



Round-eared tube-nosed bat (*Murina cyclotis*) from Southwest Sri Lanka

Vesper bats (Family Vespertilionidae) are the most diverse bat family in Sri Lanka, represented by 12 species (Yapa & Ratnavira 2013, Yapa 2017, Edirisinghe *et al.* 2018, Kotagama & Goonatilake 2019). The round-eared tube-nosed bat, *Murina cyclotis* is one of the rarest vesper bats (Yapa 2017). The species is distributed in South and Southeast Asia (Corbet & Hill 1992, Bates & Harrison 1997), and it belongs to a cryptic species complex (Francis *et al.* 2010, Soisook *et al.* 2013). The distribution range of *M. cyclotis* is patchy and in Sri Lanka it is known only from a few localities (Phillips 1932, 1935, 1980, Bates & Harrison 1997, Menon 2003, Francis 2008). Given its widespread range, it is listed as Least Concern in the International Union for the Conservation of Nature (IUCN) Red List, whereas the National Conservation Assessments of Sri Lanka listed *M. cyclotis* as Near Threatened (NT) (IUCN-MOE 2012). Here, we provide a new site record for this species from southwestern Sri Lanka.

The range extension is from the vicinity of an ancient Buddhist monastery, Bambaragala Aranya Senasanaya (6.512750° N, 80.748667° E, alt. ~150 m a.s.l.) in Pallebedda, Ratnapura District, Sabaragamuwa Province, Sri Lanka (Fig. 1). The locality is in the lowland intermediate bio-climatic zone (annual mean rainfall is 1500–2000 mm and temperature is 27.8–29.6 °C). Visual encounter surveys were carried out for a period of six days (25–30 July 2016) in dry-mixed evergreen forests in the monastery grounds involving four trained field biologists, during both the day (08:00–14:00 h) and night (18:00–21:30 h). Microbats encountered at the site were captured using hand nets (net depth: 45 cm, net diameter: 30 cm, mesh size: 1.5 × 1.5 mm). For all bats captured, standard length measurements (following Srinivasulu *et al.* 2010) were taken using digital vernier callipers (Type RD 10) in the field.

Morphological characteristics and body coloration were also documented. The captured bats were identified to the species level based on Phillips (1935), Corbet & Hill (1992), Bates & Harrison (1997), and Srinivasulu *et al.* (2010) prior to releasing. Air temperature and relative humidity were measured using a multi-digital hygrometer (TA-138, China), and wind speed using a digital anemometer (MS-6252-A, China). A Garmin Etrex handheld GPS receiver was used to georeference the roosting sites.

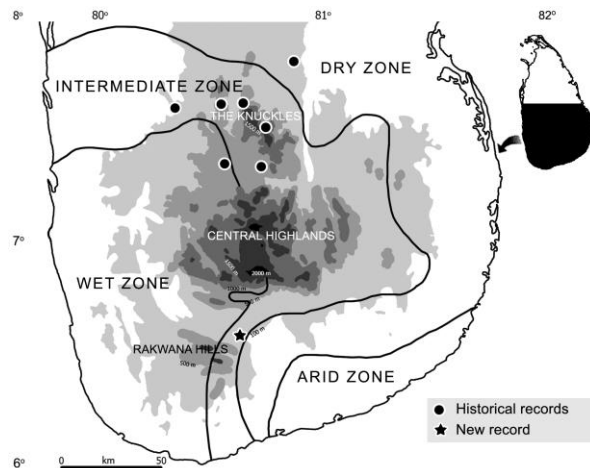


Figure 1. Distribution of *Murina cyclotis* in Sri Lanka. Historical locations are based on Phillips (1935), Bates & Harrison (1997), Yapa & Ratnavira (2013), Yapa (2017); Map © A.A.T. Amarasinghe

Two specimens of *M. cyclotis* (male and female) were captured at 10:19 h on 27 July 2016, while they were roosting on the underside of a large, dry leaf of narrow woolly-stipuled lotus croton, *Macaranga peltata* (Family Erythroxylaceae). This roosting site (1.8 m in height) had about 45–60% canopy cover. During the time of observation, the wind speed was 0.72–1.44 km/h (average 1.68 km/h), ambient temperature was 26.8–28.2 °C (average 26.7 °C), and humidity ranged between 69–76% (average 69.5%). The bats remained in this roosting site during the daytime and emerged to forage in the evening (18:45 h). These individuals flew very slowly along a walking

trail about one meter above the ground. They had golden fur coloration throughout the body (Fig. 2). The morphometric variables and morphological characteristics are provided in Tables 1 and 2. In addition to *M. cyclotis*, *Rhinolophus rouxii*, *Hipposideros speoris*, *Megaderma spasma*, *Kerivoula picta* and *Cynopterus sphinx* were also observed foraging along the same footpath. Our observations of *M. cyclotis* are in agreement with the current knowledge of its autecology. In South Asia, this species is considered a forest dweller and roosts among leaves of cardamom plantations nested in forested landscapes as well as in caves in small colonies (Molur *et al.* 2002, Yapa 2017). Its low-flying behaviour while foraging has also been recorded elsewhere (Bates & Harrison, 1997, Aul *et al.* 2014). Both the habitat and the regional landscape in the study area can be described as predominantly forested lands (Fig. 3), which matches the previous observations in

