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Molossus pretiosus.

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Molossus Geoffroy-Saint-Hilaire, 1805

Molossus Geoffroy-Saint-Hilaire, 1805:151. Type species *Vespertilio molossus* Pallas.
Dysopes Illiger, 1811:76. Renaming of *Molossus*.

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, family Molossidae. The genus *Molossus* contains five species: *M. ater*, *M. bondae*, *M. molossus*, *M. pretiosus*, and *M. sinaloae* (Koopman, 1993, 1994). However, nomenclature and species-level separation within *Molossus* are not resolved (Dolan, 1989; Simmons and Voss, 1998). A key to species of *Molossus* (modified from Hall, 1981) follows:

1 Length of forearm >47.0 mm (males) or >46.5 mm (females) 2
Length of forearm <47.0 mm (males) or <46.5 mm (females) 3
2 Floor of basisphenoid pits ≥1 mm long; dorsal hairs with contrasting white or gray bases . . . . . *M. sinaloae*
Floor of basisphenoid pits <1 mm long; dorsal hairs with little contrast between tips and bases . . . . . *M. ater*
3 Pelage ca. 3 mm in length on center of back; pale basal band on dorsal hairs . . . . . *M. molossus*
Pelage ca. 2 mm in length on center of back; little contrast between tips and bases of dorsal hairs 4
4 Length of forearm >43 mm (males) or >41 mm (females); greatest length of skull >20.5 mm (males) or >19.5 mm (females); floor of basisphenoid pits >0.5 mm in length . . . . . *M. pretiosus*
Length of forearm <43 mm (males) or <41 mm (females); greatest length of skull <20.5 mm (males) or <19.5 mm (females); floor of basisphenoid pits <0.5 mm in length . . . . . *M. bondae*

Molossus pretiosus Miller, 1902

Miller's Mastiff Bat

Molossus pretiosus Miller, 1902:396. Type locality "La Guaira [Distrito Federal—Dolan, 1989:47], Venezuela."

CONTEXT AND CONTENT. Context as above. Two subspecies of *M. pretiosus* have been recognized (Hall, 1981; Koopman, 1994), but specimens from the type locality of *M. p. macdougalli* did not differ phenotypically from surrounding populations of *M. ater*. Consequently, *M. p. macdougalli* was considered a junior synonym of *M. ater* (Dolan, 1989). Thus, *M. pretiosus* is monotypic (Dolan, 1989; Jones et al., 1988).

DIAGNOSIS. *Molossus* can be separated from *Promops* by absence of P3 in *Molossus* and a domed palate in *Promops*. From *Eumops*, *Molossus* can be distinguished by absence of P3 and V-shaped cusp pattern on M3 for *Molossus* compared with presence of P3, usual presence of a posterior commissure on M3, and usually large, forward-facing ears for *Eumops* (Freeman, 1981; Simmons and Voss, 1998). *Molossus* is distinguished from *Tadarida* and *Nyctinomops* by number of lower incisors: two in *Molossus* and four to six in *Tadarida* and *Nyctinomops* (Allen, 1939; Lopez-Gonzalez, 1998).

Skulls of different species of *Molossus* are difficult to distinguish, except for size (Dolan, 1989; Freeman, 1981). *M. pretiosus* (Fig. 1) resembles *M. ater* and *M. bondae* in all morphological characters, but *M. pretiosus* is larger than *M. bondae* and smaller than *M. ater*. *M. pretiosus* resembles *M. ater* in color and length of fur, shape of skull, development of sagittal crest, formation of

