

*Micronycteris megalotis*. By Alfonso Alonso-Mejía and Rodrigo A. Medellín

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*Micronycteris megalotis* (Gray, 1842)

Little Big-eared Bat

*Phyllophora megalotis* Gray, 1842:257. Type locality "Brazils"; restricted by Cabrera (1958:60) to Perequê, São Paulo, Brazil.

*Phyllostoma elongata* Gray, 1842:257 (not *Phyllostoma elongatum* E. Geoffroy St.-Hilaire, 1810). Type locality "Brazils."

*Phyllostoma elongatum* Gray, 1844:19. Emendation of *P. elongata* Gray, 1842.

*Phyllostoma*, *scrobiculatum* Wagner, 1855:627. Type locality unknown. A renaming of *Phyllostoma elongatum* Gray (pre-occupied).

*Micronycteris*, *megalotis*: Gray, 1866:113. First use of current name combination.

*Schizostoma megalotes*: Robinson 1896:663. Incorrect subsequent spelling of *Micronycteris megalotis* (Gray, 1842).

*Micronycteris microtis* Miller, 1898:328. Type locality "Greytown [San Juan del Norte], Nicaragua."

*Macrotus pygmaeus* Rehn, 1904:444. Type locality "Izamal, Yucatán," México.

**CONTEXT AND CONTENT.** Order Chiroptera, Suborder Microchiroptera, Family Phyllostomidae, Subfamily Phyllostominae, Genus *Micronycteris*, Subgenus *Micronycteris*. Keys to the species of *Micronycteris* are in Genoways and Williams (1986) and Medellín et al. (1985). *M. megalotis* has four subspecies:

*M. m. homezi* Pirlot, 1967:265. Type locality "Río Palmar," Zulia, Venezuela.

*M. m. megalotis* (Gray, 1842:257), see above.

*M. m. mexicana* Miller, 1898:329. Type locality "Plantinar, Jalisco, México."

*M. m. microtis* Miller, 1898:328, see above.

**DIAGNOSIS.** *Micronycteris megalotis* superficially resembles *Tonatia brasiliensis*, from which it can be separated by the number of lower incisors (four in *M. megalotis* compared with two in *T. brasiliensis*). In addition, the thumb and forearm of *T. brasiliensis* are hairy up to one-half the length of the forearm, whereas in *M. megalotis* these are naked. As in *M. hirsuta* and *M. minuta*, ears are connected by a high interauricular band, and P3 and P4 are about the same size. *M. megalotis* differs from *M. hirsuta* in that *M. hirsuta* is larger (length of forearm of *M. hirsuta* >40 mm, greatest length of skull >21 mm; in *M. megalotis* these are <38 and <21, respectively). *M. minuta* has a white venter, its calcar is shorter than the foot, and the interauricular band is deeply notched. In *M. megalotis*, the venter is brown, the calcar is longer than the foot, and the notch is only slight. *M. schmidtorum* has a white venter and a deeply notched interauricular band (Genoways and Williams, 1986; Medellín et al., 1985).

The remaining species of *Micronycteris* do not have an interauricular band, and P3 and P4 are unequal in size. *M. daviesi* and *M. behni* are much larger (length of forearm of *M. daviesi* is >50 mm and *M. behni* is >42 mm compared with <38 mm in *M. megalotis*). *M. sylvestris* has tricolored hair and trilobed lower incisors, whereas in *M. megalotis* the hair is bicolor, and the lower incisors are bifid. *M. brachyotis* has a yellow venter and a lower braincase. *M. nicefori* has a calcar shorter than the foot, and often a faint gray line is present on the lower back. In *M. pusilla*, the third metacarpal is the longest and P4 is small. The third metacarpal in *M. megalotis* is the shortest and the fifth are longest; P4 is about the same size as P3 (Genoways and Williams, 1986).

