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Pteronotus macleayii.

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Pteronotus macleayii (Gray, 1839)

MacLeay's Mustached Bat

Chilonycteris macleayii Gray, 1839:5. Type locality unspecified in Cuba.

Chilonycteris grisea Gosse, 1851:326. Type locality "Phoenix Park, St. Ann Parish," Jamaica.

Chilonycteris macleayi True, 1884:603. Unjustified emendation of *Chilonycteris macleayii* Gray, 1839.

Pteronotus macleayii: Smith, 1972:79. First use of current name combination.

CONTEXT AND CONTENT. Order Chiroptera, family Mormoopidae, subfamily Chilonycterinae, genus *Pteronotus* (Gray 1838), subgenus *Chilonycteris* (Simmons and Conway 2001; Smith 1972). Two subspecies are recognized (Koopman 1993; Smith 1972):

P. m. griseus (Gosse, 1851:326), see above.
P. m. macleayii (Gray, 1839:5), see above.

DIAGNOSIS. Within the subgenus *Chilonycteris*, *Pteronotus macleayii* (Fig. 1) can be distinguished from *P. personatus* by length of rostrum equal to or greater than one-half total length of skull and nostrils with lateral spike. From *P. quadridens*, *P. macleayii* can be distinguished by narial pad with V-shaped notch between nostrils. Calcar length ca. 1.5 times length of hind foot and clitoris is elongated in *P. macleayii*; in *P. quadridens*, length of calcar and hind foot are similar, and clitoris is moderate in size (Silva Taboada 1979; Simmons and Conway 2001). In *P. macleayii*, length of forearm ranges from 39.9 to 45.1 mm, whereas length of forearm in *P. quadridens* is <41 mm (Silva Taboada 1979; Smith 1972).

GENERAL CHARACTERS. Size is small, body is entirely furred, and wing membranes are hairless. Color ranges from grayish brown to yellowish brown; some individuals have an orange brown color (Silva Taboada 1979). Ears are narrow, pointed, and separated above head. Lateral edge of distal pinna is serrated; number of serrations ranges from 0 to 3. Tragus is long and spatulated with prominent secondary fold and is sparsely covered by short bristle-like hairs with longer hairs on cranial and distal edges (Silva Taboada 1979; Smith 1972).

Skull is relatively flat, rostrum is slightly elevated, and forehead rises abruptly to round, high braincase (Fig. 2). Length of rostrum is equal to or greater than one-half total length of skull. Means (in mm) of measurements (with parenthetical *n* and ranges) of males and females, respectively, from Cuba are zygomatic breadth, 7.9 (62, 7.5–8.2), 7.7 (63, 7.3–8.1); length of maxillary toothrow, 7.5 (61, 7.3–7.8), 7.4 (63, 7.2.–7.7); breadth of canine, 4.6 (51, 4.3–4.9), 4.5 (55, 4.3–4.7); breadth of molar, 5.7 (63, 5.4–5.9), 5.6 (64, 5.4–5.9); condylo-incisor length, 15.3 (62, 14.9–15.7), 15.1 (63, 14.5–15.5); postorbital breadth, 3.1 (63, 2.9–3.3), 3.0 (66, 2.8–3.2); depth of braincase, 7.1 (63, 6.8–7.4), 7.0 (67, 6.7–7.2); greatest length of skull, 16.0 (65, 15.6–16.4), 15.8 (67, 15.2–16.2); length of forearm, 42.3 (70, 40.8–44.2), 42.3 (79, 39.9–43.8); length of humerus, 23.0 (35, 22.1–24), 23.2 (35, 21.9–24.2); and wing area, 106.5 cm^2 (15, 101.4–114.2), 108.1 cm^2 (15, 103.2–114.4—Silva Taboada 1979); for 19 adult males from Jamaica (in mm), length of forearm, 43.5 (41.7–45.1); zygomatic breadth, 8.2 (8.0–8.4); rostral breadth, 6.4 (6.3–6.6); length of maxillary toothrow, 6.8 (6.7–7.0); condylobasal length, 15.2 (14.8–15.7); and depth of braincase, 7.1 (6.9–7.3). Mean external measurements (with parenthetical range, in mm) of 6 males and 6 females, respectively, from Jamaica are: total length, 74.2 (73.0–75.0), 74.3 (72.0–78.0); length of tail, 23.7 (22.0–25.0), 23.3 (22.0–25.0); and length of hind foot, 9.4 (9.0–10), 9.9 (9.5–10.0—Smith 1972).