Southeast Asia and mainland South Asia where *M. cyclotis* occurred in less-disturbed lowland forests and lower montane forests (Phillips 1932, 1935, Nowak 1991, Rickart *et al.* 1991, Ruedas *et al.* 1994, Yapa & Ratnavira 2013).

However, this species had previously been recorded in Sri Lanka only from Gammaduwa, Mousakanda, Kandy, and Matale (Phillips 1935); Medamahanuwera (Bates & Harrison 1997); Kurenegala (Yapa & Ratnavira 2013); and Wasgamuwa (Yapa 2017). Most of the historical records (before 1970) were reported in and around the central highlands of Sri Lanka. Thus, our observation is the first record for this species from the lowland forests of the intermediate bioclimatic zone of Ratnapura District in the south of the island. Based on our observations and earlier records (Bates & Harrison 1997, Phillips 1935, Soisook *et al.* 2013), *M. cyclotis* is likely a species restricted to forested areas, including secondary forests.

Table 1. Morphometric variables recorded from *Murina cyclotis* specimens from the Bambaragala Aranya Senasanaya, Sri Lanka, and comparisons with Phillips (1935) and Bates & Harrison (1997); measurements in mm; — not measured.

Measurement	This study		Phillips (1935)		Bates & Harrison (1997)
	Male (n=1)	Female (n=1)	Male (n=10)	Female (n=2)	Males and Females (n=unknown)
Head and Body length	41.1	44.2	46.0–48.0	48.5	38.0–50.0
Ear length	14.5	13.6	14.0–15.0	13.7–15.5	13.0–16.0
Ear width	9.1	8.4	—	—	—
Tragus length	7.7	6.1	—	—	—
Tragus width	2.1	1.6	—	—	—
Forearm length	31.9	32.0	30.6–31.0	32.5–33.0	29.7–34.5
Thumb +1 st claw length	6.8	8.3	—	—	—
2 nd metacarpal	27.2	27.7	—	—	—
3 rd metacarpal	30.2	30.3	—	—	27.3–32.3
4 th metacarpal	29.3	28.6	—	—	27.1–31.5
5 th metacarpal	29.7	29.7	—	—	27.6–32.0
1ph 3mt length	13.5	14.4	—	—	—
2ph 3mt length	16.5	18.3	—	—	—
1ph 4mt length	10.1	10.5	—	—	—
2ph 4mt length	9.9	10.3	—	—	—
1ph 5mt length	9.9	10.1	—	—	—
2ph 5mt length	9.4	10.2	—	—	—
Wingspan length	220.0	220.0	229.0	—	—
Penis length	3.4	—	—	—	—
Penis width	1.5	—	—	—	—
Testicle length	1.8	—	—	—	—
Testicle width	1.7	—	—	—	—
Tibia length	17.4	17.6	—	—	—
Calcar length	12.5	19.0	—	—	—
Hind foot length	7.3	9.1	6.8–8.0	8.0–9.0	7.0–10.0
Tail length	29.0	32.5	33.2–34.0	34.0	32.0–41.0

