Amatlán, Nayarit	37.0	16.2	15.0	7.8	7.7	3.3	3.5	5.0	6.7
A.M.N.H. No. 25108	♂	Amatlán, Nayarit	39.0	15.9	15.0	8.0	7.7	3.3	3.6	5.5	6.9
A.M.N.H. No. 25109	♂	Amatlán, Nayarit	38.7	15.6	—	7.5	7.3	3.3	3.5	5.4	6.8
A.M.N.H. No. 25110	♂	Amatlán, Nayarit	37.0	15.9	14.9	8.0	7.7	3.4	3.6	5.5	6.8
A.M.N.H. No. 25111	♂	Amatlán, Nayarit	37.0	16.2	14.6	7.8	—	3.3	3.5	5.2	7.0
A.M.N.H. No. 147904	♀	El Pachon, Tamaulipas	37.0	15.6	14.5	7.6	7.0	3.2	3.2	5.1	6.7

TABLE 1—(Continued)

Species and No.	Sex	Locality	Forearm	Length of Skull	Condylobasal Length	Zygomatic Breadth	Breadth of Braincase	Interorbital Width	Width Across Canines	Width Across Molars	Tooth Row
A.M.N.H. No. 147905	♀	El Pachon, Tamaulipas	38.2	15.9	14.8	8.0	7.5	3.2	3.3	5.2	6.8
A.M.N.H. No. 147906	♀	El Pachon, Tamaulipas	38.0	15.4	14.5	7.8	7.2	3.1	3.4	5.2	6.6
A.M.N.H. No. 147907	♀	El Pachon, Tamaulipas	37.5	15.8	14.7	7.7	7.5	3.1	3.4	5.1	6.9
A.M.N.H. No. 147908	♀	El Pachon, Tamaulipas	36.8	15.5	14.5	7.8	7.7	3.1	3.5	5.2	6.8
A.M.N.H. No. 147909	♀	El Pachon, Tamaulipas	39.0	15.7	14.7	7.9	7.3	3.3	3.4	5.5	6.9
A.M.N.H. No. 147910	♀	El Pachon, Tamaulipas	39.0	16.0	14.9	7.8	7.7	3.2	3.4	5.3	7.0
A.M.N.H. No. 147911	♀	El Pachon, Tamaulipas	38.3	15.9	14.8	8.0	7.5	3.1	—	5.4	7.0
U.M. No. 22816	♀	San Andres, Tuxtla, Veracruz	38.3	16.2	—	7.6	7.2	3.2	3.6	5.5	6.9
U.M. No. 22817	♀	San Andres, Tuxtla, Veracruz	38.0	16.0	15.2	8.2	7.6	3.2	3.6	5.6	6.9
U.M. No. 22818	♂	San Andres, Tuxtla, Veracruz	37.0	16.1	15.2	8.1	7.9	3.2	3.7	5.5	7.0
U.M. No. 22819	♂	San Andres, Tuxtla, Veracruz	38.0	16.5	15.3	8.3	7.9	3.2	3.9	5.5	7.1
U.M. No. 23822	♀	San Andres, Tuxtla, Veracruz	39.3	16.0	15.3	8.2	7.7	3.2	3.5	5.5	7.0
U.M. No. 23833	♂	San Andres, Tuxtla, Veracruz	37.3	15.8	14.9	8.4	7.8	3.2	3.4	5.5	6.8
U.M. No. 23838	♂	San Andres, Tuxtla, Veracruz	37.0	16.1	15.0	7.8	7.6	3.2	3.6	5.5	6.9
A.M.N.H. No. 120320	♂	Tequesquitengo, Morelos	—	16.1	14.7	8.0	7.7	3.1	3.3	5.5	6.9
A.M.N.H. No. 180321	♂	Tequesquitengo, Morelos	37.5	—	—	—	7.6	3.0	3.5	5.3	6.6
A.M.N.H. No. 180449	♀	Tequesquitengo, Morelos	38.6	15.7	14.8	8.0	7.7	3.1	3.4	5.25	6.9
A.M.N.H. No. 180450	♀	Tequesquitengo, Morelos	38.4	15.7	—	7.7	7.5	2.9	3.4	5.2	6.8
A.M.N.H. No. 143479	♂	San Antonio, Oaxaca	39.0	16.0	14.8	8.1	7.7	3.2	3.4	5.4	6.9

