Mammalia 76 (2012): 227–229 © 2012 by Walter de Gruyter • Berlin • Boston. DOI 10.1515/mammalia-2011-0009

Short Note

An extralimital record of the Egyptian tomb bat *Taphozous perforatus* from Pakistan

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Keywords: Attock; echolocation; monitoring; morphology; *Taphozous nudiventris; Taphozous perforatus*.

Two species of sheath-tailed bats (*Taphozous* Geoffroy, 1818) have been recorded in Pakistan (Bates and Harrison 1997, Roberts 1997, Mahmood-ul-Hassan and Nameer 2006, Srinivasulu et al. 2010). These are the Egyptian tomb bat (*Taphozous perforatus* Geoffroy, 1818) and the naked-rumped tomb bat (*Taphozous nudiventris* Cretzschmar, 1830). The naked-rumped tomb bat is widely distributed in the world, ranging from Mauritania and Senegal to Botswana, Mozambique, Somalia, Djibouti, and Egypt, S Arabia, Jordan, S Iran, NW India and Pakistan (Simmons 2005) where it is uncommon and restricted to the southern part of the country (Roberts 1997). Simmons (2005) recognized three subspecies of *T. perforatus*. *Taphozous perforatus senegalensis* Desmarest, 1820 is the subspecies found in Pakistan that was recorded from Thatta district (24° 46.636′N, 67° 55.689′E) in Sindh by the Zoological Survey of Pakistan (Siddiqi 1961). Here, we report range extension of this subspecies further north (Figure 1) in the arid-subtropical region of Pakistan up to Attock (33° 28.644′N, 072° 43.638′E) and provide information on the habitat, structure of its echolocation call and body measurements. Since no *T. perforatus* specimen is preserved anywhere in Pakistan (Roberts 1997), we provide the first locally verifiable record of the species from Pakistan.

The specimen was captured during field work on September 30, 2009 at 11:00 from a 30 m hillock that lies approximately 2 km away from Tanaza Dam (33° 27.594′N, 072° 44.066′E) in Attock district. The same roost was visited twice in December 18, 2009 and March 27, 2010 but no bat of any species was observed.

The roost is located in a rugged area with numerous valleys and steep slopes. Limestone rocks are characteristic features of the region though shale, clay and sandstone are also present. The climate is subtropical semi-arid and experiences two rainy seasons. Winter rains last from January until March, and summer rains from July to September. Temperature ranges from 1 to 15°C in winter and 20 to 40°C during the summer. Annual average rainfall is 1000 mm (Hussain and Ilahi 1991).

Bats (n=50 ca.) were roosting in a fissure (3 cm at the base and 20 cm at the top) that was open to the sky. They were very sensitive to human presence and in spite of tip toeing, the majority flew away while the fissure was being covered with a locally made nylon net (mesh size 2 cm^2).

A total of four bats were captured and identified on the basis of the difference of their body size, forearm length, presence or absence of hairs on their lower belly and posterior back (Bates and Harrison 1997). Three specimens (MMH 300909.1, MMH 300909.2 and MMH 300909.3) having naked chin, gular pouches, hairless skin on their lower belly and posterior back, and forearm length >70 mm were identified as *Taphozous nudiventris* while the fourth one (MMH 300909.4) with hairy chin, hairy lower belly and posterior back, wings attached to tibia and smaller forearm length (63.0 mm) was identified as *Taphozous perforatus* in the field (Bates and Harrison 1997, Roberts 1997, Mahmood-ul-Hassan et al. 2009).

The four bats were brought to the laboratory for further examination. They were released in a room (4.4 m×3.3 m×2.9 m) at night, one by one, for recording their calls using a Petterson D1000X Bat Detector (Petterson Electronik AB, Uppsala, Sweden) but only *Taphozous perforatus* could be accurately recorded. We used BatSound 4 (Petterson Electronik AB, Uppsala, Sweden) to analyse signals and frequencies were measured from the spectrogram (256-point fast Fourier transform, Hanning window) (Ulanovsky et al. 2010). The highest frequency was 31.4±0.7 kHz (range: 30–32 kHz), the lowest frequency was 25.6±0.5 kHz (range: 25–26 kHz) and the frequency with maximal energy was 30.0±0.4 kHz (range: 29.4–30.5 kHz). Pulse duration and interpulse interval were 14.2±2.7 ms (range: 14.2–19.7 ms) and 69.3±27.8 ms (range: 42.7–122.2 ms) respectively. These call parameters were comparable to other studies (Dietz 2005, Benda et al. 2008, Ulanovsky et al. 2010) with only different pulse duration and interpulse interval. Recordings from Israel, Nile Valley and United Arab Emirates also show that calls are narrowband with two prominent harmonics, the lower harmonic end frequency of the lower frequency ranges between 27 to 29 kHz (Deitz 2005, Davis 2007). The difference in the call structure of our specimen may either be due to population difference or to recording conditions.