**GENERAL CHARACTERS.** *Micronycteris megalotis* is a relatively common species of the genus. It is a small bat, with large rounded ears, furred on the basal one-third, with a fringe of hairs on the inner border (Fig. 1). The interauricular membrane is distinct

and moderately high. The noseleaf is small and pointed, with the nose pad more than twice as high as wide. The head is elongated and narrow with tiny, black eyes. The dorsal hairs are brown with white bases, and the ventral hairs are brown, but color varies geographically and within populations. In San Luis Potosí, México, color may range from cinnamon-drab to wood brown (Dalquest, 1953). Hair length is about 10 mm. The thumb is long, and its basal one-half is enclosed in the propatagium. The wings are relatively short, wide, and they are attached to the base of the foot. In a canonical analysis of its morphometric properties, *M. megalotis*, *M. behni*, *M. nicefori*, and *M. pusilla* were the only phyllostomines whose wing morphometric eigenvalues in the first three canonical axes fell within the values for vespertilionids (Smith and Starrett, 1979). Legs and feet of *M. megalotis* are long and slender; a relatively long calcar supports a wide uropatagium. The tail reaches the center of this membrane and has only the tip free (Goodwin, 1969; Sanborn, 1949).

The skull of *M. megalotis* is small and slender with a high, abruptly-rising forehead (Fig. 2). The sagittal crest is weak, but distinct. The braincase is swollen. The rostrum is narrow and tapering, with the interorbital region relatively swollen. The pterygoids are strongly divergent. The mandible is long with a long, ascending ramus, and a blunt coronoid process. The teeth are robust and relatively primitive. The upper, inner pair of incisors is large and chisel-shaped, and the outer incisors are small. The lower incisors are short, forming a continuous row between the canines. Upper canines are heavy and slightly divergent. Premolars are approximately equal in size, with one cusp each. Molars are delicate, with



FIG. 1. *Micronycteris megalotis* from Heredia, Costa Rica. Photograph courtesy of B. L. Clauson and R. M. Timm.

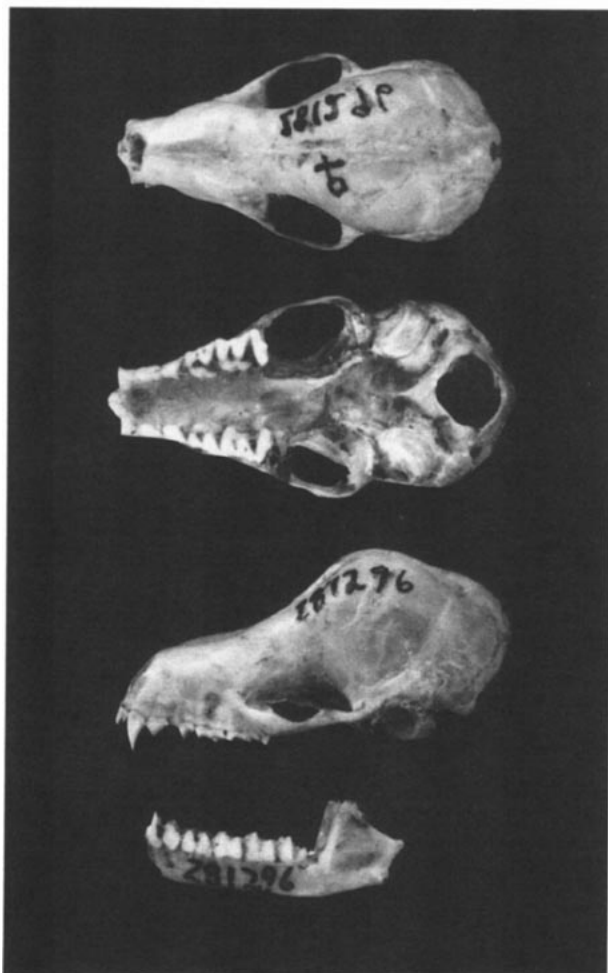


FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Micronycteris megalotis* (United States National Museum 281296) from Río Guaimaral, Colombia. Greatest length of skull is 18.7 mm. Photographs courtesy of D. E. Wilson.

evident W-shaped lophs. The dental formula is  $i\ 2/2, c\ 1/1, p\ 2/3, m\ 3/3$ , total 34.

