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Micronycteris minuta.

By Celia López-González

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Micronycteris minuta (Gervais, 1855[1856])

Gervais' Large-eared Bat

Schizostoma minuta Gervais, 1855[1856]:50. Type locality "Capella-Nova, dans le Brésil" [Bahia, Brazil].

Micronycteris hypoleuca Allen, 1900:90. Type locality "Bonda" [Magdalena, Colombia].

Micronycteris minuta Thomas, 1901:191. First use of current name combination.

CONTEXT AND CONTENT. Order Chiroptera, Suborder Microchiroptera, Family Phyllostomidae, Subfamily Micronycterinae, Genus *Micronycteris*, Subgenus *Micronycteris*. Subfamilial designation follows Van Den Bussche (1992), subgeneric arrangement is that of Sanborn (1949), keys to the species are in Genoways and Williams (1986) and Medellín et al. (1985). A key for the species of the subgenus *Micronycteris* is provided by Simmons (1996). *M. minuta* is monotypic.

DIAGNOSIS. A small-sized bat for the genus, with the ears connected by an interauricular band. *M. minuta* is similar in size to *M. megalotis, M. microtis, M. sanborni,* and *M. schmidtorum* (forearm length <40 mm). It is distinguishable from *M. megalotis* and *M. microtis* by the presence of a deep notch in the interauricular band, a paler venter, and a calcar shorter than the hind foot and claws (Brosset and Charles-Dominique, 1990; Genoways and Williams, 1986; Medellín et al., 1985; Sanborn, 1949; Simmons, 1996). The P3 of *M. minuta* is distinctly shorter than the P4, whereas they are of about the same height in *M. megalotis* and *M. microtis* (Genoways and Williams, 1986; Simmons, 1996). *M. minuta* can be separated from *M. schmidtorum* by a more gradual rise of rostrum to braincase, short rather than long fur on the leading edge of the pinnae, and a calcar shorter than the hind foot and claws (Simmons, 1996). *M. minuta* has a longer thumb, condyloincisive length, and maxillary toothrow than *M. sanborni*. The I2 is very small in *M. sanborni,* and there is a gap between the I2 and the C1, a feature absent in *M. minuta* (Simmons, 1996). A thin mustache of white hairs is present on the upper lip in *M. sanborni,* whereas *M. minuta* has only a few white hairs (Simmons, 1996). They also differ in the morphology of the P4, with *M. sanborni* possessing a well-developed posterolingual heel, which is small in *M. minuta* (Simmons, 1996).

GENERAL CHARACTERS. *Micronycteris minuta* is a slender bat, with a prominent nose-leaf and thin flight membranes. The uropatagium and base of the tail are naked (Simmons, 1996). Ears are large, rounded in outline, and connected by a band across the forehead; this band possesses a deep notch in the middle, and a coat of long hairs exists on the posterior surface of the band. The pelage is pale brown on the dorsum, the basal part of the hair is grayish white, slightly buffy or hazel on sides, and lighter—almost white—on the venter (Sanborn, 1949; Simmons, 1996—Fig. 1). The proximal half of the forearm is densely haired (Andersen, 1906). Carter et al. (1981) reported molt in 10 specimens. Goodwin and Greenhall (1961) observed a bare spot on top of the head, surrounding a small tuft of hair, in bats from Trinidad. The nose leaf is similar to that of *M. megalotis,* the lancet comparatively shorter, its extreme length being on average equal to about 1.3 times its width at the base. Wings are relatively short, the membranes are inserted on the ankles or the extremity of the tibia (Andersen, 1906), and the tail slightly perforates the upper side of the interfemoral membrane (Goodwin and Greenhall, 1961). The calcar is shorter than the hind foot, the third metacarpal is the shortest, and the fifth the longest (Sanborn, 1949; Simmons, 1996). The second phalanx of the third metacarpal is about equal to first phalanx in length, and the second phalanx of the fourth metacarpal is equal or shorter than the first phalanx (Sanborn, 1949; Simmons, 1996).

