

# Re-discovery of Pouch bearing sheath tailed bat *Saccolaimus saccolaimus* Temminck (Chiroptera: Emballonuridae) from Sri Lanka after 75 years

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## ABSTRACT

*Saccolaimus saccolaimus* Temminck, 1838, was first collected by the Museum of Natural History of Sri Lanka in the year 1919 and the first published record of this bat was in 1935 by W.W.A. Philips, though specimens were collected at various times for the collection of the Natural History Museum of Sri Lanka. However, after 1936 there were no records of the species, though, several surveys were conducted on the bat fauna of the island. The species had not been reported since, and was considered as Data Deficient according to latest literature. Here we report on its re-discovery.

**Key words:** Emballonuridae, bats, Insectivorous, Radio metacarpal pouch, Gular sac

## INTRODUCTION

The Family Emballonuridae commonly known as sheath-tailed bats consist of 51 species of small insectivorous chiropterans with a wide distribution in the tropical and subtropical regions of the world e.g. Americas, Europe, Africa, Asia, Australia and Oceania (Mickleburgh *et al.*, 2002). Six species of sheath-tailed bats belonging to two genera are reported from South Asia. Some species has well developed gular sac and/or has a gland on the throat, and radio metacarpal pouch on the wing. The tragus of each ear is expanded distally forming a club shaped extremity (Bates & Harrison, 1997).

They have conical shaped muzzle and lack nasal process or noseleaf. The basal part of the tail is enclosed loosely in the interfemoral membrane and the tip pierces the upper surface of the membrane and lies free on the dorsal side, hence the name sheath tailed bats. Wings are long, narrow and the second digit of each lack phalanges (Srinivasulu *et al.*, 2010). *Saccolaimus* is one of the genera of the family Emballonuridae. *Saccolaimus saccolaimus* is the only species of the genus that occurs in South Asia. This is a medium-sized bat (FA– 63.0-68.0 mm), the chin is sparsely haired. Gular sac (a glandular pouch like structure in the skin of the throat) on throat is well-developed in males and less developed in females. Radio-metacarpal pouch is inconspicuous. Rostrum is moderately elongated. One pair of upper and two pairs of lower incisors present. Tail is medium sized and stout (21.0-35.0 mm) (Srinivasulu *et al.*, 2010). The Pouch bearing sheathed tailed bat was first discovered from Java islands (*Taphozous saccolaimus*) by Temminck in 1838.

*Taphozous crassus* (Blyth, 1844) collected from Uttar Pradesh, India and *Taphozous pulcher* (Blyth, 1844) collected from Madras, India. The latter are considered as synonyms to *Saccolaimus saccolaimus*. It ranges from India and Sri Lanka through south-east Asia to Sumatra, Borneo, Java, Timor, New Guinea, North and North eastern Australia and Solomon islands (Bates & Harrison, 1997).

So far 30 species of bats has been record from Sri Lanka, coming under 07 families and belonging to 18 genera (Bates & Harrison, 1997; Srinivasulu *et al.*, 2010). The nominate species is one of the three species of sheathed tailed bats found in the Island which belongs to the family Emballonuridae. This species was first collected from Sri Lanka in 1919 for the collection of the National Museum of Natural History Sri Lanka (NMNH) by W.W.A. Philips and is well documented in his publication “Manual of the Mammals of Ceylon” in 1935. Past records demonstrate that *S. saccolaimus* was widely distributed both in the wet zone and the dry zone but less plentiful in lower hills of Sri Lanka (Philips, 1980).

However, the last confirmed records of this species were specimens deposited in the collection of the NMNH, Colombo, in 1936 by Mr. E.C. Fernando from-Dehiwala (Wet Zone) and Cheddikulam (Dry zone) and Major W.W.A. Phillips from Nikawewa (Dry zone). According to the IUCN Sri Lanka and Ministry of Environment and Natural Resources Sri Lanka (2007), this species fall under the Data Deficient category (DD). This reflects the limited research carried out in Sri Lanka after the colonial period, on the natural history of the country especially on the systematic relationships of Chiropteran fauna. But, after a lapse of 75 years, the authors have rediscovered this species from Sri Lanka.

