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Eumops auripendulus.

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Eumops auripendulus (Shaw, 1800)

Shaw's Mastiff Bat

Vespertilio auripendulus Shaw, 1800:137. Type locality "Guiana," restricted to French Guiana by Husson (1962).
Molossus amplexi-caudatus E. Geoffroy-Saint-Hilaire, 1805:156. Type locality "Guiane."
Dysopes longimanus Wagner, 1843:367. Type locality "Villa Maria, Caiçara, Barra do Rio negro" [Brazil].
Dysopes leucopleura Wagner, 1843:367. Type locality "Caicara" [Brazil].
Molossus nasutus J. A. Allen, 1897:115. Type locality "Guayabamba, alt. 6,000 feet, Peru" (not Spix 1823—Freeman 1981: 153).
Promops milleri J. A. Allen, 1900:92. Type locality "Guayabamba, Peru (altitude 6,000 feet)" = Santa Rosa de Huayabamba, San Martin (Hershkovitz 1949:453).
Promops barbatus J. A. Allen, 1904:228. Type locality "La Union, Venezuela."
Eumops abrasus Miller, 1906:85. Type locality unspecified (not *Dysopes abrasus* Temminck, 1827—Freeman 1981:153).
Eumops auripendulus: Goodwin, 1960:5. First use of current name combination.

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, family Molossidae. The genus *Eumops* contains 9 species: *E. auripendulus*, *E. bonariensis*, *E. dabbenei*, *E. glaucinus*, *E. hansae*, *E. maurus*, *E. patagonicus*, *E. perotis*, and *E. underwoodi* (Barquez et al. 1999; Freeman 1981; Koopman 1993, 1994). Two subspecies of *E. auripendulus* are recognized (Eger 1974, 1977; Koopman 1994):

E. a. auripendulus (Shaw, 1800:137), see above (*oaxacensis* Goodwin is a synonym).
E. a. major Eger, 1974:2. Type locality "Campo Viera (27°15′S, 55°10′W), Misiones, Argentina."

DIAGNOSIS. *Eumops auripendulus* (Fig. 1) has no posterior commissure of M3 and only a small PM3, whereas *E. perotis* has not entirely lost the commissure and has a moderate-sized PM3 (Freeman 1981). *E. auripendulus* has darker color, more pointed tragus, shallower basisphenoid pits, and shorter skull (which is less robust), as well as proportionally narrower widths of mastoid and postorbital constriction than *E. glaucinus* (Eger 1977). Zygomatic arches are subparallel in *E. auripendulus* but converge anteriorly in *E. glaucinus* (Lopez-Gonzalez 1998). *E. auripendulus* can be distinguished from *E. glaucinus* by paler color and larger and square tragus of *E. glaucinus* (Barquez et al. 1993).

GENERAL CHARACTERS. Shaw's mastiff bat is a medium-sized, free-tailed bat (Goodwin 1946). Dorsal color is dark blackish brown or dark reddish brown, venter is paler, sides are grayish, and bases of dorsal hairs are buffy white (Barquez et al. 1993; Eisenberg 1989; Goodwin 1946; Husson 1962). Ears and wing membranes are dark (Allen 1900). *E. auripendulus* has long hairs on the feet that extend past tips of claws (Redford and Eisenberg 1992). Ears are moderately large. Tragus is small, pointed, and is proportionally smaller than in other *Eumops*. Fur along margin of forearm is nearly or entirely absent. Skull (Fig. 2) is relatively long, sagittal crest is moderately developed, and lambdoid crests are well developed and project back beyond supraoccipitals (Eger 1977; Goodwin 1946).