There appears to be some altitudinal and geographical variation. Specimens from higher altitudes in Costa Rica (Fila la Máquina, Cordillera Talamanca, 2,000–2,600 m) tend to be larger than those below 700 m in Rincón and Tilarán, particularly in wing dimensions; cranial measurements tend to be greater too, but no difference in length of ear is observable (Gardner et al., 1970). Specimens from westcentral Nicaragua are, on the average, larger in cranial and forearm measurements than those from the east, whereas specimens from the middle of the region are intermediate in size, suggesting subspecies intergradation (Jones et al., 1971). Willig (1983) suggested a slight trend towards secondary sexual dimorphism in cranial characters in *M. m. megalotis* from Brazil.

Ranges of somatic and cranial measurements (in mm) of adults of both sexes are: total length, 55–65; length of tail, 11–17; length of hind foot, 7–11; length of ear, 18–23; length of forearm, 32–38; length of tibia, 12.8–16.4; length of calcar, 8–9; greatest length of skull, 17.7–20.2; condylobasal length, 15.4–17.4; postorbital constriction, 3.8–4.3; zygomatic breadth, 8.2–9.8; mastoidal breadth, 8.3–9.1; breadth of braincase, 7.2–8.9; length of maxillary tooth-row, 6.4–7.8; width across canines, 3.1–3.6; width across molars (M2–M2), 5.1–6.5. Body mass ranges from 3.4–9.1 g (Ceballos and Miranda, 1986; Dalquest, 1953; Genoways and Williams, 1986; Goodwin, 1969; Hall, 1981; Polaco and Muñiz-Martínez, 1987; Ramírez-Pulido et al., 1977; Swanepoel and Genoways, 1979; Uribe et al., 1981; Watkins et al., 1972). Data from Gaumer (1917) related to the length of tail and total length (28 and 79.3 mm, respectively) probably are errors, as they exceed the maximum lengths found in other references by 11 and 14.3 mm, respectively.

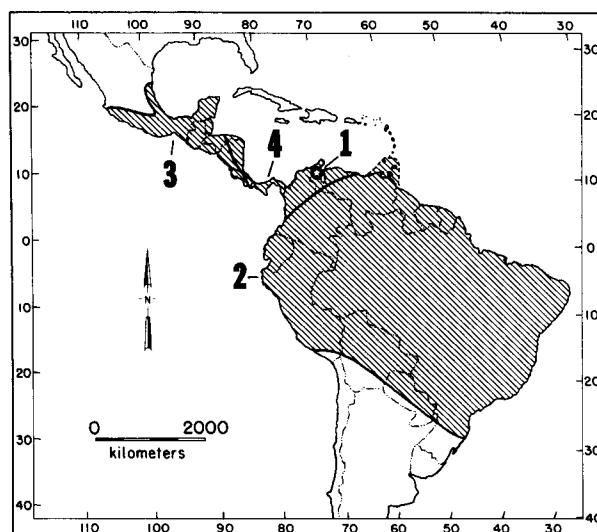


FIG. 3. Distribution of *Micronycteris megalotis*: 1, *M. m. homezi*; 2, *M. m. megalotis*; 3, *M. m. mexicana*; 4, *M. m. microtis*. Illustration by D. Harrison.

