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Study on bat diversity in and around Lengteng Wildlife Sanctuary, Mizoram, India

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Abstract

Lengteng Wildlife Sanctuary (23°44'20"N - 23°52'15"N and 93°13'40"E - 93°17'50"E) is the third largest among the six (6) wildlife sanctuaries of Mizoram; situated in the eastern part of Mizoram adjacent to Murlen National Park. Due to various types of topography there is a diversified climatic condition in this sanctuary and this supports a variety of semi evergreen trees, bamboo, wild bananas; hence a rich biodiversity. Bats play major role in food chain between plants and carnivores as well as habitat specific that help in seed dispersal, and also is considered as pest. The present investigation conducted from August 2012 to April 2013 was undertaken to study the bat diversity and prepare the checklist at Lengteng Wildlife Sanctuary of Champhai District of Mizoram. Nine (9) bat species under eight (8) genera of four (4) families were identified from study area. Insectivorous bat, *Rhinolophus hipposideros*, which was identified in this sanctuary, was for the first time recorded in Mizoram. Mist-nets and hoop-nets were used for the trapping of the bats and roosting sites were surveyed with the help of binoculars. Trapped bats were photographed by digital camera and video camera for documentation. Dead bats found in the study area were preserved in the laboratory by using 10% formaldehyde solution after identification.

Key words: Bat; diversity; Lengteng Wildlife Sanctuary; *Rhinolophus hipposideros*.

Introduction

Bats belong to the order Chiroptera (hand-winged). They are ubiquitously present except in some islands, Arctic and Antarctic regions. It is the only mammals able to fly. Till now, 1117 species in 202 genera under 18 families of bats are documented worldwide and making up almost a quarter of all known mammal species.[1] They are classified into two major groups: sub-order Megachiroptera (Old World fruit bats) consisting 186 species in one family and sub-order Microchiroptera (New World bats) consisting 931 species in 17 families.[2-6] The Megachiroptera (consisting of a single family, the Pteropodidae) are found throughout the Old World tropics and sub-tropics from Africa through southern Asia to Australia, and on islands in the Indian and western Pacific Oceans. Microchi-

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roptera are found in all areas of the world apart from the Arctic and Antarctica and some isolated oceanic islands. Bats being a nocturnal animal most of them live in the dark places during the daytime and live in a colony.

In India, the study of bat fauna was painstakingly carried out by many bat biologists. They enlisted 117 species under 39 genera of 8 families. The renowned mammalogist Wroughton dedicated his lifetime from 1899 to 1921, spanning over three decades in identifying and enlisting hundreds of mammalian species from India, Burma and Sri Lanka. He recorded several bat species from the coastal area and the Western Ghats of the Konkan region in Maharashtra.[7-9] Bates and co-workers surveyed over 74 species of the insectivorous, frugivorous and carnivorous bats found in the Western Ghats.[10,11] In recent year, many mamalogists has contributed greatly to the aspects dealing with taxonomy, ecology, morphology, feeding and reproduction of both, the frugivorous and insectivorous bats from the diverse ecosystems from the Indian subcontinent.[12-20]

In spite of the hotspot diversity of bats (Chiroptera) in north-eastern India, the data documented were deficient. Zoological Survey of India, Kolkata, has made a great contribution on bats studies in north-east India. It documented 44 species of bat from Mizoram, Meghalaya, and Tripura. In 1970s extensive studies on the ecology and biodiversity of bats from Tripura were undertaken.[21] Das and co-workers studied in details the bat fauna of Meghalaya.[22] The geographical distribution and the habitat preference of the Dobson's long-tongued fruit bat, *Eonycteris spelaea*, from Meghalaya, Manipur and Nagaland was studied.[23,24] Similarly, ecological information on the sub-tropical cave dwelling bat, *Myotis longipes*, from Meghalaya was recognized.[25]