Eumops a. major is similar in color to *E. a. auripendulus* but significantly larger in 27 of 38 characters for males and 32 of 38 characters for females. Averages of external and cranial measurements (in mm) of up to 74 males and 214 females, respectively, of *E. a. auripendulus* and 9 males and 10 females, respectively, of *E. a. major* are: length of forearm, 58.6, 58.3, 64.2, 63.4; length of 3rd metacarpal, 60.6, 60.2, 66.1, 65.6; length of 1st phalange of 3rd digit, 25.5, 25.4, 28.3, 27.8; length of 2nd phalange of 3rd digit, 23.3, 23.2, 25.6, 25.1; length of 4th metacarpal, 58.4, 57.9, 63.4, 63.1; length of 1st phalange of 4th digit, 21.5, 21.4, 23.9, 23.6; length of 2nd phalange of 4th digit, 5.7, 5.5, 6.1, 6.4; length of 5th metacarpal, 32.8, 32.6, 35.9, 35.8; length of 1st phalange of 5th digit, 17.6, 17.8, 19.3, 19.1; length of 2nd phalange of 5th digit, 5.5, 5.6, 6.0, 5.7; total length, 146.0, 132.8, 144.0, 142.5; length of tail vertebrae, 47.8, 45.2, 55.2, 53.0; length of foot including claws, 11.7, 11.0, 12.6, 11.9; length of ear from notch, 21.0, 20.2, 19.5, 21.2; length of tragus, —, 1.8, 3.7, 3.2; length of tibia, 16.1, 16.0, 18.3, 18.1; condyloincisive length of mandible, 17.4, 16.8, 18.7, 18.2; greatest length of mandible, 17.8, 17.3, 19.1, 18.7; c1 to m3, 10.6, 10.4, 11.4, 11.2; width across lower canines, including cingula, 3.9, 3.7, 3.9, 3.9; height of lower canines, 4.1, 4.0, 4.8, 4.6; width of septum between basisphenoid pits, 0.6, 0.6, 0.8, 0.8; length of basisphenoid pit, 1.8, 1.8, 2.0,

FIG. 1. *Eumops a. auripendulus* from San Juan del Sur, Departamento Rivas, Nicaragua. Photograph by Keith Geluso.

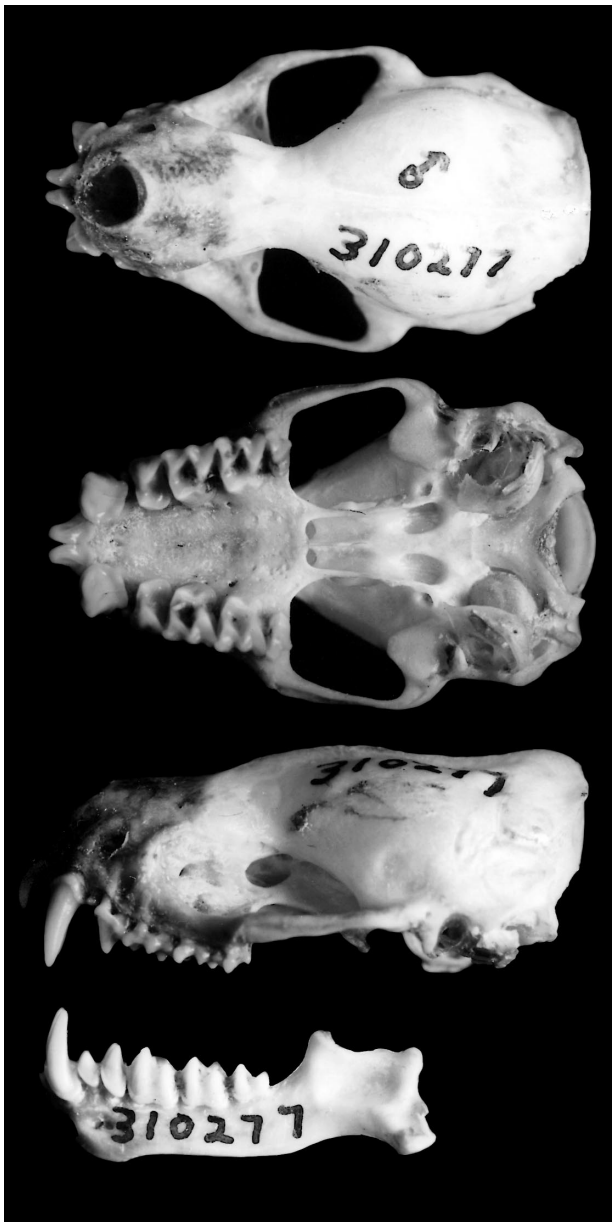

FIG. 2. Dorsal, ventral, and lateral views of cranium, and lateral view of mandible of *Eumops a. auripendulus* from Tacarcuna Village Camp, Darien, Panama (male, United States National Museum of Natural History 310277). Greatest length of cranium is 25.2 mm. Photographs by T. L. Best.