**DISTRIBUTION.** *Micronycteris megalotis* occurs from western Jalisco, eastern Tamaulipas, and the Yucatán Peninsula, México, southeastward into South America (Alvarez, 1963; Goodwin, 1954; Hall, 1981; Watkins et al., 1972). One was found dead in Zacatecas, México (northernmost record); it probably was transported accidentally by car (Matson et al., 1978). The southernmost records are Cuzco, Perú (Tuttle, 1970), Cochabamba, Bolivia (Anderson et al., 1982), and São Paulo, Brazil (Taddei, 1975). Elevational records range from sea level to 3400 m (Graham, 1983; Hall, 1981; Koopman, 1978; Navarro, 1982; Pirlot, 1967). It is found in the islands of Cozumel, México (Jones et al., 1973), Corn Islands, Nicaragua (Jones et al., 1971), Grenada, Trinidad, and Tobago (Carter et al., 1981). The subspecies ranges (Fig. 3) are: *M. m. homezi* reported only from the type locality in northwestern Venezuela (Pirlot, 1967); *M. m. megalotis*, Colombia, Venezuela, Grenada, Trinidad and Tobago, south to southern Perú, Bolivia, and Brazil (Aellen, 1970; Brosset, 1965; Jones and Carter, 1976; Ruschi, 1953; Sanborn, 1949); *M. m. mexicana*, México south to western Nicaragua and western Costa Rica, and on Isla del Maíz, Nicaragua (Jones et al., 1971; McCarthy, 1987; Ramírez-Pulido et al., 1986); *M. m. microtis*, southeastern Honduras, eastern Nicaragua, eastern Costa Rica, south to northern Colombia and northwestern Venezuela (Goodwin, 1942; Handley, 1976; Sanborn, 1949). A wide zone of intergradation is found in Nicaragua and Costa Rica between *M. m. mexicana* and *M. m. microtis* (Jones et al., 1971), and in Colombia and Venezuela between *M. m. microtis* and *M. m. megalotis*. There is no fossil record for *M. megalotis*.

**FORM AND FUNCTION.** The stomach of *M. megalotis* is simple in configuration, with a pyloric tube (portion between the esophagus and duodenum) usually short. The fundic caecum (=cardiac caecum) is moderately developed. A cardiac vestibule usually is lacking (Forman et al., 1979). The cerebrum of *M. megalotis* is relatively longer than that of *Mimon crenulatum*; the cerebellum is simple (McDaniel, 1976).

The female reproductive tract consists of a bicornuate uterus with the external cornua fused, a state considered derived from that found in other phyllostomids (Hood and Smith, 1983). The sperm of *M. megalotis* is bilaterally symmetrical, the acrosome is longer than the nucleus, and the sperm head is considerably narrower than that of *M. nicefori* and *Macrotus waterhousii* (Forman and Genoways, 1979).

A male *M. megalotis* did not recover from hypothermia at a body temperature of 5.3°C, when the environmental temperature was 3.0°C, suggesting limited thermoregulatory capabilities (Studier and Wilson, 1970). The digestion time when feeding on fruits of *Ficus* (Moraceae) is >30 min (Reis and Guillaumet, 1983). *M. megalotis* produced fecal pellets about 45 min after consuming their first prey item; three individuals ate 34 insects producing an average of 6.2 pellets/insect. *M. megalotis* has an average peak call fre-

quency of 106.8 KHz (range, 86–126.8 KHz) with a duration of 0.6 ms (range, 0.3–1.2 ms; Belwood, 1988).

**ONTOGENY AND REPRODUCTION.** In the northern parts of the range, females are pregnant during the middle to late dry season. Gravid females have been recorded from México in February, April, and May. Lactating females from México are known only from May (Medellín, 1986; Sánchez-Hernández et al., 1985). From Central America, Colombia, Venezuela, and Trinidad, pregnant females have been found from February through April, and in June, and lactation records are from May and June (Bonaccorso, 1979; Carter et al., 1981; LaVal and Fitch, 1977; Wilson, 1979). In the southern part of the North American range, the extended rainy season may cause two reproductive peaks (Wilson, 1979). Pregnant females from Perú, Bolivia, and Brazil, have been recorded from February, March, June, July, and August, and lactating females have been collected in June, August, and November (Graham, 1987; Willig, 1985; Wilson, 1979).

**ECOLOGY.** *Micronycteris megalotis* is widely distributed and occurs in many habitats: in both wet and dry areas, in both evergreen and deciduous forests, in swamps, clearings, or in secondary vegetation, as well as primary forest, although it was not found in the arid Pacific lowlands of Perú (Koopman, 1978). At lower elevations, these bats roost in hollow trees and logs, where they usually roost near an opening. They also occupy small caverns, culverts, crevices of rocky outcrops, spaces under bridges, tunnels, buildings, and houses (Handley, 1976; LaVal and LaVal, 1980; Navarro, 1982; Ramírez-Pulido et al., 1977; Watkins et al., 1972). They have been found roosting in single-species groups, and in association with *Anoura caudifer*, *Carollia perspicillata*, *C. subrufa*, *Chiroderma trinitatum*, *Desmodus rotundus*, *Diaemus youngi*, *Glossophaga longirostris*, *G. soricina*, *Micronycteris minuta*, *Myotis nigricans*, *Natalus tumidirostris*, *Peropteryx kappleri*, *P. macrotis*, *Phyllostomus hastatus*, *Pteronotus parnellii*, *Saccopteryx leptura*, and *Trachops cirrhosus* (Goodwin and Greenhall, 1961; Graham, 1988; LaVal and LaVal, 1980; Medellín, 1986; Ramírez-Pulido et al., 1977; Reis and Peracchi, 1987; Watkins et al., 1972).