TABLE 1—(Continued)

Species and No.	Sex	Locality	Forearm	Length of Skull	Condylobasal Length	Zygomatic Breadth	Breadth of Braincase	Interorbital Width	Width Across Canines	Width Across Molars	Tooth Row
A.M.N.H. No. 148386	♀	San Antonio, Oaxaca	39.0	15.4	14.8	7.9	7.2	3.1	3.3	5.4	6.9
A.M.N.H. No. 165945	♀	San Antonio, Oaxaca	38.5	16.0	15.0	7.8	7.4	3.0	3.4	5.2	7.0
A.M.N.H. No. 165946	♂	San Antonio, Oaxaca	37.5	16.7	15.5	8.2	7.7	3.1	3.9	5.5	7.1
A.M.N.H. No. 165947	♀	San Antonio, Oaxaca	37.5	15.5	14.5	7.7	7.5	3.0	3.1	5.0	6.5
A.M.N.H. No. 148387	♀	Guingola, Oaxaca	38.7	16.3	14.9	7.8	7.5	3.0	3.3	5.4	7.0
A.M.N.H. No. 148388	♂	Guingola, Oaxaca	38.5	16.5	15.4	—	7.6	3.1	3.6	5.4	7.1
A.M.N.H. No. 148389	♂	Guingola, Oaxaca	37.5	16.5	15.3	7.9	7.7	3.2	3.3	5.5	7.0
A.M.N.H. No. 148390	♂	Guingola, Oaxaca	38.4	16.2	15.2	8.0	7.6	3.1	3.5	5.5	6.9
A.M.N.H. No. 148391	♀	Guingola, Oaxaca	38.0	16.1	15.0	8.2	7.8	3.2	3.5	5.5	7.1
A.M.N.H. No. 145148	♂	Basilano, Oaxaca	40.5	16.5	15.2	7.8	7.6	3.3	3.4	5.5	7.1
A.M.N.H. No. 178758	♂	El Salado, Oaxaca	38.2	16.8	15.2	8.4	7.8	3.4	3.6	5.5	7.0
A.M.N.H. No. 178759	♂	El Salado, Oaxaca	38.2	16.0	15.2	8.0	7.7	3.2	3.6	5.5	7.0
A.M.N.H. No. 178760	♂	El Salado, Oaxaca	38.5	15.5	15.0	8.1	7.3	3.1	3.5	5.4	6.9
A.M.N.H. No. 177420	♂	Tapanatepec, Oaxaca	38.2	16.3	15.5	8.3	7.8	3.3	3.7	5.7	6.9
A.M.N.H. No. 178746	♀	Tehuantepec, Oaxaca	36.0	15.0	14.2	7.7	7.4	3.0	3.1	4.85	6.5
A.M.N.H. No. 68583	♂	El Progreso, Guatemala	—	16.3	15.4	8.0	7.9	3.3	—	5.1	6.9
A.M.N.H. No. 68584	♂	El Progreso, Guatemala	—	16.3	15.3	7.7	8.1	3.4	3.5	5.2	6.9
A.M.N.H. No. 68585	♂	El Progreso, Guatemala	—	16.3	15.2	8.3	8.0	3.3	3.9	5.4	6.9
A.M.N.H. No. 68586	♂	El Progreso, Guatemala	—	16.4	15.4	8.3	8.0	3.3	—	5.4	7.0
A.M.N.H. No. 68587	♂	El Progreso, Guatemala	—	16.2	15.1	8.0	8.0	3.3	3.6	5.2	6.8