Plate 64

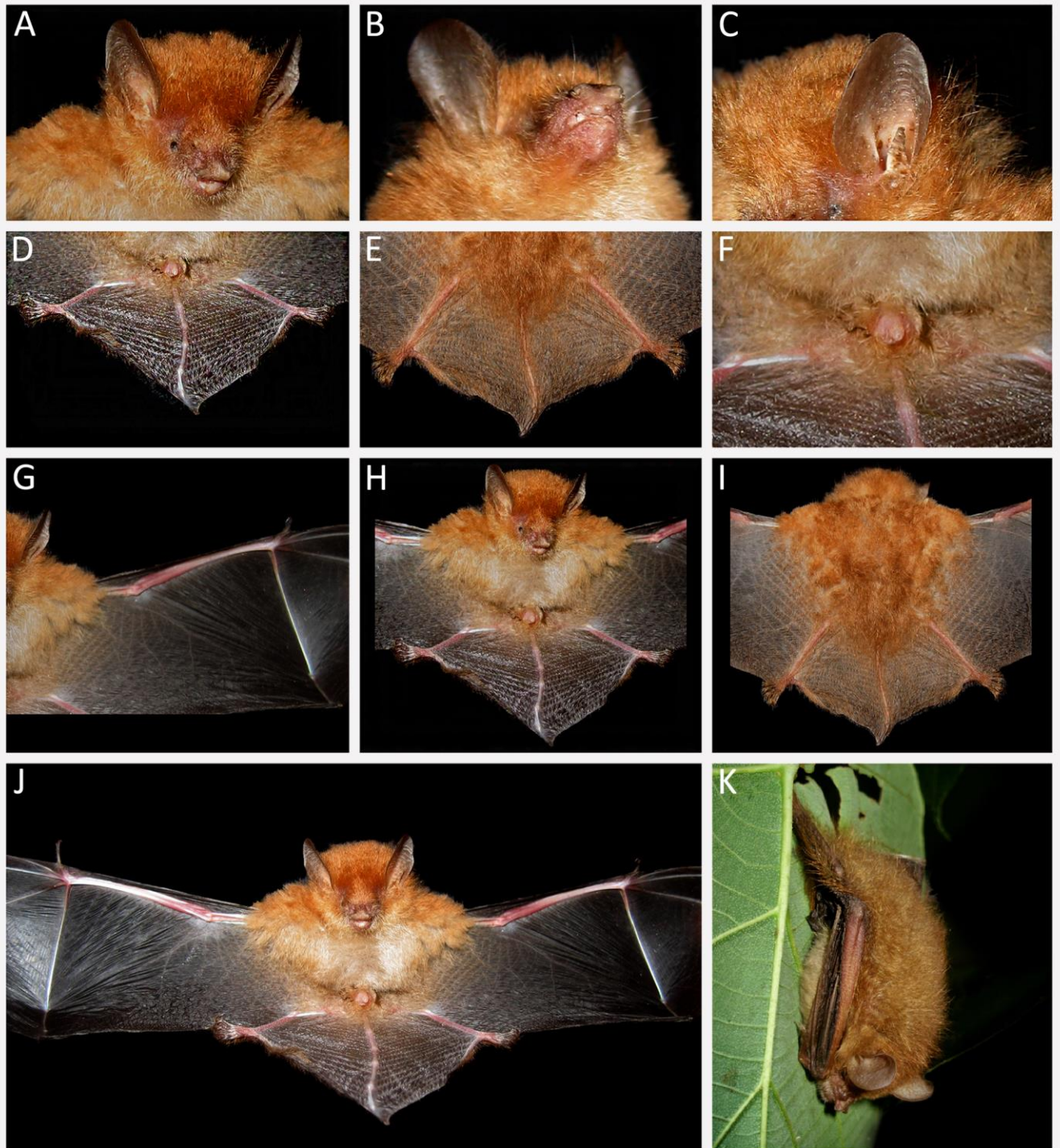


Figure 2. Unique characters of *Murina cyclotis* specimen (a male) recorded from Bambaragala, Sri Lanka: (A) facial structure, (B) throat area [see the fur colour], (C) external ear lobe and tragus; (D) ventral and (E) dorsal aspects of the semitransparent interfemoral (tail) membrane, (F) short light brown hairs around penis and the scrotum, (G) ventral aspect of the wing membrane (patagium); (H) ventral and (I) dorsal aspects of the body including the proximal parts of the patagium, (J) ventral aspect of the expanded wings; and (K) a different individual (a female) at the roosting site, on a *Macaranga peltata* tree (Family Euphorbiaceae).

Table 2. Detailed morphological features of *Murina cyclothis* recorded from the Bambaragala Aranya Senasanaya area, Sri Lanka.

Morphological character	Male	Female
Nose shape		tubular nostrils
Head	muzzle relatively long, blunt but rather narrow; eyes rounded and small	
Ears	relatively large and rounded; orange gold colour with few short hairs at base of ears	
Tip of the ear	orange gold colour with few short hairs close to the tip	
Tragus	long, narrow and tapering; narrow at the base, a small notch present at the base	
Dorsal area	dark orange gold hairs present on the head and body	
Ventral area	dark orange gold hairs present on nape and chest; abdomen area light orange to creamy yellow colour	
Breast (Nipple)	—	not well-developed. covered with light orange to creamy yellow colour hairs
Ante-brachial membrane		present
Radio-metacarpal pouch		absent
Wing membrane	dark orange gold to yellow with short hairs close to the body	
Forearms	upper surface with short, sparse dark orange gold with short hairs	
1 st metacarpal thumb	dark orange gold with short hairs	
2 nd -5 th metacarpals		naked
1 st -5 th phalanx		
1 st -5 th metacarpals		
Dorsal surface of tibia	dark orange gold with short hairs	
Interfemoral membrane (dorsal)	dark orange gold with short hairs	
Interfemoral membrane (ventral)	orange gold to yellow with short hairs	
Wing attached to	base of the claw of the outer toe	
Penis (Foreskin)	light orange gold to yellow with short hairs	—
Vagina	—	light orange gold to yellow with short hairs
Testicles	light orange gold to yellow with short hairs	—
Anus	light orange gold to yellow with short hairs	
Hind feet	well-developed and dark orange gold with short hairs	
Calcar	well-developed and dark orange gold with short hairs	
Tail	enclosed in inter-femoral membrane	