Body mass (with parenthetical *n* and range) in Cuban bats averaged 5.6 g (194, 4.6–7.5) for males and 5.1 g (183, 4.1–6.4) for females; males tend to be larger than females in almost all measurements, but difference is significant only for greatest length of skull (Silva Taboada 1979). *P. m. macleayii* is smaller than *P. m. griseus* based on external and cranial measurements (Smith 1972).

DISTRIBUTION. MacLeay's mustached bat is known from Cuba, Isla de la Juventud (former Isla de Pinos), and Jamaica, Greater Antilles (Fig. 3; Koopman 1993; Smith 1972; Varona 1974).

FOSSIL RECORD. Fossil and subfossil remains of *P. macleayii* are known from Pleistocene and Holocene deposits in Greater Antilles. Fossilized crania and postcrania were found in Pleistocene and Holocene deposits from caves in central Cuba (Silva Taboada 1974). *P. macleayii* is recorded from a late Quaternary deposit in New Providence, Bahamas, and represents the first extinct population of this species (Morgan 1989). The Bahamian fossils have no apparent morphological differences from Recent Cuban specimens. Fossil and subfossil *Chilonycteris* from Jamaica were reported as "*Chilonycteris parnelli*," without specifying if other species in the genus were present (Williams 1952).

FORM AND FUNCTION. Pelage is tricolored dorsally; individual hairs have olive-brown basal bands and dark brown to blackish tips. Central band of hairs is whitish to grayish white. Ventral pelage is grayish white with a pale buffy tinge. Subspecies do not differ in color of pelage (Smith 1972).

Plagiopataguim of MacLeay's mustached bat is attached on flanks. Wing membrane and uropatagium attach to ankle via a long ligament that is tightly bound to distal half of tibia. Uropatagium is broad with a small vertical line on free edge (Silva Taboada 1979). *Pteronotus macleayii* has a wing aspect ratio of 7.56 ± 0.30 *SD* (n = 10) and wing loading of 4.62 Nm^{-2} ± 0.48 *SD* (n = 10—Mancina et al. 2004); both indices were calculated according to Norberg and Rayner (1987). Wing morphology permits foraging in more or less cluttered habitats, including edge habitats and forests with clearings. *P. macleayi* is included in the guild of background cluttered space, aerial insectivorous bats (Kalko 1997).

FIG. 1. Photograph of an adult male *Pteronotus macleayii* from Pinar del Río Province, Cuba. Photograph by C. A. Mancina.