The study of Chiropteran diversity in Mizoram is shockingly lacking due to various reasons. However, from 1993 to 1997, Zoological Survey of India surveyed to enlist the mammals of Mizoram which include several bat species.[26-28] In recent year, Bhattacharya and Ghosh (2001) scrupulously collected the data on biodiversity of Chiropteran populations from Aizawl, Lunglei, Chhimtuipui, etc. and enlisted 24 bat species and concluded that the diversity of bat species is mind boggling.[29] Recently the survey of bat fauna in Tawi Wildlife Sanctuary was carried out and enlisted twelve bat species and out of which five species were the first time reported in Mizoram.[30]

The present investigation was undertaken to study the bat diversity and prepare the checklist of Lengteng Wildlife Sanctuary. The present study also aims to investigate threats and suggests recommendations for implementing conservation measures of bat fauna in this sanctuary.

Materials and Methods

Study site

Lengteng Wildlife Sanctuary is situated within the Champhai District and is very close to Indo-Myanmar and Indo-Bangladesh borders (Figure 1). This wildlife sanctuary is around 250 km east of Aizawl city. The sanctuary covers an approximate area of 80 sq km and ranges in altitude from 400 to 2,300 m. The average temperature in the sanctuary varies from 15-25°C in summers and 0-17°C during winters. The sanctuary receives 2,100 to 2,500 mm of rainfall every year. It covers different forest types such as tropical pine forest, tropical evergreen and semi-evergreen forest that attacks the visitors. The area within the protected area can be classifies into dense forest, semi-dense and cliff forests. This sanctuary hosts a hotspot diversity of birds, reptiles and mammals including bat fauna.

Field survey

The survey was carried out from August, 2012 to April, 2013. We established two field stations at strategic points at the base in wild banana forest and at the top of the hill which

Figure 1. Location of Lengteng Wildlife Sanctuary in Mizoram.

Table 1. A checklist of bats showing family, scientific and common names of Lengteng Wildlife Sanctuary.

Family	Scientific name	Common name
Pteropodidae	*Rousettus leschenaultia* (Desmarest, 1810)	Fulvus Fruit Bat
Pteropodidae	*Rousettus aegyptiacus* (E. Geoffroy, 1810)	Egyptian fruit bat
Pteropodidae	*Cynopterus sphinx* (Vahl, 1797)	Greater Short-nosed Fruit Bat
Rhinolophidae	*Rhinolophus hipposideros* (Bechstein, 1800)*	Rufous Horse-shoe Bat
Hipposideridae	*Hipposideros lankadiva* (Kelaart, 1850)	Indian Leaf-nosed Bat
Vespertilionidae	*Murina cyclotis* (Dobson, 1872)	Round-eared Tube-nosed Bat
Vespertilionidae	*Pipistrellus tenuis* (Temminck, 1840)	Indian Pygmy Bat
Vespertilionidae	*Miniopterus magnater* (Sanborn, 1931)	Western Long-fingered Bat
Vespertilionidae	*Tylonycteris pachypus* (Temminck, 1840)	Lesser Bamboo Bat

***** new record of species in Mizoram

cover by bamboo and trees in the sanctuary from where the visual observation of the bat colonies during the day-hours or night-hours would be feasible. The field station with be thatched huts covered by water-proof tarpaulin was fabricated.

Bats were trapped by using mist-net (Avinet - Dryden NY 13053-1103, US) in five different sites: wild banana forest, bamboo thicket, moist deciduous forest, forest stream and cave. Mist-nets (10x3 m) were deployed by using bamboo poles in the evening at 1830 hours and the bats entangled in the nets were collected at around 0530hours in the morning. Different numbers of mist-nets were used depending on the space availability in the study sites. The mist nets were placed randomly in these areas. Hoop-nets were also used to capture the bats at the cave entrances. Netted bats were placed in cloth bags and weighed using spring balance. Captured bats were identified the species by using "*A Key to Bats*" published by Srinivasulu *et al*. 2010. Morphological characters such as fore-arms, body, ears, hind foot and tail lengths were used to identify the bat species with the help of millimeter graded steel scale to the nearest 1 mm.[31,32] Dead bats found in the study area were preserved by using 10% formaldehyde solution after identification.