The skull (Fig. 2) is narrow, tapering, and lightly constructed. The braincase is domed, with little or no development of a sagittal crest (Simmons, 1996). The rostrum is long, narrow, and rises gradually. The p3 is reduced; the P3 is distinctly shorter than the P4 (Goodwin and Greenhall, 1961; Sanborn, 1949; Simmons, 1996). The dental formula is i 2/2, c 1/1; p 2/3; m 3/3, total 34 (Hall, 1981).

Sexual dimorphism has not been tested formally in *M. minuta,* because no large enough samples from a single locality exist (Simmons, 1996). This author, however, found no consistent size differences between 71 males and females from several localities. No comprehensive study on geographic variation is available, but Sanborn (1949) reports that specimens from Brazil appear to be larger than those from Colombia.

Ranges of external and cranial measurements (in mm) and number of specimens are as follows: total length, 52.0–73.0, 41; tail length, 9.0–14.0, 41; length of hindfoot, 9.0–13.0, 48; length of ear, 19.0–23.0, 36; length of forearm, 31.3–36.8, 49; length of thumb, 4.0–9.1, 39; length of third metacarpal, 26.6–30.0, 14; length of fourth metacarpal, 27.0–30.0, 12; length of fifth metacarpal, 28.7–30.7, 12; greatest length of skull (including incisors), 17.3–19.0, 14; condylobasal length (not including incisors), 15.3–16.7, 17; zygomatic breadth, 7.9–9.0, 49; breadth of mastoid, 8.0–8.8, 14; breadth of braincase, 7.2–8.0, 48; interorbital breadth, 3.8–4.4, 43; breadth across upper molars (M3-M3), 5.4–6.0, 22; length of maxillary toothrow, 6.3–6.9, 49; mandibular toothrow, 6.7–7.4, 4; body mass (in g), 6.5–8.5, 13 (Andersen, 1906; Anderson, 1997; Carter et al., 1981; Gardner et al., 1970; Genoways

FIG. 1. *Micronycteris minuta.* Photograph by Richard K. LaVal, from the Mammal Slide Library.

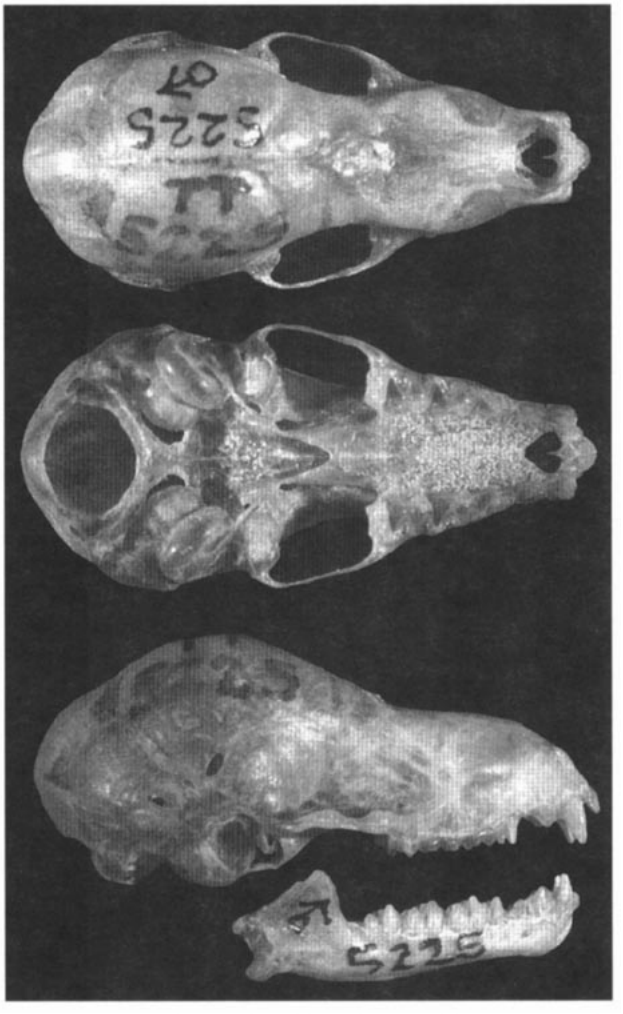

FIG. 2. Dorsal, ventral, and lateral views of the cranium, and lateral view of the mandible of a male *Micronycteris minuta* from Guayaguayare, Trinidad (Texas Tech University 5225). Greatest length of cranium is 18.7 mm. Photographs by J. A. de Oliveira.