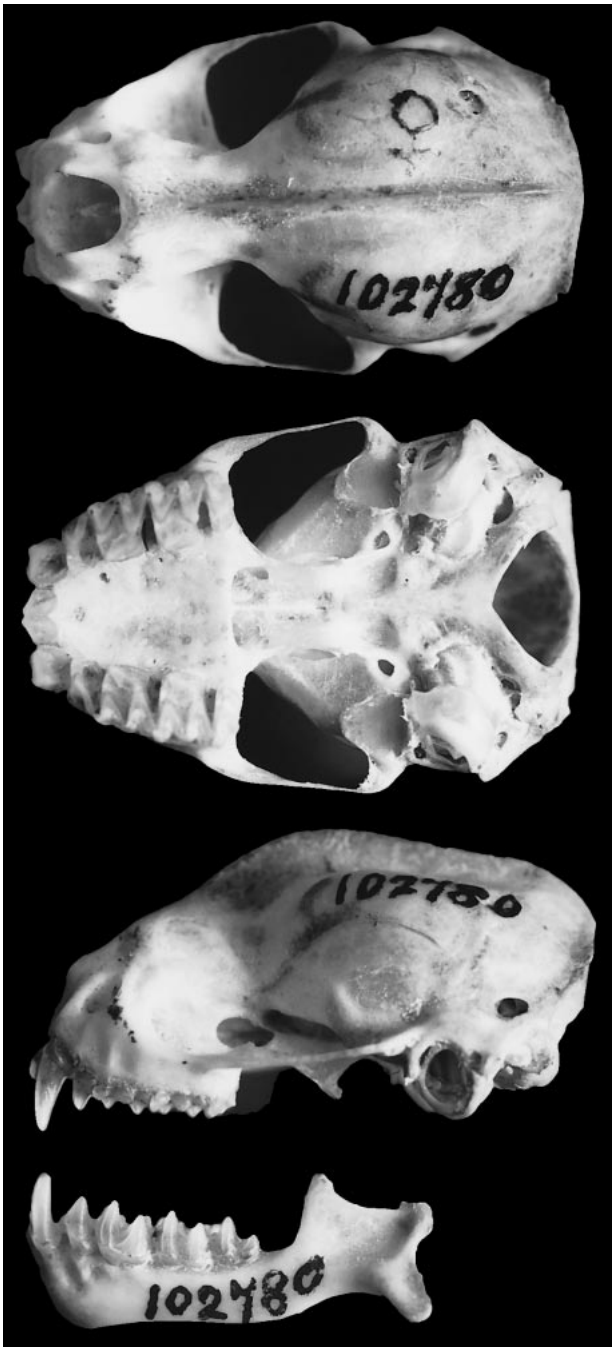

FIG. 1. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of a *Molossus pretiosus* from La Guaira, Distrito Federal, Venezuela (female, United States National Museum of Natural History 102780). Greatest length of cranium is 20.1 mm. Photographs by T. L. Best.

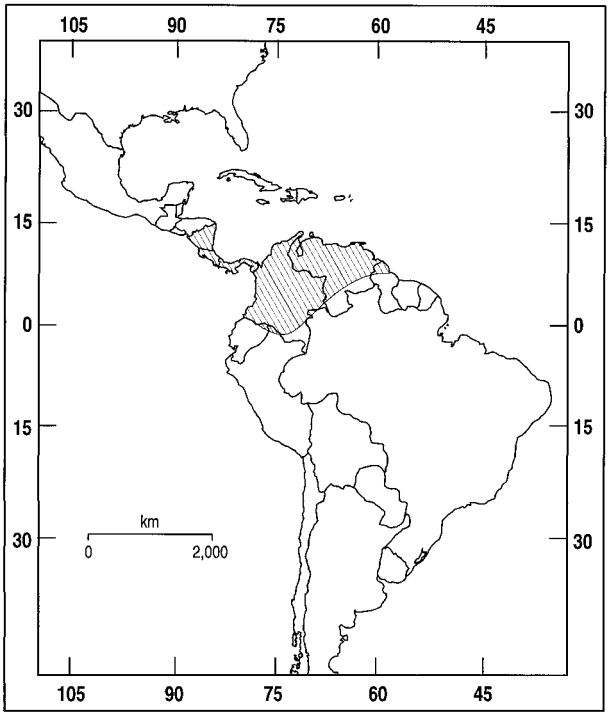

FIG. 2. Distribution of *Molossus pretiosus* in North and South America (Dolan, 1989; Eisenberg, 1989; Koopman, 1982, 1993).

the muzzle, and disposition of incisors; *M. ater* differs essentially only in size (Dolan, 1989; Simmons and Voss, 1998). *M. pretiosus* is slightly larger than *M. sinaloae* (Goodwin, 1959).

