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Mops midas.

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Mops Lesson, 1842

Mops Lesson, 1842:18. Type species *Mops indicus* Lesson, 1842 = *Molossus mops* de Blainville, 1840.

Xiphonycteris Dollman, 1911:210. Type species *Xiphonycteris spurrelli* Dollman, 1911.

Allomops Allen et al. 1917:470. Type species *Mops* (*Allomops*) *osborni* Allen et al., 1917, a subspecies of *Mops condylurus* (A. Smith, 1833).

Philippinopterus Taylor, 1934:314. Type species *Philippinopterus lanei* Taylor, 1934, a subspecies of *Mops sarasinorum* (Meyer, 1899).

CONTEXT AND CONTENT. Order Chiroptera, Suborder Microchiroptera, Family Molossidae. The genus *Mops* contains 2 subgenera and 12 species that can be distinguished using the following key modified from Corbet and Hill (1992), El-Rayah (1981), Hayman and Hill (1971), and Koopman (1994):

1 Anterior palatal emargination present, anterior upper premolar moderately to relatively large ..... Subgenus *Xiphonycteris* 2
Anterior palatal emargination largely closed, anterior upper premolar absent or greatly reduced ..... Subgenus *Mops* 6
2 Forearm <32 mm; M3 without third commissure 3
Forearm >32 mm; M3 with short but distinct commissure 4
3 Canines with enlarged cingula, upper incisors not projecting in front of anterior face of canine cingula; length of skull 14.0–16.8 mm ..... *M. spurrelli*
Canines without enlarged cingula; upper incisors projecting in front of anterior face of canine cingula; length of skull 15.0–17.5 mm ..... *M. nanulus*
4 Forearm <35 mm; length of skull 15.8–17.5 mm ..... *M. petersoni*
Forearm ≥35 mm; length of skull 17.2–20.6 mm 5
5 Wing inserts high on back; dorsal pelage restricted to top of back; basisphenoid pits deep and rounded laterally with septum between nearly parallel ..... *M. thersites*
Wing inserts lower on sides of body; dorsal pelage not restricted to top of back; basisphenoid pits shallow and long oval shaped with septum between narrowing anteriorly ..... *M. brachypterus*
6 Forearm >50 mm 7
Forearm <50 mm 9
7 Skull length ≥26 mm ..... *M. midas*
Skull length <26 mm 8
8 Ears joined at base ..... *M. congicus*
Ears separated at base ..... *M. trevori*
9 Forearm <41 mm ..... *M. demonstrator*
Forearm 41–51 mm 10
10 Anterior upper premolar vestigial but present ..... *M. condylurus*
Anterior upper premolar absent 11
11 Size relatively small (forearm 39–45 mm); C–M3 6.2–6.9 mm ..... *M. sarasinorium*
Size medium (forearm 43–48); C–M3 7.0–7.7 mm ..... *M. mops*

Mops midas (Sundevall, 1843)

Midas Free-tailed Bat

Dysopes midas (Sundevall, 1843:207). Type locality Sudan, Blue Nile, White Nile River, West Bank, Jebel el Funj.

Nyctinomus miarensis Grandidier, 1869:337. Type locality "Miari, country between Soua-haze and Soua-hane" (= Miaryinear Tuléar).

Nyctinomus unicolor Grandidier, 1870:49. Type locality Madagascar.

Mops midas Freeman, 1981:159. First use of current name combination.

CONTEXT AND CONTENT. Context as for genus. The following two subspecies of *Mops midas* are currently recognized (Koopman, 1994):

Mops midas midas (Sundevall, 1843:207) see above.
Mops midas miarensis (Grandidier, 1869:337) see above.

These subspecies may be indistinguishable morphologically, but sufficient specimens have not been available to carry out a critical assessment (Peterson et al., 1995). *Mops midas miarensis* occurs in Madagascar, whereas *M. m. midas* occurs over the rest of the range.