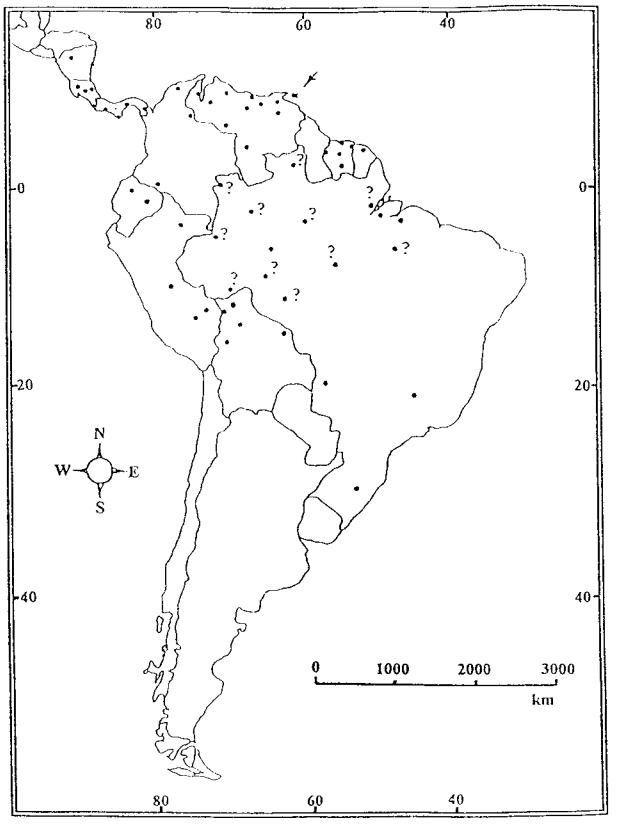

FIG. 3. Geographic distribution of *Micronycteris minuta*. See text for collection localities. Question marks indicate unconfirmed records (see Remarks section). Arrow indicates occurrence of the species in Trinidad.

and Williams, 1986; Simmons, 1996; Swanepoel and Genoways, 1979).

DISTRIBUTION. *Micronycteris minuta* is a relatively rare bat throughout its distributional range (Fig. 3). It occurs primarily in tropical forested lowlands from northern Nicaragua (Hall, 1981; Valdez and LaVal, 1971) southward through Central America in Costa Rica (Fleming et al., 1972; Gardner et al., 1970) and Panama (Handley, 1966), and into South America, where it is present in Colombia (Allen, 1900; Goodwin, 1953; Sanborn, 1949; Simmons, 1996), Ecuador (Simmons, 1996), Peru (Ascorra et al., 1991; Koopman, 1978; Pacheco et al., 1993; Simmons, 1996; Tuttle, 1970), Bolivia (Anderson, 1997; Anderson et al., 1982), Venezuela (August and Baker, 1982; Handley, 1976), Suriname (Genoways and Williams, 1979, 1986), French Guiana (Brosset and Charles-Dominique, 1990; Simmons, 1996), and Trinidad (Carter et al., 1981; Goodwin and Greenhall, 1961). Its range extends southward throughout the Amazon basin (Mok et al., 1982; Thomas, 1901) to Minas Gerais (Glass and Encarnação, 1982) and at least to Santa Catharina in southeastern Brazil (Dobson, 1878; Koopman, 1982). *M. minuta* usually is found at altitudes of 200–700 m (Patterson et al., 1996), although Glass and Encarnação (1982) reported one specimen from Minas Gerais, Brazil, collected at 900 m, and Handley (1976) reported one from near Caracas, Venezuela, taken at an elevation of 1,144 m. No fossil record is known for this species.