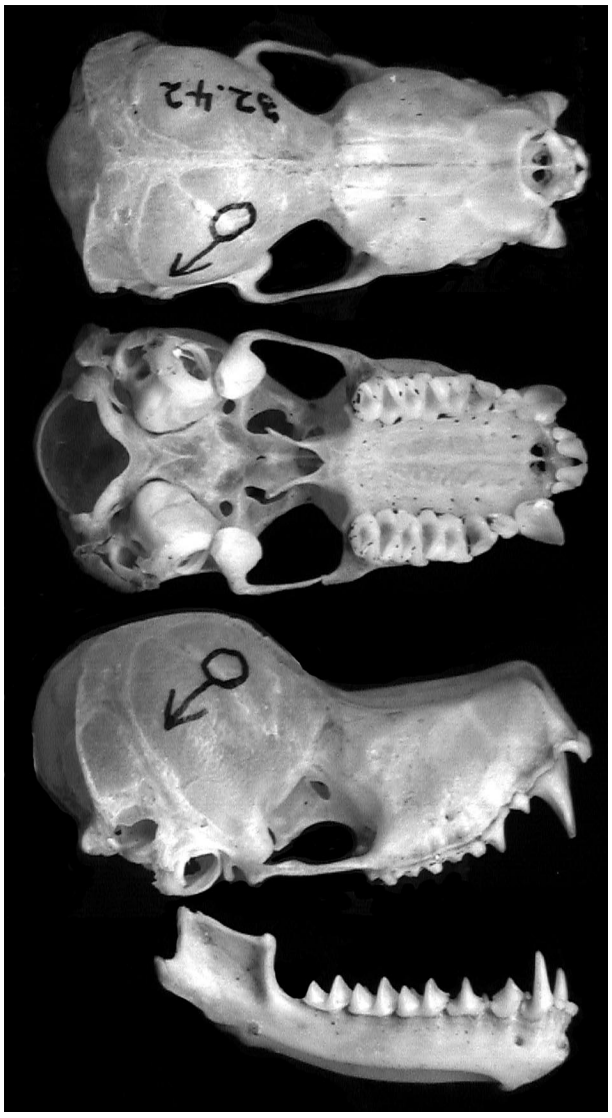

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of an adult male *Pteronotus macleayii macleayii* (Colección de Mamíferos, Instituto de Ecología y Sistemática CAZCC 1.1120). Greatest length of skull is 16.3 mm.

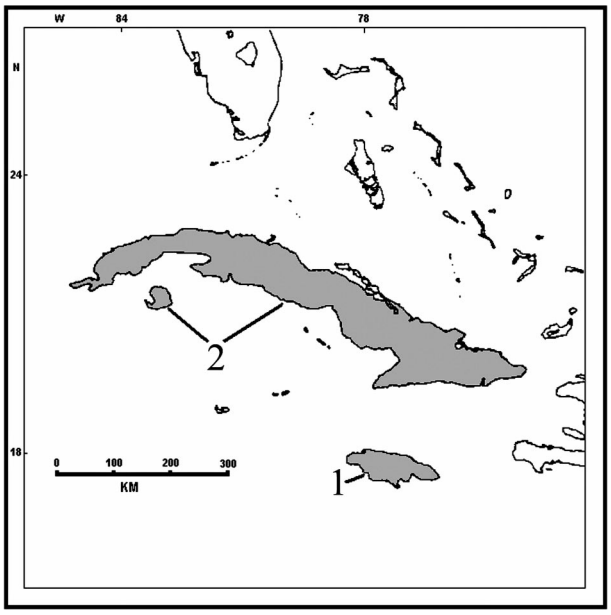

FIG. 3. Geographic distribution of *Pteronotus macleayii*. Subspecies are 1, *P. m. griseus*; 2, *P. m. macleayii*.

Dental formula is i 2/2, c 1/1, p 2/3, m 3/3, total 34. A small diastema exists between outer upper incisor and canine. Inner incisors are bifurcated. Lower incisors are reduced in size and trilobed. One individual was found without 2nd molars and with deformed alveolar cavities (Silva Taboada 1979). Dental anomalies were not found in the specimen examined by Phillips and Jones (1968). Mean ($\pm SD$, in cm^3) cranial capacity for 10 individuals was 0.13 ± 0.01, and encephalization quotient was 0.85 ± 0.05 (Mancina et al. 2004).

ONTOGENY AND REPRODUCTION. MacLeay's mustached bat is monoestrus and bears a single young each pregnancy. Testicular development is greatest in January and February; diameter of right testis ranges from 1.7 to 5.2 mm ($n = 62$). Breeding begins in March, gravid females occur from March through July, with all females being recorded as pregnant in May. Lactation occurs from June through August with a peak in August. Embryonic and adult sex ratios (percent of females) were 50% and 61.3%, respectively (Silva Taboada 1979). During the breeding season, either males or females may disappear from daily roosts (Silva Taboada 1979).