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## MATERIALS AND METHODS

*S. saccolaimus* was re-discovered during a Visual Encounter Survey on the chiropteran fauna of the island, conducted by Biodiversity Education and Research (BEAR), on 30th September 2011 at Yata Wehara estate, Kurunegala in North-Western province, Sri Lanka.

A hand net was used to capture the live specimens to obtain the measurements which are necessary for the identification of the species. All the live specimens were carefully examined and key measurements such as Forearm length (FA), Head Body length (HB), Tail-length (TL), Wingspan (WSP), Ear length (E), Third metacarpal length (3mt) etc. were taken using a Digital-caliper. Morphological characteristics such as color, pelage of all the animals were also recorded. Photographs were taken using Nikon D5000 digital SLR camera using a 35-55lens. Once the relevant data was taken the specimens were carefully released back to the roost without any harm, hindrance or disturbance to the animals or to the roosting site.

Bats of the Indian Subcontinent (Bates & Harrison, 1997) and Manual of the Mammals of Sri Lanka (Phillip, 1980) were used for field identification and the collected data and pictures were compared with dry specimens preserved at NMNH, Colombo for further clarifications in confirmation.

## RESULTS

Four individuals of *Saccolaimus saccolaimus* were found roosting in a hollow of a *Cocos nusifera* (Coconut palm) (Figure 1). The roosting tree was about 9.1 m in height and had two opening. The first opening was about 3 m and the other was about 3.6 m above ground level. The first cavity is the largest and it had probably formed due to natural deterioration over the years resultant from some physical damage to the trunk. The second opening was a circular hole (8 cm in diameter) made by a Black-rumped flameback woodpecker (*Dinopium benghalense*), as it is the only species found in the area which is capable of making such a holes in live coconut trees. Due to the continued natural deterioration of the inner core of the coconut tree, both cavities have merged, creating a deep roosting area (about 1 meter deep from the second hole). The nominate species used both holes when entering and exiting the roosting site. All these specimens captured from the site were males.

All key measurements of examined specimens were compared with measurements of all three species of the family Emballonuridae found in Sri Lanka (Table 1). By presence of well-developed gular sac (Figure 2) and inconspicuous radio metacarpal pouch, (radio metacarpal pouch presence in *Taphozous longimanus* and *Taphozous melanophogon* (Figure 3); Gular sac present in male *T. longimanus* and absence in *T. melanophogon*) along with the other morphometric characteristics, this species can be differentiated from any other species of the family Emballonuridae in Sri Lanka.

Muzzle simple, lacks nose leaf, nostrils open forward (Figures.4-5). The chin is sparsely haired. Eyes are comparatively larger than other species of insectivorous bats. Ears moderate in size and fluted, with a small

tragus which faces outwards. The body clothed in soft pelage which is dark chocolate brown to almost black, with whitish speckles on the dorsal surface, whereas the ventral surface is lighter than the dorsal side with a clear demarcation of the two. The wing membrane is coffee brown to almost black.

When being captured at the roosting site, the nominate species did not try to exit the roosting site, but instead backed further up the hollow using its wing claws and feet (in a spider like manner), while maintaining the head down position, the movements being quick. It made a squirrel like call when alarmed. It was very aggressive, snapping at everything on being captured.

The species was observed at various times of the day at their roosting site subsequent to its re-discovery by the authors. After a lapse of one month the nominate species abandoned the diurnal roosting site and it was taken over by a colony of honey bees (*Apis sp.*).

## DISCUSSION

As per the past records, *Saccolaimus saccolaimus* prefers to roost in hollow trees, especially old, decayed and broken off Kitul palms (*Caryota urens*) and Arecanut palms (*Areca catechu*) in Sri Lanka (Phillips, 1980). In Australia, all confirmed roosting records are from deep tree hollows in the poplar gum (*Eucalyptus platyphylla*), Darwin woollybutt (*Eucalyptus miniata*) and Darwin stringybark (*Eucalyptus tetradonta*) trees (McKean *et al.*, 1981; Compton & Johnson, 1983; Churchill, 1998; Murphy, 2002). The new day roosting micro habitat of this present record for the species was a hollow of a living coconut tree (*Cocos nusifera*).

