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Cover: Dorsal view of Mantis Shrimp *Cloridina ichneumon* (Fabricius, 1798) & *Gonodactylus demanii* (Henderson, 1893). © Fisheries Research Station, Junagadh Agricultural University, Sikka.



## New record and update on the geographic distribution of the Egyptian Tomb Bat *Taphozous perforatus* (E. Geoffroy, 1818) in Cameroon

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**Abstract:** The Egyptian Tomb Bat *Taphozous perforatus* is an emballonurid whose presence in Cameroon is least known. While there are previous records in the country from Waza and Yabassi, they are contested. Available publications fail to mention the presence of this species in the country, thus more information is needed to evaluate its presence. Recently, five specimens were captured near a cave entrance in Bocklé, Garoua in the Sahelian zone of northern Cameroon, adding a new locality to the distribution of the species. The discovery of this roost unequivocally confirms the presence of this species in Cameroon and indicates that the species has a wide distribution in the country as a resident species. Detailed geographical distribution of this species in Africa, along with detailed descriptions and photographs of available specimens are provided.

**Keywords:** Chiroptera, Emballonuridae, Garoua, Sahelian zone, Waza, Yabassi.

The chiropteran or bat fauna of Cameroon has received much attention in recent years (Bakwo Fils 2009, 2010, 2014; Bakwo Fils et al. 2012, 2014, 2018; Hassanin 2014; Lebreton et al. 2014; Atagana et al. 2018; Mongombe et al. 2019; Waghiiwimbom et al. 2019; Manfothang et al. 2020). Additionally, many voucher specimens from the country are deposited in

museums around the world. Despite the increase in knowledge of bats, most publications do not provide detailed distribution of species. As a result, information on most species remains fragmentary and this hinders the development of sustainable conservation plans (Bakwo Fils 2010; Bakwo Fils et al. 2018). Most of the recent studies have yielded new records and even new species (Sedlacek 2006; Bakwo Fils 2009; Bakwo Fils et al. 2012, 2014; Hassanin 2014; Lebreton et al. 2014). Yet, information on the ecology of many species in Cameroon remains scarce or unavailable (Bakwo Fils et al. 2018).

*Taphozous perforatus* is an insectivorous bat of the family Emballonuridae, suborder Yangochiroptera (Teeling et al. 2005). According to African Chiroptera Report (2018), the genus *Taphozous* comprises five species, of which three occur in Cameroon; these include *Taphozous mauritanus*, *T. nudiventris*, and *T. perforatus*. The Egyptian Tomb Bat *Taphozous perforatus* is a medium-sized bat with a grey-brown dorsal and ventral pelage and a gular pouch in males (Happold 1987). It is distributed in western and eastern Africa where it has

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been recorded from Egypt, and through Sudan to South Africa (Taylor 2013; African Chiroptera Report 2018).

The geographic distribution of this species in Cameroon is subject to contradiction according to literature. According to Taylor (2013) and the IUCN Red List (Monadjem et al. 2020), this species has not been recorded in Cameroon. However, the African Chiroptera Report (2018) mentions one specimen of *T. perforatus* captured in Yabassi, Littoral Region of Cameroon, collected by Thys Van den Audenaerde & Opendenbosch on 15 April 1970. The specimen was deposited at the Royal Museum for Central Africa (RMCA 1973 029-M-0094). Moreover, two of the three specimens collected by W. Böhme & W. Hartwig in Waza, northern Cameroon (Eisentraut 1975) were examined at the Museum Alexander Koenig of which, one female was captured on 10 February 1974, and one male was captured on 12 February 1974 (ZFMK MAM 1974-0331, ZFMK MAM 1974-0330).

Although the species is widely distributed throughout sub-Saharan Africa, the Arabian Peninsula, and the Indian subcontinent, its presence in Cameroon was uncertain. Here, we report evidence of a new locality to the distribution of the species in the country and provide the first verifiable record of this species in Cameroon. We also provide a morphometric comparison between the recent specimens and museum vouchers. Details on its geographical distribution in Africa, with descriptions and photographs of our specimens are provided.

