

## New breeding data on *Rhinolophus beddomei* in Sri Lanka: first record of juveniles

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**Abstract:** The lesser woolly horseshoe bat (*Rhinolophus beddomei*) is a forest dwelling species found throughout Sri Lanka, mostly restricted to old growth forest areas with small populations known, and listed as Vulnerable (VU) according to the National Red List. Two new forest roosting sites of this species were identified in the lowland wet zone within the Mahausakanda and Govinna regions of Sri Lanka's Sabaragamuwa Province and Western Province. Both roosts were found in small caves and were occupied by four individuals of *R. beddomei* including two juveniles in each site. These are the first time two pups per brood recordings of *R. beddomei* in Sri Lanka. Observations were made in April 2012 and March 2015 and it provides evidence that the first quarter of the year might be the breeding cycle of *R. beddomei*. However, the breeding behaviour of this species has not been thoroughly researched and further studies are required on the ecology of this species.

**Keywords:** Breeding, Lesser woolly horseshoe Bat, Rhinolophidae, *Rhinolophus beddomei*, Caves, Sri Lanka.

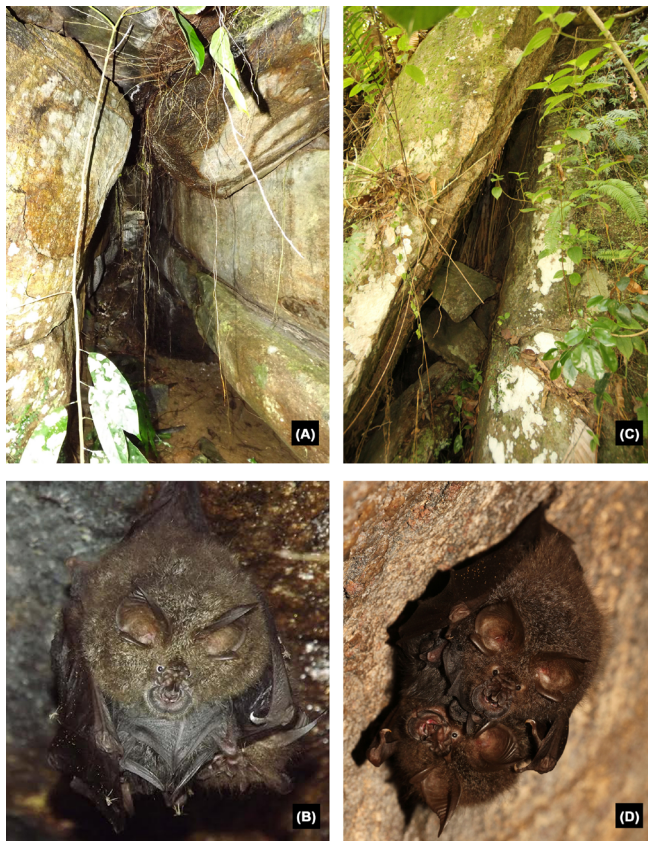
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## INTRODUCTION

Sri Lanka is a small Indian oceanic island with an area of 65,610 km<sup>2</sup> that provides habitats for a rich diversity of mammalian fauna (Yapa & Ratnavira 2013). Variable geo-climatic features and vegetation structure has generated differing patterns in the distribution of bats in Sri Lanka (Phillips 1935, 1980; Yapa & Ratnavira 2013). Sri Lankan chiroptera are represented by four species of Old World fruit bats belonging to the Pteropodidae and 26 species of micro-bats belonging to six families: Rhinolophidae, Hipposideridae, Megadermatidae, Molossidae, Vespertilionidae, and Emballonuridae (Bates & Harrison 1997; Corbet & Hill 1992). In Sri Lanka, there are two species of Rhinolophidae: *Rhinolophus beddomei* Anderson, 1905 (Lesser woolly horseshoe bat) and *Rhinolophus rouxii* Temmink, 1835 (Rufus horse-shoe bat). According to the IUCN Red List, the lesser woolly horseshoe bat is a Least

Concern (LC) species but it is listed as Vulnerable (VU) according to the National Red List of Sri Lanka (Srinivasulu & Molur 2008; MOE 2012).

