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Molossus bondae.

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Molossus bondae Allen, 1904

Bonda Mastiff Bat

Molossus bondae Allen, 1904:228. Type locality "Bonda, Santa Marta, Colombia" [= Bonda, Río Manzanares, 7 miles east of Santa Marta, Magdalena, Colombia—Hershkovitz, 1949:454].

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, family Molossidae. The genus *Molossus* contains 5 species: *M. ater, M. bondae, M. molossus, M. pretiosus,* and *M. sinaloae* (Jennings et al. 2000; Koopman 1993, 1994); additional species may exist (Dolan 1989; Simmons and Voss 1998). *M. bondae* is monotypic (Hall 1981; Jones et al. 1988; Koopman 1994).

DIAGNOSIS. *Molossus bondae* (Fig. 1) resembles *M. ater* and *M. pretiosus,* but it is smaller than both of these species; *M. bondae* also is smaller than *M. sinaloae* and larger than *M. molossus* (Dolan 1989; Jones et al. 1971). *M. bondae* is similar to *M. molossus* (Freeman 1981), but *M. bondae* has short, unicolored hair and *M. molossus* has long, bicolored hair; the distal portion is variable in darkness and the basal portion is white (Tamsitt and Valdivieso 1966).

GENERAL CHARACTERS. Dorsal hairs are black to blackish, somewhat paler at base, and 2.0–2.5 mm in length. Dorsum is dark brown to reddish brown, and venter is paler than dorsum (Eisenberg 1989). Membranes, muzzle, and ears are black to blackish. Color of pelage within a population varies between a nonlustrous black and a reddish orange; the reddish orange tint apparently results from wear (Dolan 1989).

Significant sexual dimorphism was present in 12 of 16 external and cranial characters, with males being larger than females; only greatest length of skull, zygomatic breadth, depth of skull, and length of tail were not dimorphic. Average and range of external and cranial measurements (in mm) of 4 males and 12 females, respectively, from Nicaragua and 14 males and 6 females, respectively, from Costa Rica were: total length, 111 (109–112), 103 (100–109), 111 (106–114), 106 (102–110); length of tail, 41 (40–41), 38 (35–39), 40 (36–42), 39 (36–40); length of ear, 16 (15–16), 15 (14–15), 16 (15–16), 16 (15–16); length of forearm, 41.6 (41.3–42.0), 40.1 (38.6–41.2), 41.4 (40.3–42.8), 40.5 (38.4–41.5); length of metacarpal III, 43.1 (42.2–43.8), 41.6 (39.7–42.5), 43.3 (42.1–44.7), 42.1 (39.5–43.9); length of metacarpal IV, 41.9 (41.0–42.4), 40.6 (38.9–41.4), 42.0 (40.9–43.7), 41.1 (38.7–43.0); greatest length of skull, 20.6 (20.3–20.9), 18.8 (18.3–19.9), 20.1 (19.8–20.5), 18.8 (18.1–19.4); condylobasal length, 17.9 (17.5–18.1), 16.6 (16.0–17.8), 17.6 (17.3–18.0), 16.6 (16.0–17.2); breadth of braincase, 10.1 (9.7–10.3), 9.7 (9.3–10.1), 10.0 (9.7–10.4), 9.5 (9.2–10.0); length of maxillary toothrow, 6.9 (6.6–7.1), 6.6 (6.3–7.0), 6.8 (6.4–7.0), 6.4 (6.4–6.5); breadth across M3–M3, 8.8 (8.5–9.0), 8.4 (7.9–9.0), 8.7 (8.5–9.0), 8.5 (8.2–8.6); breadth across canines, 5.3 (5.1–5.4), 4.7 (4.4–4.9), 5.1 (5.0–5.3), 4.7 (4.6–4.8—Dolan 1989). Average external measurements (in mm) of 4 males and 15 females, respectively, from Venezuela were: total length, 112, 104; length of head and body, 71, 66; length of tail, 41, 39; length of foot, 13, 11; length of ear, 14, 12; length of forearm, 41.1, 39.2. Average masses of 4 males and 3 females, respectively, from Venezuela were 18.8 g and 17.0 g (Eisenberg 1989).