GENERAL CHARACTERS. Members of the genus *Molossus* have a heavy build, mastiff appearance, thick jaws, and narrow wing tips. Average relative dentary thickness is 14% of length of dentary, and the second phalanx comprises an average of 5% of digit IV. Other characters include well-developed coronoid process, sagittal and lambdoidal crests, condyle well above the toothrow (mean elevation of condyle is 13% of length of dentary), V-shaped cusp pattern on M3, and absence of P3 and i2. This genus also has a minute p3. All species of *Molossus* have basisphenoid pits, ears joined in a V, unwrinkled lips, and no palatal emargination (Freeman, 1981).

Color of pelage is variable. Young and some adults are nearly black. In other individuals, rufous is conspicuous and sometimes comprises entire pelage. In completely reddish individuals, color can vary from burnt umber to tawny. Chest is sprinkled with whitish hairs. Ears and membranes are blackish (Miller, 1902).

Of 16 external and cranial characters, 13 exhibited significant sexual dimorphism; only depth of skull, length of foot, and length of tail did not differ between sexes. Average external measurements (in mm) of 4 males and 23 females, respectively, from Nicaragua and 3 males and 10 females, respectively, from Costa Rica were as follows: total length, 119, 113, 116, 111; length of tail, 44, 42, 41, 39; length of ear, 17, 16, 17, 16; length of forearm, 45.8, 44.5, 44.7, 44.4; length of metacarpal III, 47.2, 46.0, 47.1, 45.7; length of metacarpal IV, 45.9, 44.7, 45.6, 44.3. Average cranial measurements (in mm) of 5 males and 18 females, respectively, from Nicaragua and 3 males and 8 females, respectively, from Costa Rica, were as follows: greatest length of skull, 21.7, 20.2, 21.7, 20.2; condylobasal length, 19.2, 18.0, 18.6, 17.8; breadth of braincase, 10.3, 10.1, 10.5, 10.1; length of maxillary toothrow, 7.3, 7.0, 7.2, 7.0; breadth across M3–M3, 9.3, 9.0, 9.2, 8.7; breadth across canines, 5.6, 5.2, 5.7, 5.2 (Dolan, 1989). Average mass of 4 males and 18 nonpregnant females in Nicaragua was 27.0 and 20.9 g, respectively (Jones et al., 1971).

DISTRIBUTION. Miller's mastiff bat occurs from Nicaragua southward into Colombia, Venezuela, and Guyana (Fig. 2; Dolan, 1989; Eisenberg, 1989; Koopman, 1982, 1993). *M. pretiosus* has the most restricted and disjunct distribution of all mastiff bats. Populations in dry upper reaches of Magdalena and Cauca valleys of Colombia are well isolated from those in Central America. The species also occurs east of the Andean Cordillera Occidental in the broad llanos plain, but numerous records of populations beyond the southern terminus of this vegetative zone may represent colonies trapped in nonforest refugia by the retreating llanos. In central Andean valleys of Colombia, Miller's mastiff bat occurs as a series of relict populations, which probably migrated up river systems when drier climatic conditions prevailed and nonforest biomes were contiguous in this region (Dolan, 1989). No fossils are known.

FORM AND FUNCTION. Dorsal hairs are black to blackish, somewhat paler at the base, and 2.0–2.5 mm in length. Venter is slightly paler than the dorsum. Membranes, muzzle, and ears usually are black to blackish. Older pelages are a dark reddish brown to a reddish orange and are replaced by a black coat during molt (Dolan, 1989). Although reddish and blackish color phases have been reported (Miller, 1913), *M. pretiosus* is not truly dichromatic; a distinct progression from black, through deep russet, to ocher red occurs in Central America. Transition from black to orangish red may be related to degradation of melanistic medullary pigment granules as hair becomes worn. This degradation permits exposure of underlying xanthophylls in the cortex (Dolan, 1989).

Skull is short and broad, with weak and low sagittal and lambdoidal crests (Hall, 1981). Dental formula is i 1/1, c 1/1, p 1/2, m 3/3, total 26 (Miller, 1907).

