

## ORIGINAL ARTICLE

## First record of dawn bat *Eonycteris spelaea* (Dobson, 1871) (Mammalia: Chiroptera: Pteropodidae) from western Nepal

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### ABSTRACT

This short note aims to document the first record of dawn bat *Eonycteris spelaea* from western Nepal. A single specimen was captured with a ground level mist net within Banpale forest of the Institute of Forestry (IoF) Pokhara on 1st April 2018. A total of five fruit bat species are now known to occur in Nepal, three of which within western Nepal. This paper presents the fourth record of *E. spelaea* for Nepal which is first documented occurrence for the Pokhara valley and western Nepal.

## INTRODUCTION

Old world fruits bats are members of the family Pteropodidae which is composed of 42 genera and around 182 species globally (Simmons 2005, Wilson & Mittermeier 2009), 13 of which occur around the Indian subcontinent (Srinivasulu et al. 2010). Five species of Pteropodids are known to occur in Nepal, four of which are relatively widespread: *Eonycteris spelaea*, *Pteropus giganteus* (Brünnich, 1782), *Rousettus leschenaultii* (Desmarest, 1820) and *Cynopterus sphinx* (Vahl, 1797). There is no definitive record of *Sphaerias blanfordi* (Thomas, 1891) however it is suggested to occur in eastern of Nepal (Leekagul & McNeely 1977, Acharya et al. 2010). Of these five, three species have been previously recorded in western Nepal and in Pokhara valley: *R. leschenaultii*, *P. giganteus* and *C. sphinx* (Acharya et al. 2010).

*E. spelaea* was initially only known from Myanmar, Thailand, Laos, Vietnam, Cambodia, Malaysia, Indonesia, Philippines (Blanford 1891, Ellerman & Morrison-Scott 1951) and India (Bates & Harrison 1997). In Nepal, this species was recorded for the first time in 2000 from the vicinity of Nepal Conservation Research and Training Centre Sauraha, Chitwan, at an elevation of 200m a.s.l. and at Dhangari Khola, Tiger Tops (33km west of Sauraha) (Myers et al. 2000). Following this, the species was recorded at two caves (Bhairav and Main cave) located within the Khotang district by Thapa (2012), at an elevation of 1373m a.s.l. This was the first colony record of *E. spelaea* in Nepal and the second species distribution record for the country. Lastly, it was recorded from Shaktikhor, Chitwan by Acharya et al. (2015)

whilst identifying the bat species hunted by the Chepang community (traditional bat hunters of Nepal). Subsequently, there have been no more documented sightings of the species in Nepal. It is listed as Least Concern in IUCN Red List (Francis et al. 2008) however, due to the limited records of *E. spelaea* in Nepal, and thus a limited understanding of its national population, it is categorized as Data Deficient within the National Red List (Jnawali et al. 2011). Here we report the presence of *E. spelaea* for the first time in Pokhara, Kaski. This is the only known species of the genus *Eonycteris* recorded in Nepal (Acharya et al. 2010) or elsewhere within Southern Asia (Nameer et al. 2016, Srinivasulu et al. 2010).

## METHODS

The study was conducted at the Banpale forest of Tribhuvan University, Institute of Forestry (IoF) Pokhara (located in Hariyokharka, Pokhara, Kaski district, Nepal). This study was part of a training program (Bat Capturing, Handling and Identification) undertaken by the members of Bat Friends Pokhara under the project "Bats Survey and Conservation Outreach Programs along Kaligandaki Canyon of Nepal" funded by Rufford Foundation, UK in 2017. The total extent of the institute is 50ha; of which 30ha is forested. The forest is unlogged (however firewood collection is prominent) and largely dominated by *Castanopsis indica* (Roxb. ex Lindl.) A.DC., *Schima wallichii* Choisy, *Bombax ceiba* L., *Dalbergia sissoo* DC., *Michelia champaca* L., *Diploknema butyracea* (Roxb.) H.J.Lam and *Dendrocalamus* sp.