**MATERIAL AND METHODS**

The specimens were captured at Bocklé, a locality near Garoua, north region of Cameroon (09.303°N & 013.575°E) during surveys to determine the species of bats occurring in the area. The climate is described as Sudano-Sahelian, with low savanna, characterized by a long dry season and short rainy season. A main rainfall peak generally occurs in October (Suchel 1988).

Mist nets (four 12 × 2.5 m - Ecotone Poland), were deployed and left open from 18.00–24.00 h at the entrance of the cave. The nets were checked every 15 minutes to reduce severe entanglement of any captured bats. Captured bats were carefully removed and placed individually in airy cloth bags and weighed using an electronic balance (500 x 0.1 g, Ohaus). Morphometric measurements (mm) were taken in the field using a dial calliper (Ecotone-Poland 150/0.1 mm) and were used for identification: head body length (HBL), tail length (TL), forearm length (FA), ear length (EL), tragus length (TrL), and tibia length (TIB). The presence or absence of a gular pouch was used to determine the species' identity (Rosevear 1965; Hayman & Hill 1971) (Image 1). The coordinates of the capture site were recorded using a handheld GPS (Garmin eTrex 10). Additionally, the presence of a hairy chin, wings attached to the tibia, hairs on the lower belly, and posterior back were also used for identification (Bates & Harrison 1997; Taylor 2013).

After identification in the field, three individuals

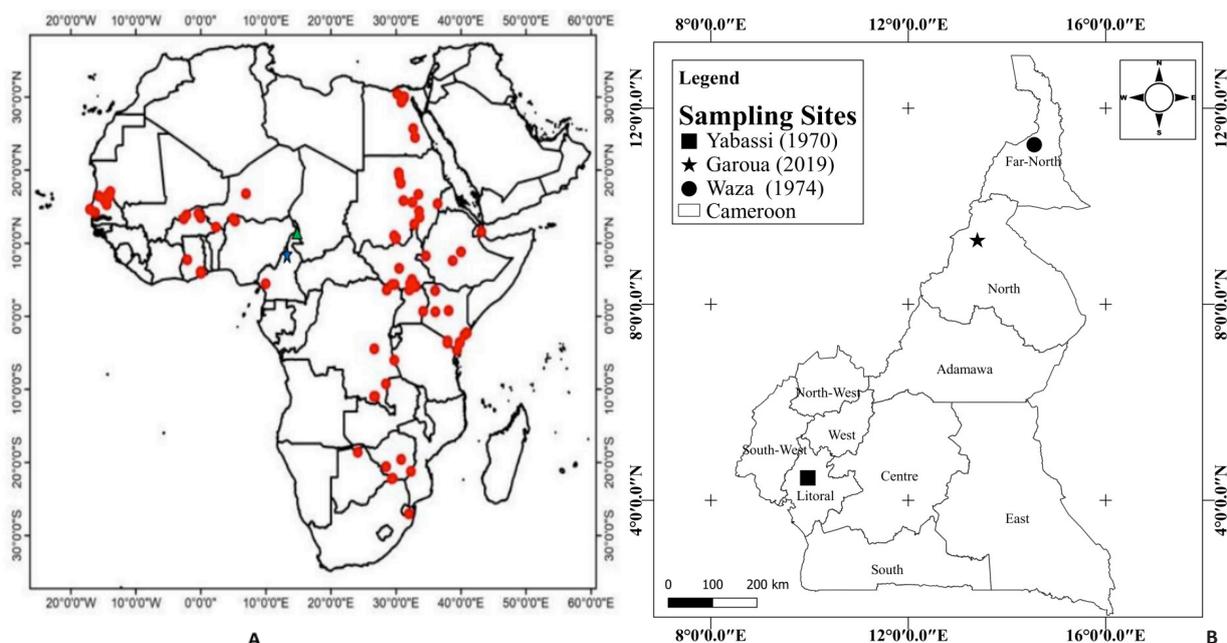


Figure 1. A—Distribution of *Taphozous perforatus* in Africa according to ACR (2018), including the records of Waza (indicated by a triangle) and the recent record in Garoua (indicated by a star) | B—Current known distribution of *Taphozous perforatus* in Cameroon.