There have been several descriptions of the day roosting sites. One description was of a poplar gum trees (*Eucalyptus platyphylla*). It was in characteristic stunted form with cavities 18-29cm in diameter within the trunk, access being made into this by the bats via openings of similar size on the trunk. In one tree, the entrance was approximately 7m above ground level while in another tree two openings on opposing sides of the trunk were 6m and 7m respectively above the ground. The cavities within the trunks ranged in depth from 5-6m, their surfaces being polished from long and constant use (Compton & Johnson, 1983). Another tree was a dead Darwin stringybark tree (*Eucalyptus tetradonta*), 8m tall and 39cm diameter at breast height. The cavity had formed due to the break-off of its crown and the subsequent deterioration of the trunk tissue from this wound. On the northern face of the trunk was a slit shaped The entrance to the cavity has been created by the crown breaking off. The entrance was approximately 7m above the ground and faced directly upward. The tree had a slit-shaped fissure about 4m long on its northern face of the trunk was a slit shaped fissure which was not used for access. This was located higher than the floor of the cavity. The cavity was estimated to be at least 3m deep. The wall of the cavity was approximately 30-40mm thick (Murphy, 2002). There are several similarities between the site description relating to the re-discovery and of the locations described in earlier records.

Phillips in 1980 mentioned that this species may occasionally be found roosting in the roofs of

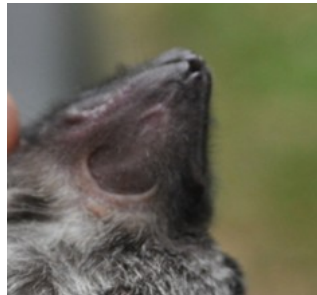
**Table 1.** Comparison of Morphometric and Morphological characters of family Emballonuridae in Sri Lanka with described colony.

Morphometric and Mor-phological character	<i>Saccolaimus saccolaimus</i> 1 (mm)	<i>Taphozous longimanus</i> 1 (mm)	<i>Taphozous melanophogon</i> 1 (mm)	Described colony (mm)
FA	63-68.2	55.6-62	60-68	64-66 (Average 65.2)
HB	80-93	73-86	67-86	82-90 (Average 85.66)
3mt	-	55.8-64	54.4-59.3	65-70 (Average 67.7)
3mt/FA (as a percentage)	-	95.8-109.4	84.9-92.7	101.5
Radio metacarpal pouch	Absent	Present	Present	Almost absent
Gular sac	Male-present; Female-absent	Male- present; Female-absent	Absent	Present
Chin	Covered with very short hairs	Naked	Covered with hairs	Covered with minute hairs
Wings are attached to	Ankle	Ankle/tibia	-	Ankle
Interfemoral membrane	Naked	Fur extends on the upper surface of the interfemoral membrane	-	Naked

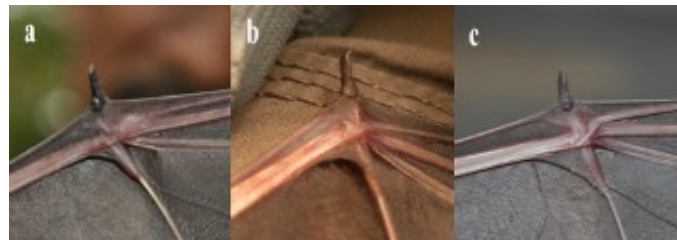
1(Bates & Harrizon, 1997)



**Figure 1.** Hollow roosting site in Coconut palm.



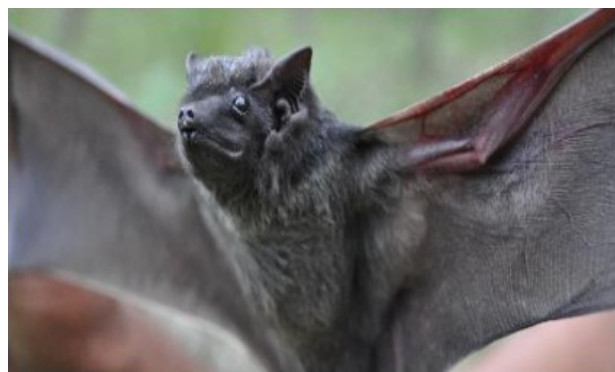
**Figure 2.** Well-developed gular sac of *Saccolaimus saccolaimus*.