TABLE 1—(Continued)

Species and No.	Sex	Locality	Forearm	Length of Skull	Condylbasal Length	Zygomatic Breadth	Breadth of Braincase	Interorbital Width	Width Across Canines	Width Across Molars	Tooth Row
A.M.N.H. No. 68588	♂	El Progreso, Guatemala	2	16.6	15.3	8.3	8.1	3.3	3.7	5.5	7.2
A.M.N.H. No. 144712	♂	Flores, Guatemala	37.0	15.7	14.7	7.8	7.3	3.2	—	5.0	6.5
A.M.N.H. No. 144713	♂	Flores, Guatemala	38.2	15.9	14.7	8.0	7.5	3.1	—	5.1	6.6
A.M.N.H. No. 144714	♂	Flores, Guatemala	36.0	15.3	14.2	7.8	7.2	3.2	3.3	5.0	6.5
A.M.N.H. No. 144715	♂	Flores, Guatemala	37.0	15.3	14.2	7.7	7.4	3.2	—	4.9	6.5
A.M.N.H. No. 144762	♂	Flores, Guatemala	38.0	15.9	14.7	7.7	7.3	3.1	3.4	5.3	6.7
A.M.N.H. No. 18729	♂	Coiba, Panama	37.7	15.9	—	6.5	7.4	3.1	3.2	—	6.5
A.M.N.H. No. 80962	♂	Chilibrillo, Panama	39.0	16.2	14.8	8.0	7.8	3.2	3.3	5.5	6.9
M.C.Z. No. 28228	♂	Penonome, Panama	38.3	16.5	14.9	8.5	8.3	3.2	3.7	5.4	6.7
M.C.Z. No. 33514	♂	Penonome, Panama	37.2	16.1	14.8	8.4	7.9	3.2	3.7	5.4	6.7
M.C.Z. No. 33516	♂	Penonome, Panama	37.2	15.7	14.3	7.8	7.6	3.2	3.5	5.3	6.5
<i>N. major major</i>											
U.S.N.M. No. 96496 ^a	♂	Dominican Republic	42.0	18.0	—	9.6	9.0	3.6	4.4	—	8.0
U.S.N.M.	♀	Dominican Republic	43.0	17.0	—	9.0	7.8	3.2	3.6	—	7.8
A.M.N.H. No. 97589	♀	Dominican Republic	43.5	16.9	16.1	8.8	8.3	3.3	3.8	5.9	7.5
A.M.N.H. No. 97590	♂	Dominican Republic	44.5	18.1	16.7	9.5	8.8	3.4	4.2	6.3	7.8
<i>N. major jamaicensis</i>											
A.M.N.H. No. 181999	♂	St. Clair, Jamaica	44.8	17.9	16.7	9.4	8.5	3.0	4.0	6.2	7.9
A.M.N.H. No. 182000 ^a	♂	St. Clair, Jamaica	45.2	18.3	16.8	9.5	8.8	3.1	4.1	6.1	8.1

TABLE 1—(Continued)