DIAGNOSIS. *Mops midas* has a heavier build than similarly-sized, sympatric molossids such as *M. congicus*, *M. trevori*, *Tadarida teniotis*, *T. ventralis*, *T. fulminans*, and *T. lobata*. This is apparent from its larger feet, larger thumbs, and thicker tail. Feet lack the smooth circular plantar pads of *T. teniotis*. Wing membranes and ears are not transluscent as in *T. lobata*. No circular tuft of hair surrounds a bare patch of skin as in *T. ventralis*. Thumbs are robust. A smooth callosity occurs underneath the distal ends of the metacarpals. The skull of *M. midas* is larger and heavier than those of *M. congicus* and *M. trevori*. Upper lip is furrowed with seven vertical ridges that bear stiff short bristles unlike the plain unwrinkled lips of *T. lobata* and *T. fulminans*. Tragus is very small and falciform in shape, whereas the antitragus is large, its height three-quarters of its length (Harrison and Bates, 1991).

Skull is distinguishable by its large size, heavy ridges, and high dorsal profile caused by development of sagittal and lambdoidal crests, particularly in adult males. Rostrum is deep and premaxillae ossify together in adults (Harrison and Bates, 1991).

GENERAL CHARACTERS. *Mops midas* is a large species (40–61.5 g), with a length of forearm of 57–66 mm. Ears are very broad and bridged across the forehead by a densely haired membrane, but without a trace of a crest (Fig. 1; Allen et al., 1917). Fur is silky, sparse on the nape of the neck and on the distal thighs and legs. Hairs on the dorsal surface are dark brown, sparsely

FIG. 1. Profile of *Mops midas* from Zimbabwe. Photograph provided by M. B. Fenton.

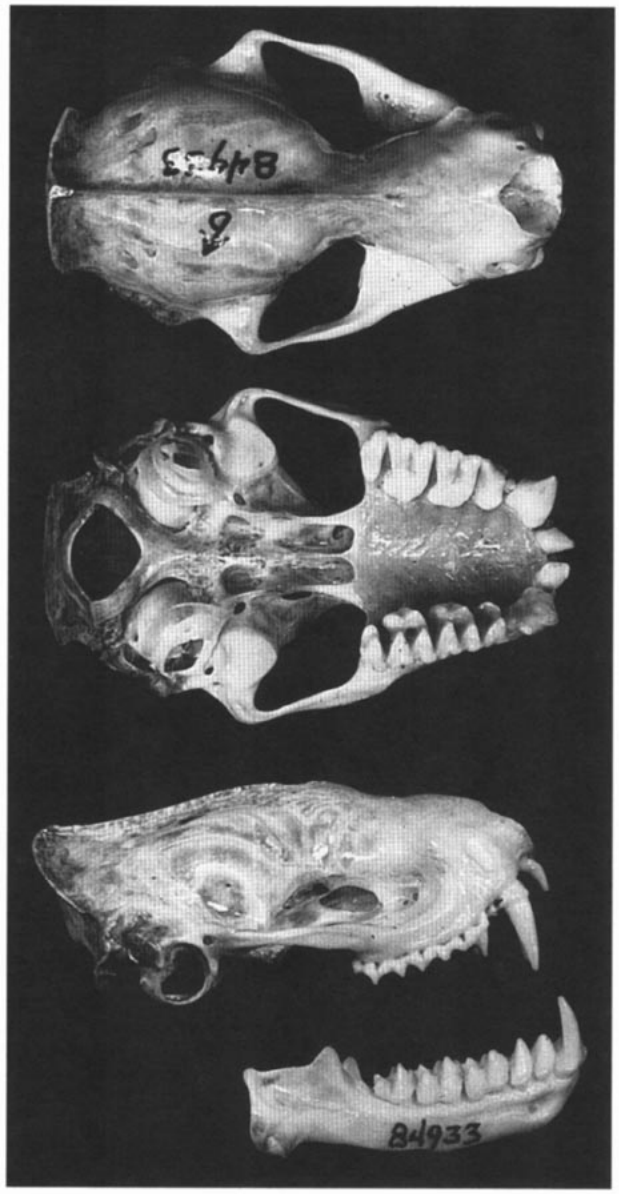

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of lower jaw of *Mops midas*, from Jerbel Aulia, Bahr el Abiad, Sudan (female, Royal Ontario Museum 84933). Greatest length of skull is 28.6 mm. Photographs provided by M. B. Fenton.