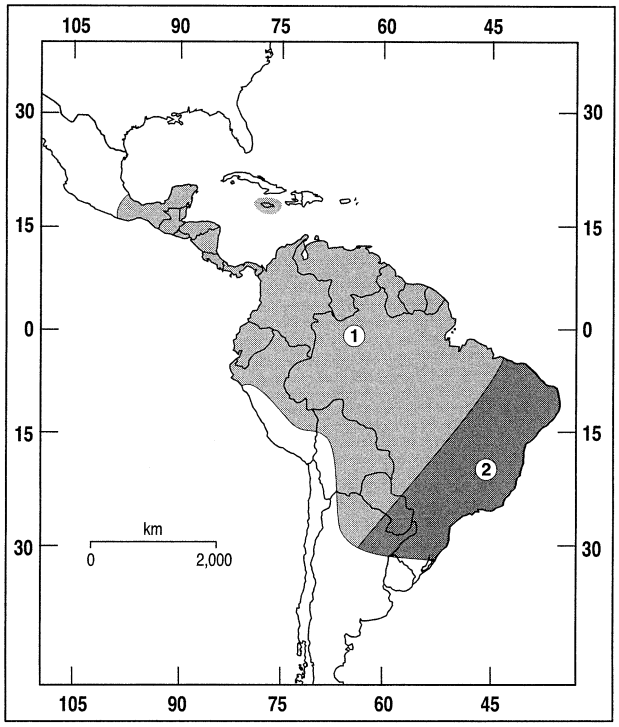

FIG. 3. Distribution of *Eumops auripendulus* in North and South America (Baker and Genoways 1978; Barquez et al. 1993, 1999; Eger 1974, 1977; Eisenberg 1989; Koopman 1982, 1993, 1994; Redford and Eisenberg 1992): 1, *E. a. auripendulus*; 2, *E. a. major*.

2.0; total length of cranium, 25.1, 24.7, 27.2, 26.6; condyloincisive length of cranium, 23.1, 22.8, 25.0, 24.8; palatal length, 11.3, 10.9, 12.1, 11.7; zygomatic width, 14.3, 14.1, 15.4, 15.1; mastoidal width, 12.3, 12.2, 13.1, 13.0; lachrymal width, 8.2, 7.9, 8.6, 8.4; interorbital width, 7.9, 7.6, 8.2, 8.0; height of braincase, 8.7, 8.5, 9.2, 8.9; width across M3s, 10.1, 9.9, 10.7, 10.5; C1 to M3, 9.5, 9.4, 10.3, 10.1; width across upper canines, including cingula, 6.2, 6.0, 6.6, 6.4; height of upper canines, 4.2, 4.1, 4.6, 4.5; anterior breadth of braincase, 10.8, 10.7, 11.1, 10.9; posterior breadth of braincase, 11.5, 11.6, 12.2, 12.1; length of maxillary toothrow, 9.5, 9.4, 10.3, 10.1; and postorbital constriction, 4.5, 4.5, 4.7, 4.9 (Eger 1974, 1977). Mass is 26–27 g in Bolivia (Anderson et al. 1993) and averages 37.8 and 31.5 g for males and females, respectively, in Paraguay (Lopez-Gonzalez 1998).

DISTRIBUTION. Geographic range of Shaw's mastiff bat extends from southern Mexico and Jamaica to Paraguay and northern Argentina (Fig. 3; Baker and Genoways 1978; Barquez et al. 1999; Cabrera 1958; Koopman 1994; Redford and Eisenberg 1992). *E. auripendulus* occurs at elevations of 25–100 m in Venezuela (Handley 1976) and from lowlands to 1,800 m in Peru (Allen 1897; Goodwin 1953; Graham 1983; Koopman 1978). No fossils are known.

FORM AND FUNCTION. Tail extends about one-half its length beyond membrane (Allen 1900), wing tips are narrow (average relative length of 2nd phalange is 6.9% of total length of 4th digit—Freeman 1981), and pelage is soft, thick (Allen 1900), and short dorsally and ventrally. Muzzle in front of ears is nearly hairless, as is inferior surface of lower jaw. Pelage of body extends on wing membrane dorsally almost as far as a line drawn from middle of humerus to knee (Dobson 1878).

Ears are large, broad, and rounded (Husson 1962, 1978); breadth across ears is 27.5 mm (Allen 1900). Inner margins of ears arise at a point on forehead equally distant from anterior commissure of eyelids and nostrils and are united only at their bases. Outer and inner margins of ear are convex and form together an almost perfect arc of a circle. Tragus is small, linear, subacutely pointed, ca. 1 mm long, and 2 mm tall with a broad base. Antitragus is about twice as long as it is tall: ca. 8 mm long and 4 mm high (Barquez et al. 1993; Dobson 1876, 1878; Husson 1962, 1978).

