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).

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 Illukkumbura situated in the Ratthihota-Pallelama 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 | Myotis horsfieldii | Myotis hasseltii | 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 |
| 3rd metacarpal | 35.9–39.0 | 35.0–38.0 | 38.7 |
| 4th metacarpal | 34.5–37.7 | 37.2–39.8 | 37.9 |
| 5th 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 6.2x6.1cm 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 6.0x6.2cm 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 Myotis hasseltii for conservation purposes. The 2012 National Red List considered Myotis hasseltii in Sri Lanka 'Near Threatened' (MOE, 2012).

The morphometric measurements we obtained were generally a good match with Indian Myotis 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 Myotis 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 |
|-------------------------|-------------------------|-----------------|-------------------|
|                         | *Myotis horsfieldii*    | *Myotis hasseltii* | *Myotis hasseltii* |
| 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           |
| 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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Figure 1 (above and left): *Myotis hasseltii* A, lateral, B, ventral, C, frontal view of the head; ventral view of the D, inter femoral membrane; E, wing pouch absent.

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