**Figure 3 a-c.** Comparison of radio metacarpal pouch: a. Inconspicuous pouch of *Saccolaimus saccolaimus*; b. Prominent pouch of *Taphozous longimanus*; c. Prominent pouch of *Taphozous melanophogon*.



**Figure 4.** Lateral aspect of *Saccolaimus saccolaimus*.



**Figure 5.** Ventral aspect of *Saccolaimus saccolaimus*.

buildings in Sri Lanka, while some authors state that this species may occasionally be found in rock crevices (Boonsong & McNeely, 1977).

Outside Australia, the bare-rumped sheath-tail bat has been recorded roosting in structures, such as the eaves of houses and in old monuments; between boulders; and also in caves. (Boonsong & McNeely, 1977; Hall, 1995; Churchill, 1998).

*Saccolaimus saccolaimus* is gregarious, between three and 40 individuals being recorded from tree hollow roosts in Australia (Compton & Johnson, 1983; Churchill, 1998; Murphy, 2002). Outside Australia, this species has been recorded roosting in groups ranging in size from “a few individuals to a few hundred” (Bonaccorso, 1998; Payne & Francis, 1998). According to the Phillips (1980) and Boonsong and McNeely (1977) this species retire to roost in small parties of five or six. This new record also confirmed their small colony roosting behavior. Boonsong and McNeely (1977) mentions that both sexes of this species occupy the same tree hollows. However, Phillips mentions that the two sexes appear to live together during most (if not all) of the year (1980). The observed colony of *Saccolaimus saccolaimus* in this study was an all-male colony. Therefore, we can hypothesise that sexual segregation does occur in *S. saccolaimus*.

During the breeding season, they may aggregate in mixed-sex colonies. Females in an advanced stage of pregnancy have been recorded by Phillips in the months of September, October and November (1980). The abandoning of the roost site by *S. saccolaimus* coincides with the breeding season of this species. Therefore, we can assume that this male colony left the roosting site, in search of female colonies.

Though, the current distribution of this species is still a mystery, only previous records help to figure out the distribution of *Saccolaimus saccolaimus* in Sri Lanka. It was recorded from Cheddikulam (E.C. Fernando in 1936); Nikawewa (W.W.A. Philips in 1935); Katupathwewa (NMNH, Colombo); Pollonaruwa (Field Museum of Natural History-FMNH, Chicago) in the dry zone and Dehiwala (FMNH); Galle (E.C. Fernando); Colombo, Mathugama (1920), Gammaduwa (1919) and Kumbalgamuwa (1931) (W.W.A. Philips); Gangodawila (Wroughton in 1915ci); Anasigalla and Payagala (British Museum of Natural History-BMNH); Passara Hills (1922) (W.W.A. Philips in 1935); Dammeriya (BMNH) in Uva hills in Wet zone. It was considered common in Kalutara district of Western province (Philips, 1980).

This re-discovery is the only record of this Data Deficient Pouch bearing sheath tailed bat after the colonial times. Further studies have to be implemented to establish the distribution and ecology of this species, highly essential to secure the long-term protection of the Pouch bearing sheath tailed bat. Such studies would enable the development of conservation strategies and action plans to secure the future of this insectivorous species. Insectivorous bats are susceptible to insecticides and pesticides, from consumption of contaminated insects, the poison accumulating in the bodies, leading to eventual poisoning and death. Further such poisoning causes breeding failure, thus making a serious impact on the insectivorous

bat population. Further studies are imperative to understand its biology and ecology, due to absence of relevant data. Since it is a difficult task to provide ex-situ conservation for these insectivorous species, in-situ conservation is of utmost importance.

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