Muzzle is obtuse, nares are directed forward and slightly outward, end of nose scarcely projects beyond margin of upper lip, which is fringed in front with straight hairs (Dobson 1876, 1878). Although lips appear smooth (Barquez et al. 1993; Husson 1962), shallow wrinkles are present (not deep ones—Freeman 1981).

Skull is massive, and teeth are broad and heavy. Rostral portion of skull is much broader than interorbital (Allen 1900). Basisphenoid pits are moderate to deep (Freeman 1981). Sagittal crest is distinct and well developed (Husson 1962), skull has a slight lachrymal ridge and well-developed lateral lambdoid crests that project beyond the supraoccipital (Freeman 1981; Sanborn 1932). Dentary is thickest of all members of the genus (Freeman 1981).

Dental formula is i 1/2, c 1/1, p 2/2, m 3/3, total 30 (Eisenberg 1989). The 3rd commissure on M3 is less developed than in other *Eumops* (Hall 1981). Upper incisors are strongly curved and arch forward, projecting much beyond canines (Allen 1900). Upper incisors are in contact with canines and with each other at their bases, and their inner margins diverge. They are about one-half as

high as canines. The minute anterior PM1 is crowded out of the toothrow, so that the C1 and the large PM2 are in contact. The PM2 is higher than molars. Lower incisors are subequal, bifid, and considerably shorter than cingulum of canines and are crowded in a nearly semicircular row. Lower premolars are about equal in size, pm1 has a somewhat lower shaft than pm2, and pm2 is slightly lower than m1 (Husson 1962).

Males have a distinct gular sac. This structure is rudimentary in females and absent in immatures (Dobson 1876, 1878).

At its base, the glans penis is oval in cross section, but at midlength, the glans widens and is dorsoventrally compressed. From its widest point (ca. 66% of distance from prepucial junction), the glans tapers sharply and terminates bluntly. Along the ventral surface of the glans is a prominent medial ridge that encloses the urethra. This urethral ridge terminates by forming a collar around ventral rim of urinary meatus. An oval bacular mound is on the ventral surface of tip of glans. It encloses a small os penis and forms the dorsal margin of the urinary meatus. No epithelial spines occur on the glans penis (Ryan 1991).

A small and straight os penis is at the terminus of the corporus cavernosum. Os penis tapers gently to end in a blunt tip, and the tip barely enters the bacular mound (Ryan 1991). Os penis of *E. auripendulus* is a stout rod that is rounded at both ends in dorsal aspect. In lateral view, os penis is blunt at base, slightly constricted just beyond midpoint, and rounded distally. It exhibits no lateral curvature. Measurements (in mm) of os penis of 3 *E. auripendulus* are: greatest length, 0.30, 0.42, 0.42, and greatest breadth at base, 0.08, 0.05, 0.05 (Brown 1967).

ONTOGENY AND REPRODUCTION. *Eumops auripendulus* is polyestrus (Carter 1970). In Mexico, females were not reproductively active in May (Alvarez-Castañeda and Alvarez 1991). In French Guiana, pregnant females were present in February (Brosset and Dubost 1967). In Trinidad, 1 of 2 females observed was lactating on 11 August (Genoways et al. 1973). In Bolivia, 12 pregnant females with single embryos were present in August (Anderson 1997). In El Salvador, a young Shaw's mastiff bat was nearly hairless on 30 April (Burt and Stirton 1961). In Venezuela, half-grown young were present on 14 April. Their color was deep black and that of adults from the same site was sooty brown (Allen 1911).

ECOLOGY. *Eumops auripendulus* is an insectivore (Barquez et al. 1993). On the Yucatán Peninsula, Mexico, Shaw's mastiff bat occurred in dense forest (Ingles 1959; Jones et al. 1973); in Chiapas, Mexico, it occurs only in coastal plains (Alvarez-Castañeda and Alvarez 1991). In Guatemala, a Shaw's mastiff bat was under a loose slab of bark (Goodwin 1946), and a colony was beneath a corrugated iron roof in El Salvador (Burt and Stirton 1961). In Panama, *E. auripendulus* is rare (Handley 1966), but 1 colony of $\leq$10 individuals was in the attic of a house, living just under the roof of a rather inaccessible corner; the roost was in a warm, dry place (Bloedel 1955).