DISTRIBUTION. Geographic range of the Bonda mastiff bat includes Central America, Colombia, Ecuador, Venezuela, Paraguay, and Argentina (Fig. 2; Dolan 1989; Dolan and Carter 1979; Eisenberg 1989; Jones et al. 1988; Koopman 1982, 1993; Lopez-Gonzalez 1998; Tamsitt and Valdivieso 1966; Willig et al. 2000). Although reported from southern Mexico (Alvarez and Ramirez-Pulido 1972; Jones et al. 1973), *M. bondae* probably does not occur in Mexico

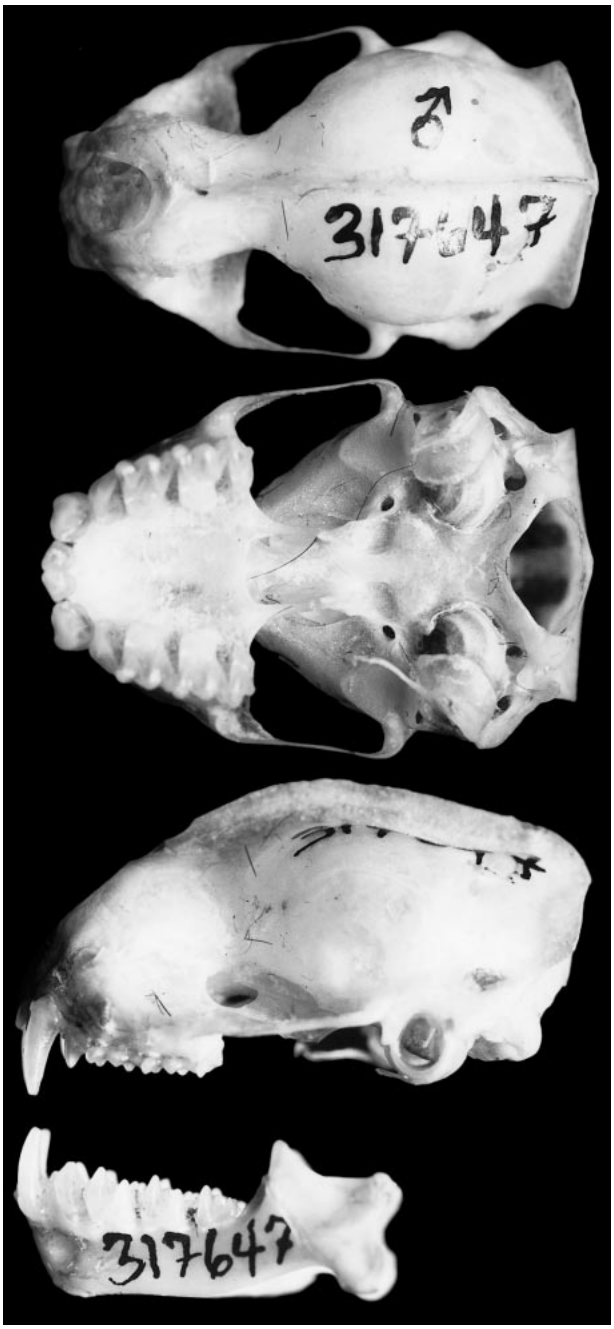

FIG. 1. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of a male *Molossus bondae* from Chira Chira, Canal Zone, Panama (United States National Museum of Natural History 317647). Greatest length of cranium is 19.1 mm. Photographs by T. L. Best.

