



A breeding colony of the brown bat (*Myotis hasseltii*) from Sri Lanka

Myotis hasseltii (Temminck, 1840) variously known as the brown bat, Van Hasselt's bat, Van Hasselt's mouse-eared bat, or lesser large-footed myotis in the vernacular is a patchily distributed species; aside from Sri Lanka, within the Indian Subcontinent it is found only in West Bengal (Bates *et al.*, 2008). The brown bat is thought to be uncommon (Phillips, 1935 & 1980) and is a resident of land below the 1000m contour (Yapa & Ratnavira, 2013). It has been reported to roost alone or in small groups in bamboo clumps, cracks in tree bark, and in abandoned buildings. Mangrove swamps are another possible habitat for these bats. *M. hasseltii* likes living near water and flies low over streams, tanks (reservoirs), and mangrove swamps hunting for gnats, small flies, and mosquitoes (Phillips, 1935). Extralimitally, an individual of this species was found with fish remains in its stomach (Yapa & Ratnavira, 2013).

It was not encountered officially in the island since Phillips's records prior to 1935 (mostly because no one was looking) until 2005 when an individual was netted over the Minipe Irrigation Canal near Rantambe east of the Knuckles mountain massif (Yapa *et al.*, 2006), evidence perhaps of a breeding colony nearby. Phillips (1935) reports of its presence in Anuradhapura, Kappachchi, Vaalachchenai, and Yala National Park (this last caught in a fish hook while flying over a pool) in the past. This species was not recorded in the 2004 bat survey by the University of Colombo nor was it noted in a subsequent survey by Bandara (2004), Yapa & Ratnasooriya (2006), and Yapa *et al.* (2002). However, in 2012, observers reported the possibility of a breeding colony of this species at Yala National Park. Despite its apparent rarity in Sri Lanka, the IUCN (2008) deems the species of 'Least Concern' in terms of range-wide population numbers.

The study was conducted in the Knuckles region, Illukkumbura area (7°32'11.51"–7°32'18.16"N, 80°46'14.73"–80°46'26.95"E, alt. ~470m a.s.l.) located in the Matale District, Central Province of Sri Lanka. This is in the Intermediate climatic zone of the island. The study area was 2 km² in extent and encompassed altitudes between 420–480m. The area's vegetation was predominantly lowland semi-evergreen forest and there were hamlets along the Thelgamuwa Oya (stream), the observation site, involved in paddy and chena cultivation. The Thelgamuwa Oya drains northwest into the Amban Ganga system. The riverine forest height was 15–30m with a closed canopy. The forest here has high floristic richness dominated by evergreens such as *Terminalia arjuna* (Combretaceae), *Madhuca longifolia* (Sapotaceae), *Ficus racemosa* (Moraceae), *F. hispida* (Moraceae), *Diospyros malabarica* (Ebenaceae), and *Entada zeylanica* (Fabaceae).

The breeding colony of *M. hasseltii* was found during a biodiversity survey carried out by the Faculty of Applied Sciences, University of Rajarata. The discovery was serendipitous in that it occurred during a survey of local freshwater fish species; there was no specific effort to sample bats in the area. The bat colony was discovered beneath a bridge spanning the Thelgamuwa Oya in Ilukkumbura situated in the Raththota-Pallegama road. An adult male (Figs. 1, 2), determined through an examination of external morphological features, was found on 8 January, 2012 accidentally captured in a drag net used for sampling fish in the Thelgamuwa Oya. It was entangled by the net at around 18:35h. The bat was examined and all details required for identification recorded. All measurements were taken using a digital vernier caliper (Tables 1–2). Morphological characters and pelage colours were observed and recorded. A Canon 550D camera fitted with a Canon 18–55mm lens was used to photograph the animal. After recording the

necessary details the bat was released. References available to the authors at the time [Bates & Harrison (1997), Francis (2008), Phillips (1935, 1980), and Corbet & Hill (1992)] were used to confirm field identification. After its discovery, the colony was observed by the authors during the above-mentioned survey for 6 months continuously and, thereafter, at three-month intervals. The total numbers of bats were counted upon their leaving the roost at dusk and returning at dawn.

Table 1: External measurements (in mm) of observed male compared with the measurements of Bates & Harrison (1997).