ECOLOGY AND BEHAVIOR. Analysis of stomach contents ($n = 58$) revealed that *P. macleayii* in Cuba feeds exclusively on insects. Stomach contents collected from January to March and July to November contained Diptera (65.5%), Coleoptera (45.4%), Orthoptera (18.2%), and Homoptera (9.1%). Stomach contents were always <6% of body mass (Silva Taboada 1979).

MacLeay's mustached bat is widespread in Cuba, Isla de la Juventud, and Jamaica (Dávalos and Eriksson 2003; Goodwin 1970; McFarlane 1986; Rehn 1904; Silva Taboada 1988). *P. macleayii* roosts exclusively in caves. In Cuba, *P. macleayii* prefers hot, humid, and relatively constant conditions (Silva Taboada, 1979), and colonies have been observed in 29 caves (Silva Taboada 1988). In Jamaica, *P. macleayii* prefers extensive, deep, wet cave systems and large, high-domed chambers located well back from entrances (Goodwin 1970).

Pteronotus macleayii is gregarious. Colonies of several thousand individuals have been found in Cuban caves; small clusters or solitary individuals have not been found (Silva Taboada 1979). In Jamaica, *P. macleayii* congregates in small to medium-sized clusters in highest parts of chambers, especially within small shallow pockets that pit the surface; in these clusters, individuals appear to be nearly in contact with one another (Goodwin 1970). MacLeay's mustached bat leaves caves at dusk, beginning 8–29 min after sunset, and returns 28–46 min before sunrise. Time interval within which exodus occurs is broader than time interval of return (Silva Taboada 1979).

Pteronotus macleayii is found in caves with *Artibeus jamaicensis*, *Brachyphylla nana*, *Erophylla sezekorni*, *Macrotus waterhousei*, *Monophyllus redmani*, *Mormoops blainvillii*, *Natalus lepidus*, *N. major*, *N. micropus*, *Phyllonycteris aphylla*, *P. poeyi*, *Pteronotus parnelli*, and *P. quadridens*, although they remain spatially separated from the other species (Dávalos and Eriksson 2003; McFarlane 1986; Silva Taboada 1979).

Echolocation calls of *Pteronotus macleayii* contain 4 harmonics. *P. macleayii* often emits short narrowband signals with dominant second harmonic at frequencies of ca. 70 and 80 kHz. Pure frequency-modulated (FM) and short constant frequency (CF) and frequency modulated calls (CF-FM) have been recorded (Kössl et al. 1999).

Pteronotus macleayii is host to several species of endoparasites, including *Histiostrongylus coronatus*, *Limatulum solitarium*, *Parabascus silvai*, *Physocephalus sexalatus*, *Torrestrongylus torrei*, and *Urotrema scabridum* (Barus and del Valle 1967; Coy and Lorenzo 1982; Odening 1973). Ectoparasites recorded from *P. macleayii* include the following mites (Acarina): *Camaronieta machadoi* (Spinturnicidae), *Eudusbabekia saguei* (Myobiidae), *Lawrenceocarpus micropilus* (Labidocarpidae), *Notoedres lasionycteris* (Labidocarpidae), and *Ornithodoros viguerasi* (Argasidae—Cerny 1969; Dusbábek 1967a, 1967b, 1970; Dusbábek and de la Cruz 1966). Batflies (Diptera) have also been found in *P. macleayii*:

Trichobius dusbabeki and *Trichobius frequens* (Streblidae—Peterson and Hurka 1974).