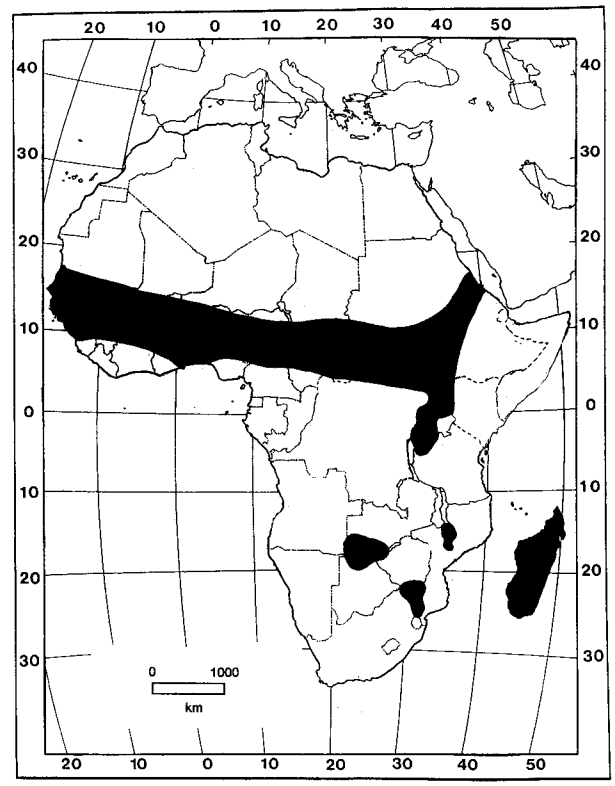

FIG. 3. Geographic distribution of *Mops midas midas* and *Mops midas miarensis*, modified from Smithers, 1983 and Peterson et al. 1995.

flecked with white, and paler at their base. Venter is paler than the dorsum, and hairs on the lower chest to the belly are tipped with white. A band crosses the top of the shoulders and appears naked because the hair is sparse (Smithers, 1983). Two color phases are known, dark and red (Kingdon, 1974). Wings are extremely long and narrow. Membranes are blackish and opaque. The wing membrane inserts below the middle of the tibia on each leg. Bands of white hair extend from forearm to thigh underneath the wing membranes (Smithers, 1983). Rosevear (1965) reports a second band of white hair behind the forearm from the elbow to the wrist in West African but not southern African specimens (Smithers, 1983).

Braincase is relatively high. Palate lacks any anterior emargination but has two small anterior palatal foramina. The median projection from the posterior edge of the palate continues posteriorly as a bony septum, and partially divides the mesopterygoid space into two compartments. Basisphenoid pits are well defined. Mandible is very heavy with the deep horizontal rami considered by Freeman (1981) to distinguish all *Mops*. Coronoid process is low, but angular process is deflected outwards, projects distinctly behind the condyle, and is strong in form (Fig. 2; Harrison and Bates, 1991). Sexual dimorphism in this species occurs primarily in the stronger development of the sagittal and lambdoidal crests (Kingdon, 1974; Smithers, 1983), as well as the greater length and width of the skull (Peterson et al., 1995) in males than in females.