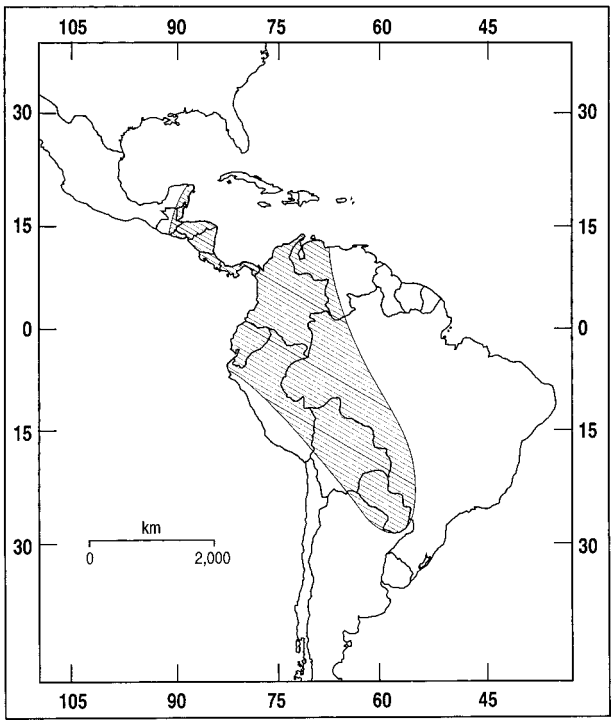

FIG. 2. Distribution of *Molossus bondae* in North and South America (Dolan 1989; Eisenberg 1989; Jones et al. 1988; Koopman 1982, 1994; Lopez-Gonzalez 1998; Willig et al. 2000).

(Dolan 1989; Lopez-Gonzalez 1998). *M. bondae* occurs at elevations <500 m in Colombia (Muñoz Arango 1990) and <600 m in Venezuela (Eisenberg 1989). No fossils of *M. bondae* are known.

FORM AND FUNCTION. Gular glands have conspicuous apocrine tubules above sebaceous cells. Sebaceous units are arranged radially around a central pit-like opening to the exterior. Fatty acids are absent from sebaceous cells, but are present in secretions in ducts. Cholesterol is not present. Secretory material within cells and lumina contains unsaturated bonds. Globular appearance of secretion is due to massive coalescence of lipid droplets. Apocrine secretions have positive reactions with PAS and Sudan blue B stains, indicating carbohydrate and neutral lipid components, perhaps as glycolipids (Dapson et al. 1977).

Average dimensions (in mm) of glans penis of 3 Bonda mastiff bats were: length of glans, 5.0; greatest width of glans, 1.9; length of tip, 0.7; width of tip, 0.6 (Ryan 1991). In Colombia, testes of a male in April were 6.0 mm in length (Valdivieso 1964).

Measurements (in mm) of 3 bacula tentatively assigned to *M. bondae* were: greatest length, 0.20, 0.21, 0.33; greatest breadth at base, 0.12, 0.08, 0.12. Bacula of *M. bondae* are among the smallest of species in the genus *Molossus*. Of 3 bacula examined, 1 was squared at the base, expanded medially, and sharply tapered at the tip; another was a short rod that was rounded at both ends, and its base was turned sharply dorsad; and the 3rd baculum was much larger than the other 2 (Brown 1967).

ONTOGENY AND REPRODUCTION. The Bonda mastiff bat is polyestrous on occasion (Dolan and Carter 1979). Pregnant females may abort when handled or confined during later stages of pregnancy (Wimsatt 1960).

In Costa Rica, 1 *M. bondae* contained a fetus that was 6 mm in length and another was neither pregnant nor lactating on 20 March (Gardner et al. 1970), some females were pregnant in January and August, and subadults were present in November (La Val 1977; La Val and Fitch 1977). In Nicaragua, 7 of 12 females had fetuses that were 20–28 mm in crown–rump length, 1 female was lactating and pregnant (fetus was 25 mm in crown–rump length), 2 were lactating, 1 was postlactating, and 1 young adult was reproductively inactive (Dolan and Carter 1979). Litter size is 1.

Zona pellucida of *M. bondae* may be swollen during the 4–6 cell stage of development (Rasweiler 1990). Maternal and fetal vascular channels are intimately associated (Wimsatt 1958). The definitive discoidal chorioallantoic placenta always is positioned at cranial end of right uterine horn. This positioning is preceded in early pregnancy by development of an unusual vascular tuft in the endometrium at this site. Maternal vessels in the tuft possess hypertrophied endothelial cells and very prominent basal laminae in sections stained for glycoproteins. Cytotrophoblastic proliferation is pronounced near the tuft (Rasweiler 1991).