The distribution, taxonomy, ecology and the status of most of the chiropterans, especially microbats in Sri Lanka, are poorly known. Recent documentation of new site records and distribution of lesser known species of bats in Sri Lanka highlights the need for more extensive studies to understand the distribution and habitat preference of bats to augment historical records (Rubsamen *et al.* 2004, Nanayakkara *et al.* 2012, Edirisinghe *et al.* 2013, 2020a–b, Wellappulli-Arachchi *et al.* 2014). Such new studies will play a crucial role in the conservation of these species (Dittus 2017).

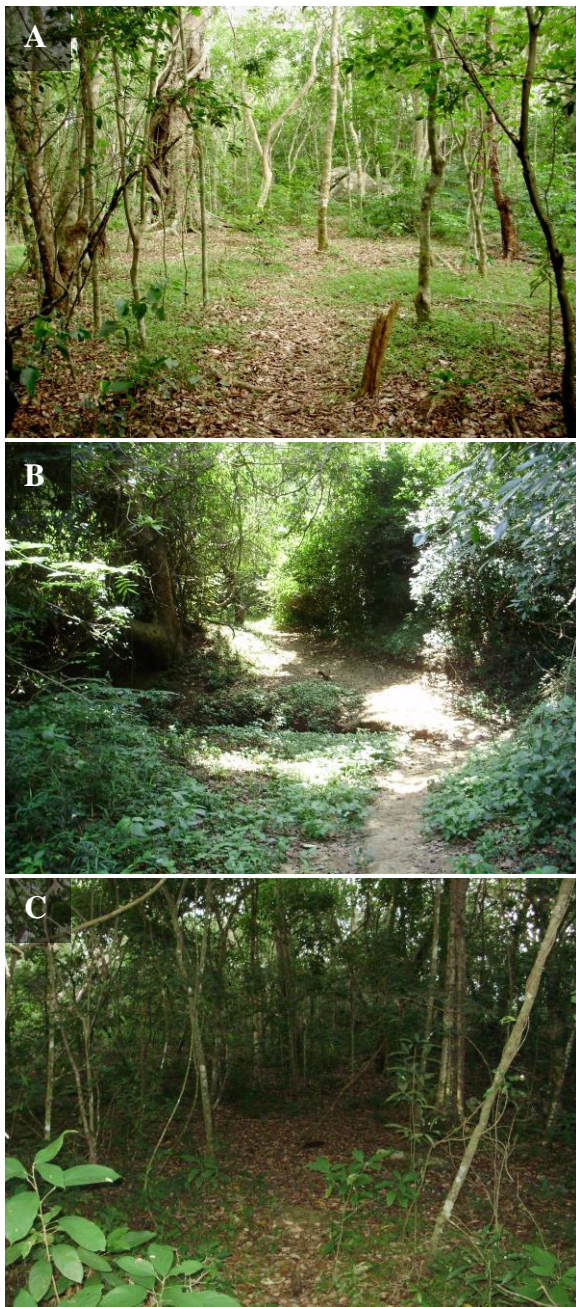


Figure 3. Some habitats of *Murina cyclotis* in Bambaragala, Sri Lanka: (A) tall forest, (B) dense forest along the foot path, and (C) dense shady forest.

Acknowledgements

We thank Ven. Weherawaththe Indrasumana Thero (chief incumbent) and other reverend theros of Bambaragala Monastery, Naveen Kumara, Dammika Wijesinghe and villagers for their support during the field work. Also, we thank Burton Lim (Royal Ontario Museum, Canada), Thasun Amarasinghe (University of Indonesia), Suranjan Karunarathna (NEET, Sri Lanka), and Philip Bowles (IUCN) for constructive comments that helped to improve the manuscript.

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Submitted: 5 March 2020, Accepted: 12 June 2020
Section Editor: Burton Lim

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Published date: 28 November 2020