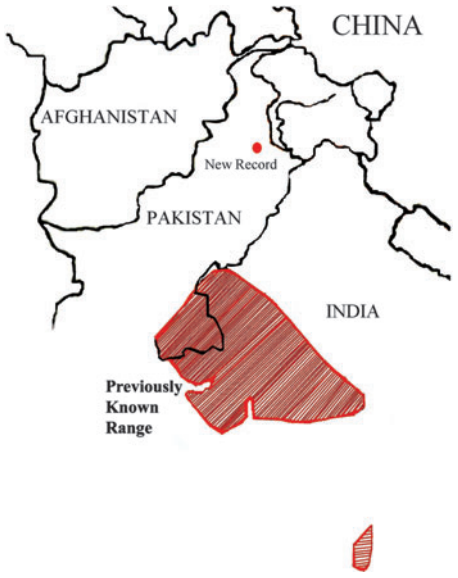

Figure 1 Distribution map of *Taphozous perforatus* in the Indian subcontinent.

The bats were then euthanized and measured (Table 1), skulls were prepared and their cranial measurements were recorded according to Bates et al. (2005). The dental formula was:

$$i\frac{1}{2}\ c\frac{1}{1}\ pm\frac{2}{2}\ m\frac{3}{3} = 30$$

Table 1 External body and cranial measurements of the Egyptian tomb Bat (*Taphozous perforatus*) and the naked-rumped tomb bat (*Taphozous nudiventris*) captured from Attock district in Pakistan (n is the number of specimens).

Body parameters	*T. perforatus* MMH 300909.4	*T. nudiventris* Mean±SD (n)
Head and body	80	83.3±10.5 (3)
Tail	26	18.5±3.3 (3)
Ear	18	11.3±0.6 (3)
Tragus	5	4.3±0.6 (3)
Forearm	60.8	71.3±1.7 (3)
Thumb	7	7.2±0.3 (3)
Claw	2	3.5±0.0 (3)
Third metacarpal	57	63.3±4.75 (3)
Fourth metacarpal	50	50.7±4.2 (3)
Fifth metacarpal	42	41.2±4.5 (3)
Wingspan	330	385.0±58.1 (3)
Hindfoot	12.5	14.7±1.2 (3)
Calcar	6.5	4.3±0.6 (3)
Greatest skull length	23.4	26.16±0.32 (2)
Condylocanine length	22.3	23.1±0.12 (2)
Zygomatic breadth	14.5	14.15±1.69 (2)
Mastoid breadth	12.6	10.87±0.18 (2)
Interorbital constriction	5.1	5.1±0.32 (2)
Maxillary tooth row	8.5	10.08±1.98 (2)
Mandibular tooth row	9.9	8.75±2.43 (2)
Mandible length	18.5	17.53±1.15 (2)

The headless specimens were preserved in the absolute alcohol in the BatLab, Department of Zoology and Fisheries, University of Agriculture, Faisalabad.

The body and cranial measurements of this *Taphozous perforatus* specimen are at the upper end of the range of this species. A comparison with specimens from Israel (Mendelssohn and Yom-Tov 1999), Egypt (Setzer 1952, Dietz 2005), Oman (Harrison 1968), Iran (DeBlase 1980), Pakistan (Roberts 1997, BM specimens 60.254-6 in DeBlase 1980), India (Brosset 1962), Indian subcontinent (Bates and Harrison 1997) and South Asia (Srinivasulu et al. 2010) exhibits clinal variations in body size. Clinal variations in body size of various mammalian species (e.g., rodents) enhance thermoregulatory capabilities (Brown and Lee 1969) and fasting endurance in climatically severe environments (Boyce 1978, Searcy 1980, Lindstedt and Boyce 1985, Millar and Hickling 1990).

The distance of this record from previous ones in Pakistan (Siddiqi 1961) and in India (Purohit and Senacha 2004) is approximately 1072 km and 748 km, respectively (Figure 1). While it was recorded co-roosting together with *Taphozous nudiventris*, *Rhinopoma hardwickii* and *Cynopterus sphinx* in abandoned buildings (Roberts 1997, Senacha et al. 2006), *Taphozous perforatus* was not reported from this region by Siddiqi (1961) and Roberts (1977, 1997), contrary to *T. nudiventris* and *R. hardwickii,* in spite of intensive assessment and monitoring.

So, range extension can be hypothesised. This has been recorded in India (Molur et al. 1998) where range recently extended from Gujarat north to Rajasthan (Molur et al. 1998). However, *Taphozous perforatus* has completely vanished from Jaisalmer (India) where over the past 50 years it has been replaced by *Taphozous nudiventris* (Purohit and Senacha 2004). The ambient temperature varied during the three visits from 29°C on September 30, 2009 down to 10°C on December 18, 2009, and was 16°C on March 27, 2010. *Taphozous perforatus* is reported to avoid low temperature (Bohra 2011) and migrate locally to overcome the effect of seasonal changes in micro-climatic parameters of their roosts (Bohra 2011). Surveys with a bat detector should be planned to confirm the seasonal or annual presence of the species in the region and in the suitable habitats of other parts of Indian sub-continent.

Acknowledgements

This study was jointly funded by the Higher Education Commission of Pakistan and The Rufford Small Grants Foundation, UK. The Financial support by these agencies is gratefully acknowledged. We are also grateful to the guide who helped us to locate the roost, editors and two anonymous referees who improved this manuscript.

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Received February 3, 2011; accepted February 15, 2012;
previously published online March 20, 2012