Species and No.	Sex	Locality	Forearm	Length of Skull	Condylobasal Length	Zygomatic Breadth	Breadth of Braincase	Interorbital Width	Width Across Canines	Width Across Molars	Tooth Row
J.I. No. 3	♂	St. Clair, Jamaica	44.5	17.8	16.2	9.0	8.5	3.0	4.0	6.2	7.9
J.I. No. 4	♂	St. Clair, Jamaica	44.0	17.8	16.5	9.0	8.6	3.1	3.9	6.0	8.0
<i>N. tumidirostris tumidirostris</i>											
U.S.N.M. No. 102105	♀	Curacao	35.0	15.8	—	7.8	7.7	3.2	3.5	5.0	6.6
U.S.N.M. No. 102106 ^a	♂	Curacao	36.4	16.2	—	8.0	7.8	3.2	3.7	5.2	6.8
L.M. No. 14387	♂	Curacao	36.5	16.0	—	8.0	7.9	3.2	3.9	5.2	6.9
<i>N. tumidirostris continensis</i>											
A.M.N.H. No. 31510	♂	San Esteban, Venezuela	38.3	—	—	—	—	—	—	—	7.0
A.M.N.H. No. 31511	♀	San Esteban, Venezuela	38.0	16.0	14.7	8.0	7.6	3.3	3.4	5.1	6.7
A.M.N.H. No. 31512	♀	San Esteban, Venezuela	39.0	—	—	—	—	—	3.5	5.6	7.0
A.M.N.H. No. 31513	♀	San Esteban, Venezuela	39.0	—	—	—	—	—	3.6	5.5	6.9
A.M.N.H. No. 31514	♂	San Esteban, Venezuela	39.3	15.8	15.1	8.1	7.3	3.4	3.6	5.3	7.0
A.M.N.H. No. 31515	♂	San Esteban, Venezuela	—	—	—	—	—	—	3.4	5.5	6.9
A.M.N.H. No. 31516	♂	San Esteban, Venezuela	39.0	16.0	14.4	8.0	7.4	3.6	3.3	5.7	6.9
B.M. ^e	♂	San Esteban, Venezuela	38.7	16.8	15.6	—	8.4	—	—	—	7.1
C.N.H.M. No. 72125	♀	Barichara, Colombia	41	16.7	15.2	8.3	7.6	3.5	4.0	5.5	7.0
C.N.H.M. No. 72126	♀	Barichara, Colombia	40	16.5	15.2	8.3	7.7	3.4	3.8	5.6	7.1
C.N.H.M. No. 72127	♂	Barichara, Colombia	39	16.7	15.4	8.3	7.9	3.4	3.9	5.6	7.05
C.N.H.M. No. 72128	♂	Barichara, Colombia	38	16.5	15.2	8.3	7.7	3.3	3.7	5.5	7.0

TABLE 1—(Continued)

Species and No.	Sex	Locality	Forearm	Length of Skull	Condylobasal Length	Zygomatic Breadth	Breadth of Braincase	Interorbital Width	Width Across Canines	Width Across Molars	Tooth Row
C.N.H.M. No. 72129	♂	Barichara, Colombia	38	16.3	15.2	8.3	7.6	3.3	4.0	5.6	6.9
<i>N. tumidirostris haymani</i>											
A.M.N.H. No. 175856	♂	Trinidad	40.0	16.7	15.7	8.5	7.9	3.3	4.0	5.7	7.2
A.M.N.H. No. 175857	♀	Trinidad	39.0	16.3	15.0	8.3	7.8	3.2	3.6	5.6	6.9
A.M.N.H. No. 175859	♂	Trinidad	40.0	—	—	8.4	—	3.4	3.8	5.7	7.3
A.M.N.H. No. 175840	♂	Trinidad	40.0	17.3	16.5	8.6	8.3	3.5	3.9	5.7	7.2
A.M.N.H. No. 176587	♂	Trinidad	40.0	16.7	—	8.5	—	3.5	3.8	5.4	7.3
A.M.N.H. No. 176588	♂	Trinidad	40.5	16.7	15.5	8.4	8.1	3.3	3.8	5.3	7.3
A.M.N.H. No. 176589	♂	Trinidad	39.7	17.0	15.7	8.5	7.9	3.3	4.0	5.5	7.2
A.M.N.H. No. 176590*	♂	Trinidad	40.5	16.9	15.7	8.6	8.2	3.3	4.1	5.8	7.4
A.M.N.H. No. 176594	♀	Trinidad	40.3	16.6	15.5	8.5	8.0	3.3	4.0	5.7	7.0
A.M.N.H. No. 176598	♂	Trinidad	41.5	16.8	15.7	8.4	7.9	3.3	3.9	5.5	7.3
B.M. No. 37.8.27	♀	Trinidad	40.1	16.1	15.5	8.4	8.0	3.6	3.9	6.0	7.2

*Type.