*Rhinolophus beddomei* is a widely-distributed bat species in Sri Lanka (Bates & Harrison 1997; Menon 2003; Phillips 1935, 1980; Yapa & Ratnavira 2013). However, it is mostly restricted to old growth forest areas with small populations known. The species range extends from low to mid elevations (43 m in Kala-Oya and 1,077 m in Medamahanuwara) (Andersen 1918, Bates & Harrison 1997). They either live in pairs or in groups of three to four individuals roosting in hollow trees, small caves, abandoned houses, tunnels, culverts, deserted wells or from overhanging rocky outcrops in some isolated forest patches (Phillips 1935, 1980, Yapa & Ratnavira 2013). In term of reproduction previous studies shows that females may not breed until two or three years of age (Phillips 1935, 1980; Bates & Harrison 1997).



**Plate – 1:** (A) Roosting place in Mahausakanda Regenerating Rainforest, Kiriella (B) *Rhinolophus beddomei* roosting with two babies (C) Roosting place in Govinna, Bulathsinhala (D) *Rhinolophus beddomei* roosting with two babies.

We surveyed bat roosting sites via opportunistic field visits and Visual Encounter Surveys (VES) (Thomas & LaVal 1988; Thomas et al. 1979). Bat roosting sites were observed during daylight hours with the aid of head lamps using only the red light. Disturbances were kept to a minimum during the observations. Species identification was based upon Phillips (1935) and Bates and Harrison (1997). Magenta Bat 5 heterodyne bat detector was used to locate bats in the second observation site. GPS coordinates of bat roosting sites were taken on site. Phillips (1935) recorded a pregnant female of *R. beddomei* in January (this record did not provide a specific date) in Sri Lanka while a female with a pup was also previously observed in Kerala in Maharashtra (India) on 16<sup>th</sup> and 22<sup>nd</sup> May (Brosset 1962).

Our first observation was made on 26<sup>th</sup> April 2012 in the Mahausakanda regenerated forest (6°76' 68.9" N and 80°25' 38.4" E), Kiriella, Ratnapura District, Sabaragamuwa Province. This roosting location can be described as an enclosed, humid, small cave (2.1 m height, 1.2 m length and 1.2 m width) surrounded by an extensive network of rocky outcrops within a relatively undisturbed forest (human activities stopped 10 years ago); the cave was occupied by a group of *R. beddomei* (Figure A). The group was composed two adults and two juveniles; all roosting on the cave ceiling (Figure B). The juveniles had a dense black fur and were clearly at the suckling stage as they were clinging to the female's nipples. Their echolocation was recorded inside the cave (CF calls at 40.3-61.8 kHz).

The second observation was made on 16<sup>th</sup> March 2015 at Govinna (6°40' 01.3" N and 80°07' 39.9" E), Bulathsinhala, Kalutara District, Western Province. This roosting site was a partly-eroded, granite rock cave, substantially exposed to sunlight with canopy cover at 40 %, and located within a rubber estate (Figure C). This site was occupied by four individuals of *R. beddomei* with two adults and two juveniles (Figure D). The juveniles were clinging onto the females while the adult male was roosting nearby. Their echolocation was recorded inside the cave (CF at 41.0 - 63.5 kHz).

These observations are from the first half of the year and confirm that this period might be the breeding season for the species. Our study has reported the first juvenile sightings (four individuals in total, two in each group) of *R. beddomei* in Sri Lanka.

Most bats produce only one pup per brood; multiple broods are only found among Vespertilionids although most vesper bats produce a single pup but a significant minority can produce twins and few up to three (Altringham 2011). In the family Rhinolophidae, only one pup per brood has been recorded so far (Phillips 1935; Korad et al. 2010). In contrast, we recorded two pups in a brood of *R. beddomei* in Sri Lanka. Our observations have established the first records for the presence of two individuals in a given brood for this species in Sri Lanka. The brood size of bats can vary due to different reasons. According to Tuttle and Stevenson (1982), older, more experienced females tend to produce larger broods. Myers (1977) found that *Eptesicus furinalis* generally has two pups in its first annual cycle in Paraguay, but the second litter of the year, when food supplies are diminishing, invariably contains just one pup. The breeding pattern of *Rhinolophus rouxii*, a related species found in Sri Lanka, is well documented, as opposed to *R. beddomei*. Further studies are required on the reproductive ecology of both species to understand any patterns in brood size.

This study is highlighting the importance of this zone for the bats population, and the need of further development in bat research and monitoring at a local and national level.

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