FORM AND FUNCTION. The brain of *Micronycteris minuta*, along with that of *M. nicefori*, is the shortest for the genus. It has a well-developed cerebral pseudocentral sulcus; the inferior culliculi are exposed dorsally, and not contiguous with one another dorsally but separated by the anterior lobe of the vermiform body of the cerebellum (McDaniel, 1976). The cerebrum of *M. minuta* is pictured in McDaniel (1976, fig. 4).

ONTOGENY AND REPRODUCTION. *Micronycteris minuta* is hypothesized to have a reproductive pattern with breeding initiated at the beginning of the rainy season (Wilson, 1979). A litter size of one was found in each of five specimens collected in April at Parque Nacional Guatopo, Venezuela, where the young were 18–26 mm long (August and Baker, 1982). Seven females—one gravid, two non-gravid, two lactating, and two nursing young—have been reported in May in Trinidad (Goodwin and Greenhall, 1961). Three pregnant females were collected in Peru in July (Graham, 1987), but two nonpregnant females were collected in July in San Pablo, Peru (Tuttle, 1970). No fetuses were found in nine females collected in Trinidad in August (Carter et al., 1981). Genoways and Williams (1986) reported a female with a 13 mm fetus in July, and another, lactating, in September, in Suriname. They also reported testis measurements of 2–3 mm for five individuals from this same country in May, September, October, and November.

ECOLOGY. Although *Micronycteris minuta* is primarily an inhabitant of evergreen and deciduous tropical forests (Genoways and Williams, 1979; Handley, 1976), it has been collected in swampy areas, cloud forests, near plantations, and in orchards, pastures, croplands, and yards (Genoways and Williams, 1986; Handley, 1976). *M. minuta* was considered to be an "insecti-carnivore" species by Patterson et al. (1996), and an insectivore foliage-gleaner by LaVal and Fitch (1977). Fecal pellets from one specimen collected at La Selva, Costa Rica, contained large Coleoptera and large Hemiptera, and probably Lygaeidae (Whitaker and Findley, 1980). Aguirre (1994) found insects belonging to Grillidae, Lepidoptera, and Coleoptera in two stomachs of *M. minuta* from Bolivia. Although most available data indicate that *M. minuta* feeds mostly on insects, there is evidence that it also consumes fruit in considerable quantitites (Gardner, 1977*a*; Goodwin and Greenhall, 1961). Stomachs of four specimens collected in Panama and Costa

Rica contained 24% plant material and 76% insects (Fleming et al., 1972).

Micronycteris minuta roosts alone or in small groups (Fenton and Kunz, 1977). It has been found roosting with *Saccopteryx leptura, Micronycteris megalotis, Platyrrhinus helleri,* and *Carollia perspicillata* in hollow trees. One specimen was collected in a cave with *M. megalotis* and *Chiroderma trinitatum* (Goodwin and Greenhall, 1961).

The following ectoparasites have been reported from *M. minuta*: *Periglischrus micronycteridis, P. parvus* (Spinturnicidae), and *Trichobius handleyi, T. joblingi, Strebla machadoi* (Streblidae—Furman, 1966; Herrin and Tipton, 1975; Webb and Loomis, 1977; Wenzel et al., 1966).

GENETICS. *Micronycteris minuta* has 2n = 28, and FN = 50 or 52. The X chromosome is subtelocentric or submetacentric, the Y chromosome is acrocentric (Baker, 1973, 1979; Baker et al., 1982; Simmons, 1996). In a comparison of diploid number, fundamental number, and chromosome structure, Gardner (1977*b*) concluded that *M. megalotis, M. schmidtorum,* and *M. minuta* were chromosomally distinct from *M. nicefori* and *M. hirsuta.* He also considered that the karyotype of *M. minuta* could be derived, through six Robertsonian fusions and six pericentric inversions, from a hypothetical ancestor for all the species of the subgenus *Micronycteris* known at the time; the proposed ancestor had a karyotype "near 2n = 40, FN = 38." In contrast, Patton and Baker (1978:460), based on G- and C-banded karyotypes, concluded that *M. minuta* and *M. megalotis* were "so chromosomally unique that apparently most or all of the elements of their karyotypes cannot be parsimoniously related to the karyotypes of each other or any other phyllostomatoid." However, in a recent report, the standard karyotype for *M. sanborni* (Simmons, 1996) appears to be indistinguishable from that of *M. minuta.* Standard and G-banded karyotypes of *M. minuta* are pictured in Baker (1979, plate 6) and Patton and Baker (1978, fig. 2), respectively.