ECOLOGY AND BEHAVIOR. The Bonda mastiff bat primarily is a forest dweller. Its distribution closely follows tropical rainforest habitat along the Caribbean lowlands in Central America as far as northern Honduras, where forest becomes restricted on the coast. *M. bondae* probably is ubiquitous throughout the area. Its presence in western and southwestern Colombia along the Pacific versant is due to crossing over of the rainforest belt in Panama. The population at the type locality of Santa Marta on the northern Colombian coast may be a relict left by the last interglacial episode when forests contracted, because arid environments now surround the locality. Other populations may persist in refugia scattered about Colombia's intermontane valleys and in portions of western Venezuela, but Bonda mastiff bats probably never occurred much farther east than Venezuela (Dolan 1989).

In Costa Rica, *M. bondae* roosted in a building, over the Río Tortuguero (Gardner et al. 1970), and a colony occupied the roof of a 2nd-story porch, the floor of which was used as a roost site by *M. sinaloae* (La Val 1977). In Nicaragua, a colony of *M. bondae* roosted in a church; associated species included *Eptesicus furinalis, Glossophaga, M. sinaloae, Myotis nigricans, Noctilio albiventris,* and *Rhogeessa tumida* (Dolan and Carter 1979).

In Panama, a small colony of *M. bondae* roosted in a house with a colony of *Noctilio* of about the same number of individuals. A few naked, but flying and almost adult-sized young were noted in early August, when bats crawled out of the attic onto the outside of the house during the middle of the day (Bloedel 1955).

In Colombia, the Bonda mastiff bat usually lives in large colonies under metal roofs where temperature in the day is extreme; it also is found in caves, hollow trunks of trees, and cracks in rocks (Valdivieso 1964), and has been captured with mist-nets as it left roofs of buildings on a sugar plantation (Rasweiler 1990). In Venezuela, *M. bondae* occurs in dry, deciduous tropical forest in coastal areas (Eisenberg 1989), it has been found roosting in the thatched roof of a house in a dry upland area, and it also has been captured near a stream in a pasture (Handley 1976). In Paraguay, the Bonda mastiff bat is restricted to nonforested areas. Along with *Eumops patagonicus* and *Myotis albescens,* a colony of *M. bondae* was present in the roof, hollow walls, and ceiling of an abandoned wooden house near the Río Paraguay. *M. bondae* also is sympatric with *M. ater* in Paraguay (Lopez-Gonzalez 1998).

Molossus bondae is insectivorous (Muñoz Arango 1990). An average of 492 moth scales are present per gram of feces (Freeman 1979).

Ectoparasites include the mite *Mitonyssus molossinus* (Yunker and Radovsky 1980), the bat fly *Trichobius dunni* (Peterson and Hůrka 1974; Wenzel et al. 1966), and possibly the bat fly *Basilia myotis* (Guimarães 1966). Of 32 Bonda mastiff bats examined from Panama, none had fleas (Tipton and Méndez 1966).

In Colombia, the bacterium *Shigella boydii-2* was isolated from *M. bondae* (Arata et al. 1968; McCoy 1974). The Bonda mastiff bat also tested positive for the protozoan *Schizotrypanum* in Colombia (Marinkelle 1982).

GENETICS. Intraspecific variation in allelic frequency is demonstrated in *M. bondae* at the phosphoglucomutase-1 locus by populations from Costa Rica and Nicaragua. *M. bondae* differs from *M. ater* and *M. pretiosus* by a species-specific marker allele at the lactate-dehydrogenase locus (Dolan 1989).

With the exception of *M. bondae,* populations within species of *Molossus* have demonstrated some degree of inbreeding in Central America. Based upon analysis of variance of gene frequencies, a difference in social organization may exist between *M. bondae* and other species of *Molossus* such that consanguineous matings are avoided. However, only 2 populations were represented in the assessment (Dolan 1989).

REMARKS. *Molossus* is from the Greek *molossos* referring to the molossus or mastiff hound (Jaeger 1955). The specific epithet *bondae* refers to the type locality of Bonda, Santa Marta, Colombia.

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