The photograph of captured bats was also taken by using video camera (Sony HDR-XR350V, Japan) and digital still camera (Cannon DS126291, Taiwan) for further identification and documentation. They were then released immediately after identification. Bats were also searched inside the caves, old building, tree bark, hollow, bamboo, wild banana leaves and rock crevices during the day time using binoculars. Bats population in the colonies were estimated and photographed.

Results and Discussion

During the study periods, nine (9) bat species were identified; out of which six (6) were insectivorous bats and three (3) were frugivorous bats. Insectivorous bats belongs to the families

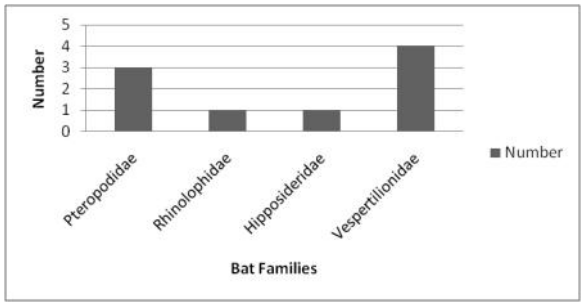

Figure 2. Different bat families found in Lengteng Wildlife Sanctuary.

of Vespertilionidae (four species), Rhinolophidae (one species), and Hipposideridae (one species) and frugivorous bats belong to the family Pteropodidae (three species) (Figure 2). Bat species enlisted in this sanctuary are *Rousettus leschenaultia* (Desmarest, 1810), *Rousettus aegyptiacus* (E. Geoffroy, 1810), *Cynopterus sphinx* (Vahl, 1797), *Rhinolophus hipposideros* (Bechstein, 1800) *, *Hipposiderus lankadivia* (Kelaart, 1850), *Pippistrelus tenuis* (Temminck, 1840), *Murina cyclotis* (Dobson, 1872), *Miniopterus magnater* (Sanborn, 1931), and *Tylonycteris pachypus* (Temminck, 1840) (Table 1). From the present study, Rufous Horse-shoe Bat, *R. hipposideros*, is the first record in Mizoram.

Bats were captured in five different habitat types: caves, wild banana forest, bamboo thicket, moist deciduous forest, and forest stream. The most common captured in all study sites was the frugivorous bat (*C. sphinx*). This may be attributed to the abundance of food resources in the Sanctuary such as wild banana, wild fruits like fig species, mango, berries, etc. *R. leschenaultia* and *R. aegyptiacus* were common in wild banana forest at the base of the sanctuary and cave. *P. tenuis* and *M. magnater* were commonly captured in forest stream, moist deciduous forest and cave. *R. hipposideros* and *M. cyclotis* were mostly captured in forest stream near the cave. *H. lankadivia* preferred cave and forest stream near the river. *T. pachypus* were trapped in bamboo forest. The diverse habitats of Lengteng Wildlife Sanctuary play a significant role in the diversity of bats. The presence of

hollow trees, bamboo holes, wild banana leaves, rock crevices, and caves provides an ideal site for the roosting bats.[33] The mixed vegetation of the nearby villagers will also help the bats to exploit the area efficiently.[34] The water resources, abundant of roosting sites and foods availability in the Lengteng Wildlife Sanctuary could be the factors that support the rich abundance of bats. The previous and present studies reveal that the bat diversity of Mizoram could be more than what we presently know. Further research on bats will help to identify other new species of bats in Mizoram.

According to the local people nearby village the population of bats is declining due to wild fire, landslide, killing for meat, visitor of the sanctuary who disturbing their roosting sites in the cave, tree, and banana leaves etc. The youngsters burned the dry leaves inside the cave to get rid of the bat from the cave and covered the cave entrance by using fishing-net at a time killed 20-30 bats for meat. Some people shot by using catapult and believed that fruit bats as a vermin to orchards. Several villagers in Mizoram used bats as medicine particularly for urinal problem. The present study reveals that there is an urgent need for making the public aware of the beneficial aspects of all the bats and removing the century-old misconception about bats.

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