were released and two specimens (one female and one male) were euthanized and kept in 70% alcohol for further examination of craniodental characteristics. The greatest length of the skull (GLS), condylo-canine length (CCL), condylo-basal length (CBL), mastoid breadth (MB), maxillary tooth row (C–M<sup>3</sup>), mandibular tooth row (C–M<sub>3</sub>), mandible length (ML), interorbital constriction (IC), mandible length (ML), width across canines (C–C), and the cranio-canine length (CrnC) were measured. These specimens were deposited in the collection of the Laboratory of Zoology of the University of Maroua, Maroua, Cameroon under the voucher number GAR568 and GAR570. The measurements of our specimens were compared with those in the Chiroptera collection of the Zoological Research Museum Alexander Koenig (ZFMK), Bonn, Germany (Table 1).

## RESULTS AND DISCUSSION

Five individuals of *Taphozous perforatus* were captured using a mist-net on 13 October 2019 at about 08.23 h at the entrance of a cave in Bocklé, near Garoua, northern Cameroon. Our specimens had a greyish-brown dorsal pelage (Image 2) and greyish-white ventral pelage (Image 1), with forearm length between (FA: 60.92–65.16 mm). The head was pointed, large pointed ears with a hatchet-shaped tragus, and a poorly developed lobule at the base of the posterior margin (Image 2).

The Tomb Bat (*Taphozous* E. Geoffroy, 1818) is different from all other emballonurids by the presence of a radio-metacarpal pouch and tragus not parallel-sided (Monadjem et al. 2010). *Taphozous* bats can also be distinguished from other emballonurids by the profile of the forehead being strongly concave; FA: 56–79 mm, and the upper incisors being minute and often absent (Rosevear 1965; Taylor 2013). Within Africa, the genus *Taphozous* comprises five species, of which three species occur in Cameroon (African Chiroptera Report 2018) namely the Mauritian Tomb Bat *Taphozous mauritanus* E. Geoffroy, 1818; the Naked-rumped Tomb Bat *Taphozous nudiventris* Cretzschmar, 1830, and the Egyptian Tomb Bat *Taphozous perforatus* E. Geoffroy, 1818. The Egyptian Tomb Bat *Taphozous perforatus* occurs throughout western and eastern Africa. It is recorded continuously from Egypt, Sudan to South Africa (Taylor 2013; African Chiroptera Report 2018). The geographic distribution of this species in Cameroon is subject to confusion. Taylor (2013) and Monadjem et al. (2020) did not mention the species in previous records in Cameroon. However, the African Chiroptera Report (2018) mentioned one specimen of *T. perforatus* collected in Yabassi, by Thys Van den Audenaerde &



**Image 1.** Ventral view of the *Taphozous perforatus* collected from “Grotte de Bocklé” Sahelian zone of northern Cameroon. The upper arrow indicates the hatchet-shaped tragus; the lower arrow indicates the absence of gular pouch. © Kingha 2019.



**Image 2.** The side view of *Taphozous perforatus* showing the hatchet-shaped tragus and the poorly developed lobule at base of posterior margin of the ear. © Kingha 2019.

Opdenbosch in 1970 (Figure 1A), which is housed in the Royal Museum of Central Africa (RMCA 1973 029-M-0094).