GENETICS. *Pteronotus macleayii* has diploid number of 38 with 60 autosomal arms. Karyotypic variation is restricted to a paracentric inversion and presence or absence of a heterochromatic short arm (Baker and Bickham 1980). Autosomal pairs include 6 large and 4 medium-sized metacentrics or submetacentrics, 2 large and 4 small acrocentrics, and 2 small submetacentrics. X chromosome is submetacentric, and Y chromosome is acrocentric (Sites et al. 1981).

CONSERVATION STATUS. MacLeay's mustached bat is listed as vulnerable by the International Union for the Conservation of Nature/Chiroptera Specialist Group (Hutson et al. 2001). Commercialization, high levels of disturbance in caves, and use of animals in research have been listed as threats (Hutson et al. 2001).

REMARKS. Type locality for *Pteronotus macleayii* was restricted by Silva Taboada (1976) to Guanabacoa City in Havana Province, Cuba. Conservation status suggested by Hutson et al. (2001) should be limited to populations in Jamaica where *P. macleayii* is less abundant and has a more restricted distribution than in Cuba. Genus name *Pteronotus* is derived from the Greek *pteron* and *notos*, meaning "that carry the wings in the back" (Álvarez-Castañeda and Álvarez 1996); this likely refers to fusion of the wing membrane on the mid-dorsal line. Specific name, *macleayii*, honors William Sharp MacLeay, who collected Cuban specimens on which John E. Gray based his original description.

LITERATURE CITED

Álvarez-Castañeda, S. T., and T. Álvarez. 1996. Etimologías de los géneros de mamíferos mexicanos. Ciencia 47:39–49.

Baker, R. J., and J. W. Bickham. 1980. Karyotypic evolution in bats: evidence of extensive and conservative chromosomal evolution in closely related taxa. Systematic Zoology 29:239–253.

Barus, V., and T. del Valle. 1967. Systematic survey of nematodes parasitizing bats (Chiroptera) in Cuba. Folia Parasitologica 14:121–140.

Cerny, V. 1969. The tick fauna of Cuba. Folia Parasitologica 16: 279–284.

Coy, A. O., and N. H. Lorenzo. 1982. Lista de los helmintos parásitos de los vertebrados silvestres cubanos. Poeyana 235: 1–57.

Dávalos, L. M., and R. Eriksson. 2003. New and noteworthy records from ten Jamaican bat caves. Caribbean Journal of Science 39:140–144.

Dusbábek, F. 1967a. *Jamesonia*, a new genus (Acarina: Myobiidae) with seven new species from Cuban bats. Folia Parasitologica 14:247–261.

Dusbábek, F. 1967b. New species of genus *Cameronieta* from Cuba (Acarina: Spinturnicidae). Folia Parasitologica 14:149–160.

Dusbábek, F. 1970. Mites of the genus *Notoedres* (Acarina: Sarcoptidae) parasitic on Cuban bats. Folia Parasitologica 17: 271–276.

Dusbábek, F., and J. de la Cruz. 1966. Nuevos géneros y especies de ácaros (Acarina: Listrophoridae) parásitos de murciélagos cubanos. Poeyana serie A 31:1–20.

Goodwin, R. E. 1970. The ecology of Jamaican bats. Journal of Mammalogy 51:571–579.

Gosse, P. H. 1851. A naturalist's sojourn in Jamaica. Longmans, London, United Kingdom.

Gray, J. E. 1838. A revision of the genera of bats (Vespertilionidae), and the description of some new genera and species. Magazine Zoology and Botany 2:483–505.

Gray, J. E. 1839. Descriptions of some Mammalia discovered in Cuba by W. S. MacLeay Esq. Annals Natural History 4:1–7.

Hutson, A. M., S. P. Mickleburgh, and P. A. Racey (comps.). 2001. Microchiropteran bats: global status survey and conservation action plan. IUCN/SSC Chiroptera Specialist Group. International Union for the Conservation of Nature, Gland, Switzerland, and Cambridge, United Kingdom.