Measurement	<i>Myotis horsfieldii</i>	<i>Myotis hasseltii</i>	Observed male
Total length	49.0–59.0	52.0–58.0	55.3
Ear	13.0–15.2	15.5–16.5	15.6
Forearm	36.5–41.5	37.2–40.3	39.9
3 rd metacarpal	35.9–39.0	35.0–38.0	38.7
4 th metacarpal	34.5–37.7	37.2–39.8	37.9
5 th metacarpal	33.9–37.1	37.5–40.6	36.1
Tibia	16.8–17.8	15.1–17.6	17.5
Calcar	-	-	22.5
Hind foot	7.0–11.2	9.0–11.0	10.3
Tail	34.0–42.0	35.0–42.0	33.8

The roosting colony was located within a small square-shaped hole under the bridge over the Thelgamuwa Oya on the Raththota – Pallegama road. The hole was 6.2×6.1cm at the opening and 19.8cm deep. It appears that the hole was made during construction of the bridge. The height of the bridge was 161cm from the river bed and the hole was directly on the lower surface facing the water. The insect population in this habitat appeared healthy. Initially, 12 individuals were recorded in the one roost that comprised the colony. (Please see the cover page of this journal for a photograph of an individual from the colony). No other roosting sites were located on the bridge at the time. However, during a subsequent visit on 28 September, 2013 we discovered another roost on the same bridge. The second roost occupied a similar square hole 4.8m from the first. It was 6.0×6.2cm in size at the opening and 19cm deep. When we discovered it this second roost had 8 bats and the first roost had been reduced to 10 bats. We were unable to determine whether there was an occasional exchange of individuals between the two holes. We were also unable to determine the gender

composition of the residents because, lacking permits, we refrained from trapping them.

Upon further inspection on 28 September, 2013, two baby bats were recorded in the first roost and a juvenile bat was discovered in the second. This suggests that the breeding season for this species, at least in this area, was around August–September. The bats normally left the roost just after dark around 1815–1900h. Upon leaving, they flew very close to the surface (around 0.5 to 1.5m) of the water, gradually ascended, and then flew along the river. During our 28 September visit we observed two individuals flying around the bridge and returning to the roosts frequently; we speculated that these were lactating females feeding the pups. Although the colony was located beside a spot frequently visited by humans for bathing, it seemed that the bats were not disturbed. During daytime the colony was mostly silent but, on occasion, we heard high pitched sounds emanating from the holes especially when someone walked on the bridge.

Our continuing observations indicate that the colony is expanding. Perhaps the local abundance of insects and the relative inaccessibility of the roosts to predators are factors here. On the other hand, the Thelgamuwa Oya occasionally floods and the roost holes are inundated. In April 2012, the holes were covered for 2 days when the stream was in spate and the bats would have had to abandon their colony. Remarkably, they were back in the two roosts when we returned a month later. Another risk factor could be pesticide poisoning. Large amounts of pesticides were seen to be utilized in nearby hamlets which may accumulate in bats via their insect diet. This may lead to breeding failure and death. The need, therefore, exists for an ecological assessment of *M. hasseltii* for conservation purposes. The 2012 National Red List considered *M. hasseltii* in Sri Lanka 'Near Threatened' (MOE, 2012).

The morphometric measurements we obtained were generally a good match with Indian *M. hasseltii* as opposed to *M. horsfieldii* but a few measurements were seen as overlapping with *M. horsfieldii*. Our specimen's hind foot length, tail length, and head length are at variance with measurements obtained from other *M. hasseltii* specimens from Sri Lanka.

What significance this carries is unknown at this time but the uncertain taxonomic status of bat species (Francis *et al.*, 2010) points to the urgent need to carry out extensive systematic surveys of this fauna in Sri Lanka. This is the first confirmed breeding colony of *M. hasseltii*

found in Sri Lanka in over 80 years. The previous record of a single individual caught flying over the Minipe Canal in 2005 is from a location ~30 km from the current site (Goonatilake, W.L.P.T.S. de A., pers. comm. 2014).