Mean external measurements (in mm) for *M. midas* females and males from Maun, Botswana, respectively, are as follows: total length, 142 (n = 44), 144 (n = 8); length of tail, 47 (n = 44), 49 (n = 49); length of hind foot, 15(n = 31), 15 (n = 26); length of ear, 27 (n = 44), 28 (n = 38); length of forearm, 60 (n = 29), 61 (n = 30—Smithers, 1983). Mean cranial and dental measurements (in mm) for *M. midas* from Saudi Arabia (n = 3, sex not specified) are the following: greatest length of skull, 26.2; condylobasal length, 24.0; zygomatic breadth, 15.8; breadth of braincase, 12.5; postorbital constriction, 4.4; length of maxillary toothrow, 9.8; length of mandibular toothrow, 10.4; length of mandible, 18.5 (Harrison and Bates, 1991). Mean external measurements (in mm) for *M. midas* females and males respectively from Madagascar are as follows: length of forearm, 63.3 (n = 4), 62.8 (n = 3); length of metacarpal of third digit 63.9 (n = 4), 64.3 (n = 3); length of metacarpal of fourth digit 61.7 (n = 4), 62.0 (n = 3); length of metacarpal of fifth digit 36.9 (n = 4), 37.4 (n = 3); greatest length of skull, 28.0 (n = 2), 28.5 (n = 2); condylobasal length, 25.4 (n = 2), 25.5 (n = 3); zygomatic breadth, 17.3 (n = 2), 17.5 (n = 3); breadth of rostrum at level of lacrimal foramen, 9.6 (n = 2), 9.8 (n = 3); postorbital constriction, 5.0 (n = 2), 4.7 (n = 3); width of maxillary toothrow (M3–M3), 12.3 (n = 2), 12.0 (n = 3); length of maxillary toothrow (C–M3), 10.6 (n = 2), 10.8 (n = 3); width at level of upper canines (C–C), 8.2 (n = 2), 8.2 (n = 3); length of mandibular toothrow (c–m3), 11.7 (n = 2), 12.0 (n = 3—Peterson et al., 1995).

DISTRIBUTION. *Mops midas* is distributed from Senegal to Saudi Arabia, south in eastern Africa to Botswana and Transvaal, and also in Madagascar (Fig. 3; Koopman, 1994). Fossils of this species are not known.

FORM AND FUNCTION. Dental formula of *Mops midas* is i 1/2, c 1/1, p 2/2, m 3/3, total 30. Upper incisors are short, broad, and narrowly separated. Upper canines are large and broad. A small upper premolar is closely compressed between the canine

and the larger second premolar. Upper cheekteeth are heavy, and the M3 is slightly reduced. The third commissure of this M3 is vestigial, and so this tooth has half the crown area of M2. The lower canine is strong with a prominent cingulum. Crown area of the anterior lower premolar exceeds that of the posterior one. The anterior premolar overlaps the heel of the canine and is in turn overlapped by the posterior premolar as these teeth are compressed together (Harrison and Bates, 1991).

ONTOGENY AND REPRODUCTION. *Mops midas* has a well defined breeding season in southern Uganda. In January, five females were all in early pregnancy whereas a female captured in March was lactating. A female in June still showed signs of milk glands and enlarged teats (Kingdon, 1974). This same breeding season was seen in Botswana, with females pregnant from December to February, suggesting parturition in February or March (Smithers, 1983). However a second breeding season is possible as indicated by capture of a lactating female in October (Kingdon, 1974). Birth weights are 9.6–10.0 g as extrapolated from fetuses that were close to full term. Females bear a single young (Smithers, 1983).

ECOLOGY AND BEHAVIOR. *Mops midas* is a woodland and savannah species, and most records from the southern parts of its range are associated with major rivers or extensive swamps (Smithers, 1983). They may make local migrations, as they only appear in parts of their range (northeastern Congo) at the end of the dry season when hard-bodied coleoptera are common (Allen et al., 1917). Freeman (1981) predicted this for thick-jawed *Mops*. Wing morphology often indicates style of flight, and in this case, high wingloading (18.4 ± 0.9 *SD*) and high aspect ratio (8.9 ± 0.7 *SD*) indicate that *M. midas* has high flight speed and low maneuverability (Aldridge and Rautenbach, 1987). This style of flight is also reflected in the long, narrow-bandwidth, echolocation calls that are poorly designed for cluttered environments. Aldridge and Rautenbach (1987) recorded high-intensity, shallow-sweep, frequency modulated signals lasting 12 ms with a maximum frequency of 30 kHz as this bat exited from the roost. This species makes rapid, sharp clicks when flying, unlike other molossids in the area (Kingdon, 1974). *Mops midas* shows little overlap in bandwidth (0–3%) between adjacent calls. This allows it to extend its effective range of perception by separating in frequency the echoes returning from adjacent calls (Fenton, et al., 1998).