Two sizes of mist net (height 2.6m, length 4m and 6m, and 38mm mesh) were deployed to capture the bats

>50cm from ground level across the forest trail near (50m from) *Diploknema butyracea* trees. Mist nets were left open from 6:00 PM to 9:00 PM and continuously checked at an interval of 10 minutes to reduce severe entanglement of captured bats. External morphometric measurements were taken using a vernier caliper (0.01mm accuracy). The measurements taken include the head and body length (HB), forearm length (FA), ear length (EL), tail length (TL), hind foot length (HF), wingspan (WSP), tibia length (TIB), 3rd meta tarsal and phalanges length (3mt, 1ph3mt, 2ph3mt), 4th meta tarsal and phalanges length (4mt, 1ph4mt, 2ph4mt) and 5th meta tarsal and phalanges length (5mt, 1ph5mt, 2ph5mt). The body weight (BW) was measured using a pesola spring balance (1gm accuracy). The species was identified using “Bats of Nepal: A field guide book” (Acharya et al. 2010) and Bates & Harrison (1997).

## RESULTS

A single sub-adult male *E. spelaea* was caught in Banpale forest of IoF Pokhara (28°11'15.2"N, 83°59'26.9"E) at an elevation of 798m a.s.l. on 1st April 2018 at 7:45 PM (2 hours after sunset) in full moon light. The morphometric measurements are provided in Table 1 and the updated distribution map of *E. spelaea* is provided in Fig. 1.

The specimen was released at the point of capture and no genetic analysis was conducted. We identified the species using the following morphological characteristics; 1) the absence of claw on 2nd digit, 2) muzzle length, 3) tail length and 4) the presence of the anal glands. *E. spelaea* is a medium-sized fruit bat resembling *Rousettus sp.* but differs characteristically by the absence of a claw on second digit,

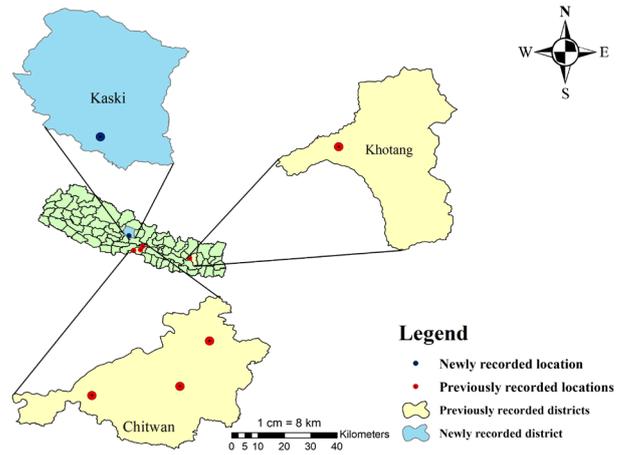


Fig. 1 - Updated distribution map of dawn bat *Eonycteris spelaea* from Nepal. // Source: Bajracharya (2013), Map of Nepal 2010: ICI-MOD, created using Arc GIS 10.3.1

which was confirmed for this specimen and subsequently verified before its release. The muzzle was also comparatively elongated as in *R. leschenaultii* (Fig. 2). The tail was short (but longer than *R. leschenaultii* or *C. sphinx*) and its tip protruded from the interfemoral membrane (Fig. 2). Large, kidney-shaped glands were present on either side of the anal opening (Fig. 2). The pelage was short, velvety and flat to the skin, colored dorsally dark-brown and ventrally mottled grey-brown. The muzzle and the tibia were naked. The wing membranes were uniformly dark brown and underside of the forearm was moderately hairy (Bates & Harrison 1997).

Table 1. The morphometric measurements of *E. spelaea* from Banpale forest of IoF Pokhara, Kaski, Nepal.

Parameters	Measurements (mm)	Acharya et al. 2010
FA	71.3	66.0-78.0
HB	99.5	92.0-130.0
TL	10.6	10.5-23.0
HF	17.9	17.0-21.0
EL	19.9	16.9–21.0 (Bates and Harrison 1997)
WSP	379.6	370.0-400.0
TIB	29.5	Not available
3mt	42.7	Not available
1ph3mt	32.1	Not available
2ph3mt	44.7	Not available
4mt	44.7	Not available
1ph4mt	22.4	Not available
2ph4mt	26.7	Not available
5mt	41.5	Not available
1ph5mt	21.4	Not available
2ph5mt	18.7	Not available
BW (gm)	68	Not available

