



Distribution of Studied Insectivorous Bat Species of Myanmar

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Abstract

Forty-five species of insectivorous bats; *Craseonycteris thonglongyai*, *Emballonura monticola*, *Taphozous melenopogon*, *T. theobaldi*, *T. longimanus*, *Megaderma lyra*, *M. spasma*, *Rhinolophus affinis*, *R. rouxii*, *R. pusillus*, *R. lepidus*, *R. macrotis*, *R. trifolius*, *R. pearsoni*, *R. malayanus*, *R. steno*, *R. thomasi*, *R. shameli*, *R. acuminatus*, *R. marshalli*, *Rhinolophus sp.*, *Hipposideros pomona*, *H. larvatus*, *H. armiger*, *H. lylei*, *H. ater*, *H. fulvus*, *Aselliscus stoliczkanus*, *Tadarida plicata*, *Myotis siligorensis*, *M. muricola*, *M. horsfieldii*, *M. hasseltii*, *M. chinensis*, *Scotophilus heathii*, *S. kuhlii*, *Ia io*, *Pipistrellus javanicus*, *P. coromandra*, *P. pulveratus*, *P. paterculus*, *P. affinis*, *P. ceylonicus*, *Miniopterus pusillus* and *M. magnater* were distributed in 7 Divisions; Yangon, Bago, Ayeyawady, Taninthayi, Magway, Mandalay and Sagaing Divisions, and 7 States; Mon, Kayin, Shan, Chin, Kayah, Kachin and Rakhine States of Myanmar.

Introduction

Myanmar has a rich diversity of bats with 92 species (Bates *et al.*, 2001), including globally endangered taxa. Today, bat research in Myanmar from ecological and biodiversity conservation aspects remain underdeveloped. Unfortunately bats are declining globally with approximately 22 per cent of species considered threatened and a further 23 per cent as near threatened by the IUCN (Hutson, Mickleburgh, and Racey, 2001). Roosts and habitat destruction or degradation is the main cause of decline and is of particular importance to cave dwelling species. As well as having life histories adapted, and hence dependent, on stable habitats (Kunz and Pearson, 1994). Bats are of great importance due to their roles in pollination, seed dispersal and pest control. This makes up to-date surveys of Myanmar imperative to bat conservation and the maintenance of environmental processes in the country. In this study the main objective is to contribute significant information on their distribution, ecological parameters and conservation status. It is thus aimed to add a previous publication on new records of bats for Myanmar reviewed by Bates *et al.*, (1997) and also to provide a platform for further systematic research and conservation planning.

Materials and Methods

Study area and study period

The study area were concentrated in 14 regions of Myanmar; Yangon, Bago, Mandalay, Sagaing, Magway, Ayeyawady and Taninthayi Divisions, Mon, Kayin, Shan, Chin, Kayah, Kachin and Rakhine States. Collection of the bat specimens was undertaken in 48 Townships; Bahan, Botahtaung, Yankin, Dagon, Mingaladon, Lanmadaw, Sanchaung, Mingalathaungnyunt, Thongwa, Hlegu, Htauk-kyant, Hmawbi, Taikgyi, Kungyangon, Twante, Bago, Waw, Mawlamyine, Mudon, Kyaikmayaw, Kyaikkame, Pa-an, Thahton, Kanpetlet, Moengyin, Bahmo, Loikaw, Taunggup, Kanma, Mandalay, Patheingyi, Pyinoolwin, Sagaing, Monywa, Pyinmana, Thawutti, Kyaukse, Taunggyi, Kalaw, Aungban, Pindaya, Inlay, Kyaukme, Pathein, Wakema, Bokale, Kawtaung and Myeik (Figure 1).

Field surveys were conducted between June, 2002 and May, 2004.