The diet of *M. megalotis* includes insects and fruits. It is commonly placed in the "gleaning-carnivorous" or "foliage-gleaning" guild (Belwood and Morris, 1987; Bonaccorso, 1979; LaVal and LaVal, 1980). On Barro Colorado Island, Panamá, it is the smallest of the foliage-gleaning bats, weighing 4–6 g (Belwood, 1988). *M. megalotis* gleans arthropods from the ground or from vegetation (Gaumer, 1917; Whitaker and Findley, 1980). It forages from day roosts, as evidenced by accumulation of wings (Belwood, 1988). Three bats from Jalisco, México, were flying so low that they were collected by stepping on them (López-Forment et al., 1971). *M. megalotis* is known to feed on fruits in Costa Rica, Panamá, and Brazil (Bonaccorso, 1979; Howell and Burch, 1974; Reis and Peracchi, 1987). Food items include Araneida, Coleoptera (Carabidae, Cleridae, Elateridae, Scarabaeidae, Lucanidae), Diptera, Hemiptera, Homoptera, Hymenoptera (Formicidae), Lepidoptera, Orthoptera (Acrididae, Blattellidae, Gryllidae, Tettigoniidae), Odonata, and fruits of *Cecropia*, *Ficus* (Moraceae), *Musa paradisiaca* (Musaceae), *Eugenia vulgaris*, *Psidium guajava* (Myrtaceae), *Eriobotrya japonica* (Rosaceae), and *Solanum paniculatum* (Solanaceae; Belwood, 1988; Belwood and Morris, 1987; Dalquest, 1953; Gardner, 1977; Goodwin and Greenhall, 1961; Howell and Burch, 1974; Humphrey et al., 1983; LaVal and LaVal, 1980; Reis and Guillaumet, 1983; Reis and Peracchi, 1987; Ruschi, 1953; Valdivieso and Tamsitt, 1962; Whitaker and Findley, 1980). Bats of this species take toxic butterflies of the genus *Parides* (Papilionidae) in Chiapas, México (J. de la Maza, pers. comm.).

In Costa Rica, *M. megalotis* takes a large percentage of beetles at the end of the rainy season (70% of the total number of items), whereas in the dry season beetles taken decrease to about 30% and orthopterans increase to >40%; Lepidoptera, mostly moths, accounted for 40% of one rainy season sample (LaVal and LaVal, 1980). During 1 year in Panamá, dipterans represented 59% of the food types in fecal samples, and coleopterans 24% (Humphrey et al., 1983). It has been suggested that *M. megalotis* switches to fruits during the dry season in Panamá (Bonaccorso, 1979). Some discrepancies in diet analysis might be expected because soft fruit parts may be quickly digested or rendered unidentifiable (Whitaker and Findley, 1980). The stomachs of individuals taken during the day in Veracruz, México, were empty, but stomachs of those collected



FIG. 4. Karyotype of a male *Micronycteris megalotis*. Photograph courtesy of R. J. Baker.

at night were full (Hall and Dalquest, 1963). Feeding habits probably represent a combination of opportunism and selective predation. Although no bats were examined, this species was assumed to be nectarivorous in Colombia (Valdivieso and Tamsitt, 1962).