Kalko, E. K. V. 1997. Diversity in tropical bats. Pp. 13–43 in Tropical biodiversity and systematics. Proceedings of the international symposium on biodiversity and systematics in tropical ecosystems, Bonn, 1994 (H. Ulrich, ed.). Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany.

Koopman, K. F. 1993. Order Chiroptera. Pp. 137–241 in Mammals species of the world, a taxonomic and geographic reference (D. E. Wilson and D. M. Reeder, eds.). Smithsonian Institution Press, Washington, D.C.

Kössl, M., F. Mayer, G. Frank, M. Faulstich, and I. J. Russell. 1999. Evolutionary adaptations of cochlear function in Jamaican mormoopid bats. Journal of Comparative Physiology A 185:217–228.

Mancina, C. A., R. Borroto-Páez, and L. García-Rivera. 2004. Tamaño relativo del cerebro en murciélagos cubanos. Orsis 19: 7–19.

McFarlane, D. A. 1986. Cave bats in Jamaica. Oryx 20:27–30.

Morgan, G. S. 1989. Fossil Chiroptera and Rodentia from the Bahamas, and the historical biogeography of the Bahamian mammal fauna. Pp. 685–740 in Biogeography of the West Indies: past, present and future (C. A. Wood, ed.). Sandhill Crane Press, Gainesville, Florida.

Norberg, U. M., and J. M. V. Rayner. 1987. Ecological morphology and flight in bats (Mammalia; Chiroptera): wing adaptations, flight performance, foraging strategy and echolocation. Philosophical Transactions of the Royal Society London B 316:335–427.

Odening, K. 1973. Tremátodos de los quirópteros cubanos. Torreia nueva serie 28:1–21.

Peterson, B. V., and K. Hurka. 1974. Ten new species of batflies of the genus *Trichobius* (Diptera: Streblidae). Canadian Entomology 106:1049–1066.

Phillips, C. J., and J. K. Jones, Jr. 1968. Dental abnormalities in North American bats. I. Emballonuridae, Noctilioidae, and Chilonycteridae. Transaction of the Kansas Academy of Science 71:509–520.

Rehn, J. A. G. 1904. A study of the mammalian genus *Chilonycteris*. Proceedings of the Academy of Natural Sciences of Philadelphia 56:181–207.

Silva Taboada, G. 1974. Fossil Chiroptera from cave deposits in central Cuba, with description of two new species (genera *Pteronotus* and *Mormoops*) and the first West Indian record of *Mormoops megalophylla*. Acta Zoologica Cracoviensia 19: 33–74.

Silva Taboada, G. 1976. La localidad tipo de algunos murciélagos cubanos descritos en el siglo XIX. Miscelánea Zoológica 5:2–3.

Silva Taboada, G. 1979. Los murciélagos de Cuba. Editorial Academia, La Habana, Cuba.

Silva Taboada, G. 1988. Sinopsis de la espeleofauna cubana. Editorial Científico-Técnica. La Habana, Cuba.

Simmons, N. B., and T. M. Conway. 2001. Phyllogenetic relationships of mormoopid bats (Chiroptera: Mormoopidae) based on morphological data. Bulletin of the American Museum of Natural History 258:1–97.

Sites, J. W., J. W. Bickham, and M. W. Haiduk. 1981. Conservative chromosomal change in the bat family Mormoopidae. Canadian Journal of Genetics and Cytology 23:459–467.

Smith, J. D. 1972. Systematics of the chiropteran family Mormoopidae. Miscellaneous Publications, Museum of Natural History, University of Kansas 56:1–132.

True, F. W. 1884. A provisional list of the mammals of North and Central America, and the West Indian island. Proceedings of the United States National Museum 7:587–611.

Varona, L. S. 1974. Catálogo de los mamíferos vivientes y extinguidos de las Antillas. Academia de Ciencias de Cuba, La Habana, Cuba.

Williams, E. E. 1952. Additional notes on fossil and subfossil bats from Jamaica. Journal of Mammalogy 33:171–179.

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