In South America, Shaw's mastiff bat occurs in eastern Brazilian highlands and coast, Amazon Basin, eastern slopes of the northern Andes, northern coast and islands, and Pacific coast of Colombia and Ecuador (Koopman 1982). In Trinidad, *E. auripendulus* was observed over a small pond and over a cement holding tank at a municipal waterworks; it was encountered at the same site as *M. ater* and *M. molossus* (Genoways et al. 1973). In Venezuela, Shaw's mastiff bat occupies dry, deciduous thorn forests with rocky outcroppings (Eisenberg 1989) and has been observed adjacent to streams in a pasture and in a savanna (Handley 1976). A colony was in the loft of a house, where bats were hanging in a large cluster on the side of a perpendicular timber. The colony evidently had occupied the site for some time as a great heap of excrement littered the floor below (Allen 1911). In Surinam, *E. auripendulus* is common in coastal lowlands but also occurs in foothills of the interior (Husson 1978). In French Guiana, Shaw's mastiff bat occupies roofs and belfries, the number of individuals per colony is $\geq$15 (Brosset and Dubost 1967), and it has been captured in mist nets suspended 17–23 m above a narrow dirt road through lowland rainforest (Simmons and Voss 1998). In Ecuador, daytime roosts include sites beneath exfoliating bark of large dead trees (Brosset 1965). In Brazil, it occupies all major biomes (da Fonseca et al. 1996). In Paraguay, Shaw's mastiff bat occurs only in the Alto Chaco in the western part of the country (Willig et al. 2000). In Argentina, this species inhabits subtropical forest (Redford and Eisenberg 1992; Massoia 1976), and it roosts in bell towers (Barquez et al. 1993) and buildings occupied by humans (Delpietro et al. 1969).

In Argentina, rabies virus was isolated from brain tissue (Delpietro et al. 1969), and 5 *E. auripendulus* showed clinical signs of rabies (Uieda et al. 1995). In Brazil, Shaw's mastiff bat was infected with *Schizotrypanum* (Dias et al. 1942). Although not detected in some studies in Brazil (Deane 1961) and Colombia (Marinkelle 1982), *Trypanosoma cruzi* has been detected in *E. auripendulus* from Brazil (Deane et al. 1963; Marinkelle 1968, 1976; Nussenzweig et al. 1963).

Ectoparasites include the mites *Chiroptonyssus haematophagus* (Yunker et al. 1990), *Chiroptonyssus venezolanus* (Radovsky 1967), *Liponissus hematophagus* (da Fonseca 1936), and *Parakosa tadarida* (McDaniel and Webb 1982). No fleas were on 4 *E. auripendulus* examined in Panama (Tipton and Méndez 1966).

BEHAVIOR. On the Yucatán Peninsula, Shaw's mastiff bat has been observed at dusk over a highway (Ingles 1959; Jones et al. 1973). In Panama, individuals tended not to hang head down but instead tended to crawl into cracks and small recesses. When disturbed, they almost never flew but tried to escape by running on all fours (Bloedel 1955).

GENETICS. Diploid number of chromosomes is 42–52, and fundamental number of chromosomal arms is 60–62 (Trierveiler et al. 1996; Varella-Garcia et al. 1989; Warner et al. 1974). In the 2n = 42 karyotype, autosomes are composed of 9 pair of submetacentrics ranging in size from large to medium, 2 pair of medium-to-small subtelocentrics, plus a series of 9 acrocentrics. The X chromosome is a large submetacentric, and the Y chromosome is a medium-sized subtelocentric (Warner et al. 1974) or a small acrocentric (Varella-Garcia et al. 1989). Electrophoretic data from 24 genic loci indicate that *E. auripendulus* and *E. glaucinus* are genetically less closely allied than suggested by morphological evidence (Dolan and Honeycutt 1978; Eger 1977).

REMARKS. *Eumops* is from the Greek prefix *eu-* meaning good or true and the Malayan *mops* meaning bat. The specific epithet *auripendulus* probably is from the Latin *auris* and *pendulus* referring to the ears and how they are positioned (Jaeger 1955). Additional common names include long-nosed mastiff bat, shaved mastiff bat (Elliot 1905), Temminck's mastiff bat (Tuttle 1970), Oaxaca mastiff bat (Goodwin 1956), murciélago mastín (Villa-R. 1967), moloso rojizo intermedio (Delpietro et al. 1969), slouch-eared bat, moloso alilargo (Redford and Eisenberg 1992), and moloso oscuro (Barquez et al. 1993).

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