There are no records of causes of mortality, although habitat destruction must be of major concern. The following endoparasites have been found in the small intestine of *M. megalotis* in Yucatán, México: *Anenterotrema auritum* (Trematoda: Anenterotrematidae); *Capillaria* (Nematoda: Trichiuridae). Other endoparasites are *Eimeria* (Sporozoa: Eimeriidae) and *Trypanosoma cruzi*-like (Zoomastigophorea: Trypanosomatidae; Ubelaker et al., 1977).

The following ectoparasites have been reported only on *M. megalotis*: *Lapidocarpus luckoschi* (Labidocarpidae); *Basilisa bequaerti* (Nycteribiidae); *Periglischrus micronycteridis* (Spinturnicidae); *Strebla alvarezii*, *Trichobius joblingi*, *T. yunkerii* (Streblidae); *Hooperella spinirostra*, *Perissopalla deopertus*, *Whartonia pachywhartoni* (Trombiculidae). Nonspecific ectoparasites found on *M. megalotis* include: *Chirnyssoides carolliae* (Sarcoptidae); *Periglischrus parvus* (Spinturnicidae); *Euctenodes mirabilis*, *Trichobius dugesii*, *T. keenani* (Streblidae); *Beamerella acutascuta*, *Eutrombicula balatas*, *Hooperella vesperuginis*, *Loomisia desmodus*, *Microtrombicula boneti*, *Perates anophthalma*, *Perissopalla eshumatus*, *P. precaria*, *Speleocola secunda* (Trombiculidae; Furman, 1966; Goff and Brennan, 1982; Pearse and Kellogg, 1938; Webb and Loomis, 1977; Wenzel et al., 1966). Specimens from Trinidad and Tobago were rabies-negative (Goodwin and Greenhall, 1961). Some specimens from Panamá had histoplasmosis (Jones, 1976).

**BEHAVIOR.** *Micronycteris megalotis* did not show any significant selection for height of flight, either in the groundstory level or in the subcanopy (Bonaccorso, 1979). Its flight is not rapid, and it apparently hovers while it plucks fruits from trees (Dalquest, 1953; Goodwin and Greenhall, 1961). It appears to roost alone or in small groups (Fenton and Kunz, 1977). In Guyana, it forms colonies of 3–5 individuals, and in Perú, the colonies include 5–25 individuals (Tuttle, 1970). It often roosts in places with some illumination (Handley, 1976; Lukens and Davis, 1957), although on bright moonlight nights it remains in its roosts until the moon sets. It tends to leave its roost approximately 15 min before it is too dark for an observer to distinguish it in the forest without a flashlight (Belwood, 1988).

Evidence suggests that *M. megalotis* uses echolocation and prey-produced sounds (for example katydid calls) as prey-finding cues (Belwood, 1988; Belwood and Morris, 1987; LaVal and LaVal, 1980). *M. megalotis* is not easy to maintain in lab conditions (Belwood, 1988).

**GENETICS.** The diploid number of chromosomes is 40 and the fundamental number is 60 (Fig. 4). The X chromosome is subtelocentric (most common) or submetacentric, the Y chromosome is acrocentric (Baker, 1979; Patton and Baker, 1978). *M. megalotis* has a karyotype in which essentially none of the euchromatic arms proposed to be primitive for the family can be identified (Baker et al., 1982). *M. megalotis* formed a clade together with *M. hirsuta* and *M. schmidtorum* based on allozymic data (Arnold et al., 1983). Based on albumin-immunological data, *Micronycteris* is in a monophyletic group, and *M. megalotis* has close immunological distances with *M. hirsuta*, *M. minuta*, and *M. schmidtorum* (24, 27, 29, and 34, respectively; Honeycutt and Sarich, 1987).

**REMARKS.** A subspecies described from Río Palmar, Venezuela (*M. m. homezi*; Pirlot, 1967), was based on three specimens, two of which showed bicolored hair, pale venter, and a glabrous cutaneous depression. Nevertheless, no substantial basis was given for this separation, and few authors have recognized this name (Jones and Carter, 1976). Goodwin (1946) and Handley (1976) listed *M. microtis* as a species distinct from *M. megalotis* (see Andersen, 1906, and Lyon, 1906, for discussion). The name *Micronycteris* means small bat and *megalotis* refers to the large size of the ears.

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