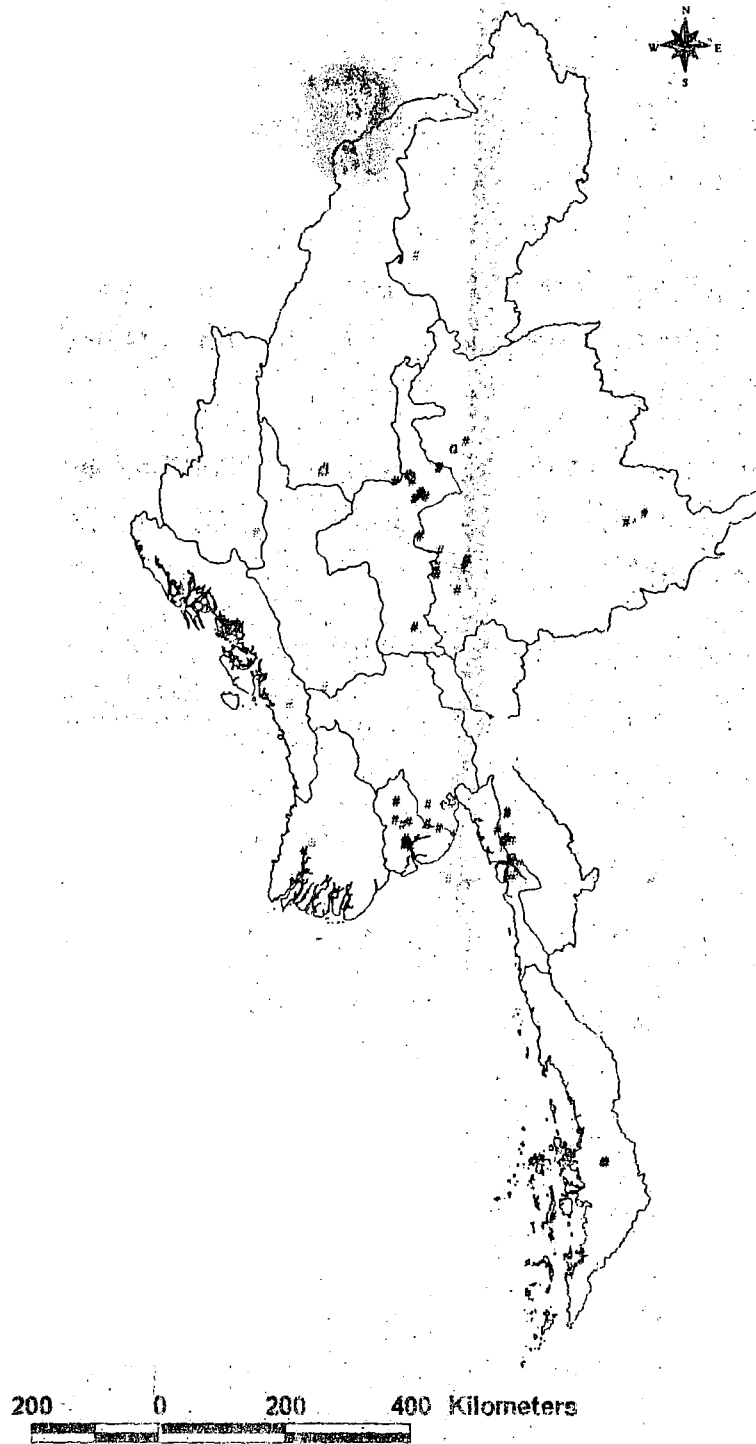


Fig. 1. Map of distribution of studied insectivorous bat species in Myanmar
(Source - Department of Geography)

Bats captured and emergence time recorded

Japanese nylon mist nets 2 ply, four shelves were utilized to capture the bats. The length of the mist nets were set up at 18 ft, 30 ft and 42 ft in accordance with the size of the caves studied. Hand nets, flip nets and harp traps were also utilized. The utilized nets and traps were set just half an hour before sunset and kept for three hours. The set up nets and traps were placed at the entrance as well as inside the caves.

The time of the captured bats were recorded and set free from the nets and traps. Some of the bats in roosting sites were caught by hand nets if in dried palm leaves and long forceps if in crevices.

Measurements and identification of bat species

Bat species were set free from the nets and traps in order to examine the morphometric characters such as sex, status of age i.e, juvenile or adult. The forearm length was measured by caliper and body weight by pesola spring scales just after capturing the bats. Species identification was followed after Bates and Harrison (1997).

Preservation of bat specimens

The captured bats except for one or two specimens were then released back. The purpose of the keeping the bat specimens was to verify the species referring the record given by Bates and Harrison (1997). The kept specimens were tagged with numerical labels, noting the time of capture, location of the cave where the bats had emerged and then preserved in 70 per cent ethanol as voucher specimens.

Results

A total of 45 species of insectivorous bats belonging to (7) families were found to be distributed among (7) States and (7) Divisions. Bat species recorded are Craseonycteridae: *Craseonycteris thonglongyai*; Emballonuridae: *Emballonura monticola*, *Taphozous melanpogon*, *T. longimanus*, *T. theobaldi*; Megadermatidae: *Megaderma lyra*, *M. spasma*; Rhinolophidae: *Rhinolophus affinis*, *R. rouxii*, *R. pusillus*, *R. lepidus*, *R. macrotis*, *R. trifolius*, *R. pearsoni*, *R. malayanus*, *R. steno*, *R. thomasi*, *R. shameli*, *R. acuminatus*, *R. marshalli*, *Rhinolophus* sp.; Hipposideridae: *Hipposideros pomona*, *H. larvatus*, *H. armiger*, *H. lylei*, *H. ater*, *H. fulvus*, *Aselliscus stoliczkanus*; Molossidae: *Tadarida plicata*; Vespertilionidae: *Myotis siligorensis*, *M. muricola*, *M. horsfieldii*, *M. hasseltii*, *M. chinensis*, *Scotophilus heathii*, *S. kuhlii*, *Ia io*, *Pipistrellus javanicus*, *P. pulveratus*, *P. coromandra*, *P. paterculus*, *P. affinis*, *P. ceylonicus*, *Miniopterus pusillus* and *M. magnater*. Distribution of insectivorous bat species of Myanmar is shown in Table 1.