ONTOGENY AND REPRODUCTION. In Nicaragua, average length of testis of four males on 20 February was 5.7 mm, that of seven males in March was 5.0 mm, that of two males on 18 July was 6.3 mm, and that of three males in mid-August was 5.0 mm (Jones et al., 1971). *M. pretiosus* is polyestrus; females may be pregnant and lactating simultaneously (Dolan, 1989). In Nicaragua, no female was pregnant on 20 February, three of four were pregnant 27–31 March, three of four were pregnant on 4 April, one was pregnant on 18 July, and three of eight were pregnant and flying juveniles were present in mid-August (Jones et al., 1971). In Costa Rica, some females were pregnant in May, July, and October, and subadults were present in July and October (La Val, 1977; La Val and Fitch, 1977). Of 10 *M. pretiosus* examined from Costa Rica on 12 August, two had one fetus each (crown–rump length, 4–22 mm), one was lactating and pregnant (fetal crown–rump length, 15 mm), four were lactating, two were postlactation, and one was reproductively inactive (Dolan and Carter, 1979). At birth, newborns probably are ca. 25% of adult mass (Dolan, 1989). Lifespan is unknown.

ECOLOGY AND BEHAVIOR. Bats of the genus *Molossus* usually form small colonies under palm leaves, in hollow trees, under roofs, in sheds and attics, in crevices of cliffs, and under bridges (Freeman, 1981). *M. pretiosus* usually is a nonforest dweller that occupies open areas such as grassland savannas, dry woodlands, and cactus and thorn scrub (Dolan, 1989; Dolan and Carter, 1979). Roosts of Miller's mastiff bat have been found in a cave, in a church roof, and in a hollow tree (Dolan and Carter, 1979; Marinkelle and Cadena, 1972).

In Nicaragua, Miller's mastiff bats have been observed flying over streams, foraging high over trees in a coffee plantation, flying over a concrete water tank, and emerging from a hollow tree over a stream (Jones et al., 1971). In Costa Rica, *M. pretiosus* was active over a watering hole in a stream; at dusk, bats emerged flying single file from a riparian forest, heading toward the watering hole, at an altitude of ca. 20 m (La Val, 1977).

Bats of the genus *Molossus* are capable of eating hard items such as beetles (Freeman, 1981). Four Miller's mastiff bats had an average of 631 moth scales per gram of fecal material; parts of coleopterans also were present (Freeman, 1979).

In Nicaragua, *M. pretiosus* and *M. ater* have not been found in the same roost sites (Jones et al., 1971). In Colombia, *M. pretiosus* generally has supplanted *M. ater* (Dolan, 1989).

The only endoparasite known from *M. pretiosus* is the protozoan *Schizotrypanum* (Marinkelle, 1982). No ectoparasites are known.

Molossus can fly rapidly (Freeman, 1981). *M. pretiosus* can be captured in mist nets (Jones et al., 1971; La Val, 1977; Marinkelle and Cadena, 1972).

GENETICS. Diploid number of chromosomes is 48, and fundamental number of chromosomal arms is 66, the same as *M. ater.* No recognizable genetic difference exists between *M. pretiosus* and *M. ater.* However, *M. bondae* differs from these two species by a species-specific marker allele at the lactate-dehydrogenase locus (Dolan, 1989).

Populations within species of *Molossus,* including *M. pretiosus,* demonstrate some degree of inbreeding in Central America. Electrophoretic evidence from a single Venezuelan specimen genetically links South American *M. pretiosus* with those in Central America (Dolan, 1989).

REMARKS. *Molossus* is from the Greek *molossos,* referring to the "molossus" or mastiff hound. The specific epithet *pretiosus* is from the Latin, meaning "of great value" (Jaeger, 1955). An additional common name is murciélago moloso (Villa-R., 1967).

Molossus pretiosus is similar to *M. ater,* which has led to reluctance in accepting *M. pretiosus* as a valid species. No fixed chromosomal or genetic differences between the two species support *M. pretiosus* as a valid species. Although no physical barriers prevent mixing in sympatric portions of their ranges, reproductive isolation exists and has led to a distinct and consistent difference in size. Thus, *M. pretiosus* is considered a valid species (Dolan, 1989).

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