Mops midas appears at dusk, leaving the roosts in groups of 10–20, and returning as a group at dawn (Verschuren, 1957). Pairs have been observed drinking together (Kingdon, 1974). *M. midas* appears to fly continuously while foraging, and observations indicate no change in foraging patterns on moonlit nights (Fenton and Rautenbach, 1986). Foraging times for *M. midas* are bimodal, resulting from occasional short flights (<10 min) in the immediate area surrounding the roost. Five of 15 recorded flights of *M. midas* lasted ≤10 min. The remaining flights recorded averaged 51.7 min (Fenton and Rautenbach, 1986). Foraging *M. midas* were detected over large areas, moving up to 10 km away from their roosts (Fenton and Rautenbach, 1986) and have been seen flying fairly high (20–40 m) before coming down to drink (Allen et al., 1917).

Mops midas is gregarious, reported to roost in groups of up to several hundred (Smithers, 1983); however, they often occur in smaller groups of approximately 20 bats. Colonies are noisy, particularly if disturbed. They prefer roosting in total darkness, as evidenced by a roost in Maun, Botswana that was located in an attic (Smithers, 1983). This species has also been observed roosting in long, narrow cracks in trees (Verschuren, 1957) often located on an exposed limb, or trunk, in order not to hamper exits. A third report of roosting habits shows them roosting head up, packed together tightly, in the joints of a concrete bridge (Smithers, 1983).

Mops midas roosts in buildings also occupied by *Tadarida pumila* and *T. condylura*, and the mean ambient temperature in these roosts was 32.8°C (Fenton and Rautenbach, 1986). Females outnumber males in the roost at a ratio of four to one (Verschuren, 1957). *M. midas* may become very aggressive when handled, and will bite hard if given the opportunity.

A number of parasitic mites have been recorded for this species, including *Chelanyssus aethiopicus* (Family Macronyssidae) and *Nycteriglyphus tadaridae* (Family Rosensteiniidae—Anciaux de Faveaux, 1971, 1976). Bat fleas (Siphonaptera) have also been recorded from *M. midas*. *Lagaropsylla hoogstraali* (Ischnopsyllidae: Ischnopsyllinae) was found amongst a batch of fleas taken from *M. midas* in the Kruger National Park, in the Parfuri area (South Africa—Segerman and Braack, 1988).

GENETICS. *Mops midas* has a diploid number of 48 and a fundamental number of 66. The autosomal complement has 1 pair of large metacentric, 3 pairs of medium metacentric, 4 pairs of medium subtelocentric, 2 pairs of small subtelocentric, and 13 pairs of medium-to-small acrocentric chromosomes. The X chromosome is submetacentric and the Y chromosome is medium sized and acrocentric. The large metacentric chromosome pair is twice the size of the medium pair (Smith et al., 1986).

REMARKS. Supraspecific taxonomy within the group *Tadarida* has been relatively unstable. The genus *Mops* has traditionally been considered a subgenus of *Tadarida* (see Ellerman and Morrison-Scott, 1951; Koopman, 1965); however, Freeman (1981) raised *Mops*, *Mormopterus*, and *Chaerephon* to generic status. She based her decision on multivariate analyses of phenetic measures which indicate natural groupings within *Tadarida*, and was confident that the historical subgenera are distinct enough to warrant their own generic status. LeGendre (1984) disagreed with Freeman (1981) and considered *Mops*, *Mormopterus*, and *Chaerephon* to be subgenera of *Tadarida* on the basis of tooth morphology, which he does not feel is adequately indicative of generic status. Peterson et al. (1995) use LeGendre's arrangement in their review of molossid species in Madagascar. Koopman (1994) concurs with Freeman and accords generic status to *Mops*, *Mormopterus*, and *Chaerephon*. He also recognizes two subgenera of *Mops*: *Xiphonycteris* and *Mops*.

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