REMARKS. The occurrence of *M. minuta* in the Amazon basin has been documented by, among others, Mok et al. (1982). Unfortunately, based solely on their published data, it is not possible to establish from which localities (indicated by question marks in Fig. 3) their specimens of *M. minuta* came. Other records (Simmons, 1996; Thomas, 1901), however, confirm the presence of this species in Amazonia. The type locality of *M. minuta* was originally stated as "Capella-Nova, dans le Brésil." Subsequent authors (Cabrera, 1958; Koopman, 1993) further restricted it to Brazil, Bahia, Capela Nova. However, Allen (1900:91), in comparing the holotype of *Micronycteris hypoleuca* to *M. minuta,* mentions that "The type of *M. minuta* was from 'Capella-Nova, dans le Brésil,' on the upper Amazon, but a second specimen, still darker in color, from the province of Bahia, was also referred to it by Gervais." This statement raises some doubts as to the true type locality of *M. minuta,* and therefore it is not included in the distribution map.

The type specimen of *M. minuta* was deposited at the Museum National d'Histoire Naturelle, Paris. It definitely was there in the 1870s (Dobson, 1878), but there is no mention of it beyond the early 1900s (Andersen, 1906). Rode (1941) did not mention it in his catalog of types at the Muséum National d'Histoire Naturelle; Carter and Dolan (1978) did not report the specimen in their account of types deposited in European museums; and Simmons (1996) did not mention it in her description of *M. sanborni,* even though *M. minuta* is the species most similar to *M. sanborni.* However, there seems to be no doubt about the identity of the type material with *M. minuta,* as currently understood, throughout the literature (Andersen, 1906; Dobson, 1878; Sanborn, 1949; Thomas, 1901).

Based on morphological data (skull and ear characters, noseleaves, band between the ears, and length of the tail) Andersen (1906) presented the first phylogeny for the genera *Micronycteris* and *Glyphonycteris,* both of which are currently included in the genus *Micronycteris* (Simmons, 1996). In this work, *M. megalotis* is depicted as the closest relative to *M. minuta,* with *M. hirsuta* a more distant relative.

Karyotypic data published by Patton and Baker (1978) suggested that *Micronycteris* was a monophyletic group. Albumin-immunological data analyzed by Honeycutt and Sarich (1987), were in agreement with this hypothesis, but not so an analysis of allozymic variation (Arnold et al., 1983). More recently, Simmons (1996) reanalyzed the allozymic data of Arnold et al. (1983), and constructed a different phylogeny of *Micronycteris* which is essentially congruent with her own results based on morphological data. Moreover, she conducted a "total evidence" analysis of a combined data set that included morphological, allozyme, and karyotypic data. According to her results, the genus *Micronycteris* is monophyletic, as is the nominate subgenus, which includes *M. hirsuta, M. megalotis, M. microtis, M. minuta, M. schmidtorum,* and *M. sanborni.* Within this subgenus, *M. minuta* is the sister taxon of *M. sanborni.*

The name *Micronycteris* is derived from two Greek roots meaning small bat; *minuta* refers to its small size. *M. minuta* also is referred to as "white-bellied big-eared bat" (Goodwin and Greenhall, 1961). I thank R. A. Van Den Bussche, R. D. Owen, M. R. Willig, R. Sherwin, and an anonymous reviewer for their helpful comments to early versions of the manuscript.

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C. LÓPEZ-GONZÁLEZ, DEPARTMENT OF BIOLOGICAL SCIENCES, TEXAS TECH UNIVERSITY, LUBBOCK, TX 79409-3131.