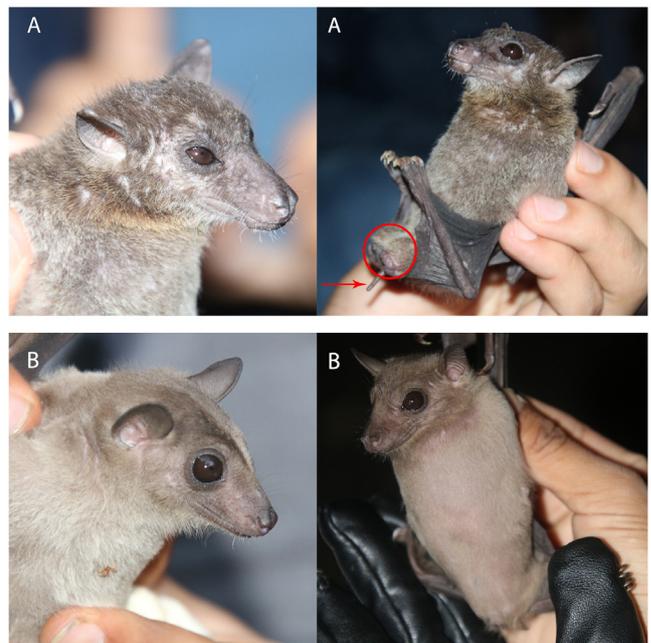


Fig. 2 - Dawn bat *Eonycteris spelaea* (A) captured from Banpale forest of Institute of Forestry (IoF) Pokhara, Kaski, Nepal with *Rousettus leschenaultii* (B) captured from Ranipauwa, Myagdi, Nepal during the project under Rufford Roundation, UK. Kidney shaped anal glands (red circle) and tail (red arrow) // Picture credits: *E. spelaea* by Basant Sharma and *R. leschenaultii* by Anoj Subedi.

## DISCUSSION

The present finding of this species from Banpale forest is the western most record of *E. spelaea* from Nepal, representing the fourth report in the literature for the country (Myers et al. 2000, Thapa 2012, Acharya et al. 2015). With this note we confirm that *E. spelaea* is present within 3 of the 77 districts of Nepal; Chitwan (Myers et al. 2000, Acharya et al. 2015), Khotang (Thapa 2012) and Kaski (Fig. 1). This record infers that either the species has previously been overlooked or that it has extended its range. This supports the hope of finding this species further west in Nepal.

*E. spelaea* is a nectarivore and feeds on the nectar of *Diploknema butyracea*, *Oroxylum indicum* (L.) Kurz and *Musa sp.* (Acharya et al. 2010, Acharya et al. 2015), each of which is available at the site. The flower of *O. indicum* blooms during rainy season (May-August) (Kirtikar & Basu 2001), *D. butyracea* during winter season (January-March) (Dhakal 2014) and *Musa spp.* in all year round and their flowers produce sugary nectar. The bat was captured in April, during which month most of the flowers of *D. butyracea* were observed to have fallen to the ground (few remaining in tree branches), producing immature fruits in tree branches (fruits mature during June/July). This indicates *E. spelaea* might use IoF premises as foraging ground during the flowering season of *D. butyracea*. However, whether these bats feed during the flowering season of other plant species, as well as their food resource preferences, remains unknown and requires further study. Further research would also be needed to identify where this species is roosting.

Currently, all species of fruit bat found in the Pokhara valley have been recorded inside the IoF, Pokhara (Acharya et al. 2010). This site provides an abundance of food resources for fruit bats, such as *Diploknema butyracea*, *Elaeocarpus ganitrus* Roxb. ex G. Don, *Psidium guajava* L., *Carica papaya* L. and *Litchi chinensis* Sonn. These and other available tree species collectively may provide sufficient food resources for these bats which might be the reason for all fruit bat records, excluding *Sphaerias blanfordi*.

Pokhara valley also harbors plenty of food resources for *E. spelaea*. *D. butyracea* is scattered throughout parks such as Shanti Banbatika, premises of Prithivi Narayan Campus, government places including green pasture in Hariyokharka, public places along roadsides and several private home gardens. This indicates these areas may also provide suitable foraging habitat for *E. spelaea*. *E. spelaea* is cave dweller and known to travel long distances to forage (Acharya et al. 2015). Since the area contains numerous caves, Pokhara valley may provide roosting sites for *E. spelaea*. As of yet, most of these caves have not been surveyed for bats. To increase our understanding of this species' distribution and activity in Pokhara Valley, bat surveys within unexplored caves, at potential foraging sites and a more detailed study on the distribution of food resources is strongly recommended. With the first record of *E. spelaea* in Pokhara valley, this note now opens up new opportunities for further research to assess their abundance, and foraging behavior in this area. It also promotes further work to understand the key roles of fruit bats within this mosaic urban habitat and to alert the Pokhara valley to their additional responsibility

for this species conservation.

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