Table 2: Morphological characters of observed male comparing with the other references: Bates & Harrison (1997) and Phillips (1935)

Morphological character	Bates & Harrison (1997)		Phillips (1935)	Present publication
	<i>Myotis horsfieldii</i>	<i>Myotis hasseltii</i>	<i>Myotis hasseltii</i>	Observed male
Ears	naked	Rather narrow	Moderately long	Moderately long
Tip of the ear	Rounded	Narrowly rounded-off	Rounded	Rounded
Tragus	Short, half or less than the height of the pinna, relatively broad	Narrow, half or less than the height of the pinna	Moderately long, rather attenuated, bluntly pointed	Moderately long bluntly pointed (half or less than the height of the pinna)
Ante-brachial membrane	Present	-	-	Present
Inter-femoral membrane	Present	Present	Present	Present
Wing attached to	Outer metatarsal of each foot	Ankles or tibia	Ankles	Ankles
Hind feet	Enlarged and exceed half the length of the tibia	Long and slender, greatly exceed half the length of the tibia	Long, slender, and long claws	Long, slender, and long claws
Calcar	-	-	Very long	Well developed
Tail	-	-	Rather long	Rather long
Tail shape	-	-	Fully webbed	Fully webbed (Enclosed with Inter femoral membrane)
Free tail	-	-	-	Absent

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PLATE 16

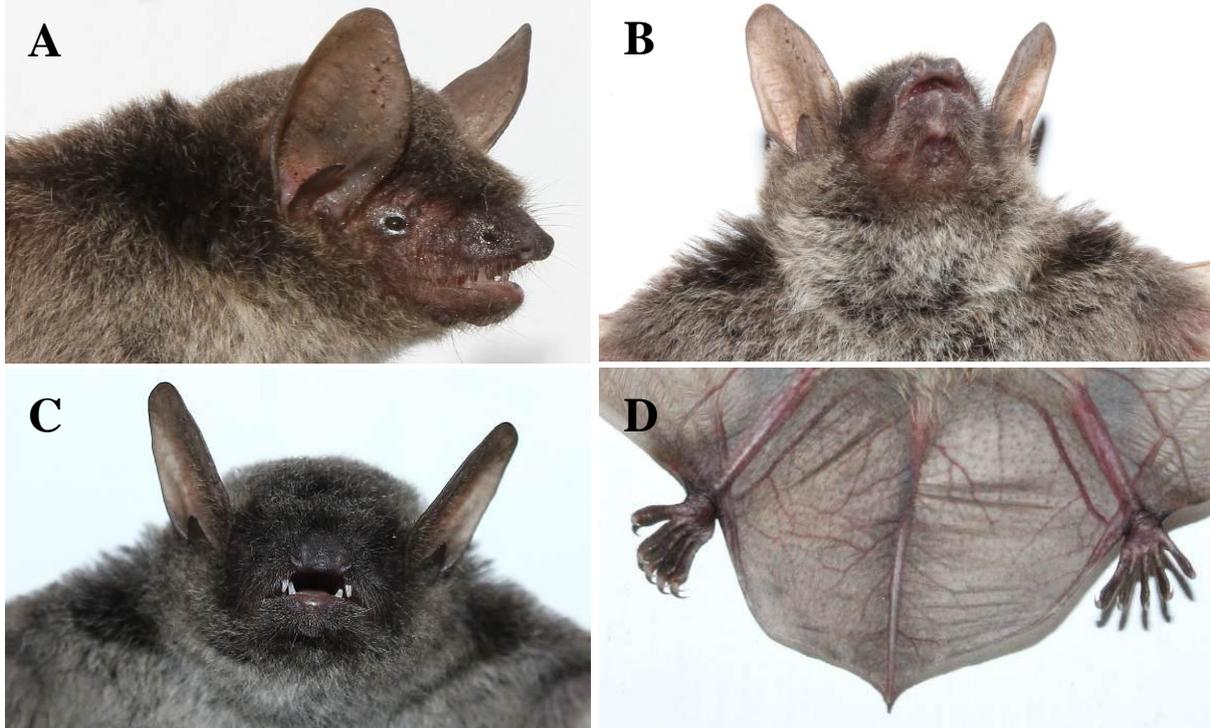


Figure 2 (below): *Myotis hasseltii* wingspan; A, dorsal view; B ventral view.