Simmons (2005) showed that there are four subspecies of *T. perforatus* recognized in Africa. *T. perforatus sudani* is the subspecies found in Cameroon (ZFMK MAM 1974-0331 & MAM 1974-0330). This species is listed as Least Concern (LC) on the IUCN Red List of Threatened Species. We identified the specimens collected in the Bocklé cave as *T. perforatus* based on morphometric and cranio-dental measurements. The Egyptian Tomb Bat is a medium-sized insect-eating bat in Africa and is distinguished from others *Taphozous* by the absence of a pronounced gular pouch; radio-metacarpal

**Table 1. External and craniodental measurements (mm) and mass (g) for *Taphozous perforatus* including specimens from our recent surveys and ZFMK specimens. Males and females presented separately. (n—number of specimens)**

Measurements (mm)	Males		Females	
	Present study (GAR570)	ZFMK MAM 1974-0330	Present study (GAR568)	ZFMK MAM 1974-0331
Head Body (HBL)	60.07	80	56.87–69.7 (n = 5)	[82]
Forearm (FA)	63.29	[64.2]	60.92–65.16 (n = 5)	[59.15]
Tail length (TL)	24.11	29	17.67–26.78 (n = 5)	[24.26]
Ear length (EL)	17.02	18	16.5–18.9 (n = 5)	[14.4]
Tragus length (Trl)	4.03	[3.91]	4.78–5.07 (n = 5)	[4.71]
Tibia length (TIB)	24.26	-	23.8–26 (n = 5)	-
Weight (W) in grams (g)	32	-	27–35 (n = 5)	-
Greatest length of skull (GLS)	21.04	19.66	20.12	20.61
Condylo-canine length (CCL)	18.26	19.64	19.32	19.52
Condylo-basal length (CBL)	20.21	-	18.39	-
Mastoid breadth (MB)	9.33	11.08	8.81	10.99
Mandibular tooth row (C–M <sub>2</sub> )	8.96	10.3	9.24	9.23
Maxillary tooth row (C–M <sup>3</sup> )	8.31	8.73	8.28	8.34
Interorbital constriction (IC)	5.82	5.17	7.38	5.13
Mandible length (ML)	15.37	15.73	15.19	15.55
Width across canines (C-C)	3.53	-	3.84	-
Cranio-canine length (CrnC)	19.68	-	19.17	-

[ ] skin measurements on dry specimen

pouch present in both sexes; body weight of 20-39g; sexes similar; and wings attached to the tibia (Rosevear 1965; Roberts 1997; Mahmood-ul-Hassan et al. 2009, 2012; Taylor 2013). The braincase is rounded and elevated above the level of the rostrum, with distinct frontal depression, flanked by anterior (lacrimal), and posterior (postorbital bar) inflations of bones on each side of the rostrum (Monadjem et al. 2010). The body and cranial measurements of our specimens do not exceed the published range as reported by Rosevear (1965), Hayman & Hill (1971), Patterson & Webala (2012), and Taylor (2013).

The cave from where the present specimens were captured contained two species of bat, the upper entrance is occupied by *Nycteris arge*, and the deep and lower entrance is occupied by *Taphozous perforatus*. The same roost was visited twice, on 25 October 2019 and 25 November 2019, when these species were observed. The area is covered by moist savanna with ambient temperature varied between 28–45 °C. This is in line with studies conducted by Bohra (2011) who reported that *T. perforatus* avoids areas with low temperatures. Indeed, Monadjem et al. (2010) and Taylor (2013) mentioned this species in open woodland savannas and flooded savannas (e.g., Sahel Savanna, Sudan Savanna,

Guinea Savanna) where suitable day-roosts are present. It roosts by crawling into dark crevices in rocky outcrops and caves (Smithers 1971; Smithers & Wilson 1979), where it forms small groups (Monadjem et al. 2010). The discovery of the roost of *Taphozous perforatus* in Garoua is therefore not surprising and re-affirms the species presence in Cameroon (Figure 1B). According to Taylor (2013), records of this species' distribution in Africa are extremely scarce.

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