Table 1. Distribution of studied insectivorous bat species of Myanmar

Families and species	Distributional regions													
	Yangon	Bago	Ayeyawady	Taninthayi	Mandalay	Sagaing	Magway	Mon	Kayin	Shan	Chin	Kayah	Kachin	Rakhine
I. Craseonycteridae														
<i>Craseonycteris thonglongyai</i>	-	-	-	-	-	-	-	+	+	-	-	-	-	-
II. Emballonuridae														
<i>Emballonura monticola</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>Taphozous melanopogon</i>	+	+	-	+	+	+	-	+	+	+	-	-	-	-
<i>T. longimanus</i>	+	+	+	-	-	-	+	-	-	-	-	+	-	-
<i>T. theobaldi</i>	-	-	-	-	-	-	-	+	+	-	-	-	-	-
III. Megadermatidae														
<i>Megaderma lyra</i>	-	-	-	-	-	-	-	+	+	+	-	-	-	-
<i>M. spasma</i>	-	-	-	+	+	-	-	+	-	+	-	-	-	-
IV. Rhinolophidae														
<i>Rhinolophus affinis</i>	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>R. rouxii</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>R. pusillus</i>	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>R. lepidus</i>	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<i>R. macrotis</i>	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>R. trifoliatus</i>	-	-	-	-	-	-	-	-	-	+	-	-	-	-

Families and species	Distributional regions													
	Yangon	Bago	Ayeyawady	Taninthayi	Mandalay	Sagaing	Magway	Mon	Kayin	Shan	Chin	Kayah	Kachin	Rakhine
<i>Myotis siligorensis</i>	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>M. muricola</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>M. horsfieldii</i>	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<i>M. hasseltii</i>	+	+	-	-	-	-	-	+	-	-	-	-	-	-
<i>M. chinensis</i>	-	-	-	-	-	-	-	+	+	+	-	-	-	-
<i>Scotophilus heathii</i>	+	+	+	-	-	-	-	-	-	+	-	-	+	-
<i>S. kuhlii</i>	+	+	+	-	+	-	-	-	-	-	-	-	-	-
<i>Ia io</i>	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Pipistrellus javanicus</i>	+	+	-	-	-	-	-	-	-	-	-	-	-	-
<i>P. coromandra</i>	+	+	-	-	+	-	-	+	-	-	-	-	-	-
<i>P. pulveratus</i>	-	-	-	-	+	-	-	+	+	+	-	-	-	-
<i>P. paterculus</i>	-	+	-	-	+	-	-	+	+	-	-	-	-	-
<i>P. affinis</i>	-	-	-	-	-	-	-	+	-	+	-	-	-	-
<i>P. ceylonicus</i>	-	+	+	-	-	-	-	-	-	-	-	-	-	-
<i>Miniopterus pusillus</i>	-	-	-	+	-	-	-	+	+	-	-	-	-	-
<i>M. magnater</i>	-	-	-	-	-	-	-	+	+	-	-	-	-	-

Discussion

Of 45 species recorded from 14 regions, the two species *Thaphozous melanopogon* and *Hipposideros larvatus* were observed in eight studied regions. The species, *T. melanopogon* is a widespread species ranging from Sri Lanka and India to Southern China, Java, Borneo, Philippines and Myanmar while the species *H. larvatus* ranges from Assam and Bangladesh eastwards to China, Malaysia, Indonesia and Northern Myanmar (Bates and Harrison, 1997). It could thus be noted that these two species may be the most widely distributed bat species.

On the other hand, nine species of studied insectivorous bats; *Craseonycteris thonglongyai*, *Rhinolophus steno*, *R. affinis*, *R. acuminatus*, *R. pearsoni*, *R. ceylonicus*, *Pipistrellus javanicus*, *Hipposideros ater* and *Miniopterus magnater* were collected only from two regions. Among these, the smallest mammal, *C. thonglongyai* was discovered in 1973 by Thonglongya, in a cave near Sai Yok Waterfall, Kanchanaburi Province, Western Thailand (Hill, 1974). On the basis of unique characteristics of this bat, Hill described *C. thonglongyai* is new species in its own family, Craseonycteridae. In Myanmar, a single specimen was collected from Saddan Sin Cave in Mon State and published as a new record from Myanmar (Bates *et al.*, 2001). However, a very interesting finding from this study was a large colony of this species was recorded in Kywe Cave in Kayin State. This species is listed as endangered in the IUCN Red list (Huston *et al.*, 2001). This species is thus considered to have a small distribution. The species, *R. acuminatus* is recorded from Myanmar for the first time. A diurnal roost of about one hundred individuals was located in a celler beneath a monastery in Nyaungkharshay Village, in Waw Township. It was also found in Talinedat Cave and Kawtaung, in Taninthayi Division. This species ranges Laos, Cambodia, Thailand, Malaysia, Java, Borneo, Palawan, Bali and Lombok (Corbet and Hill, 1992). In addition, it is the 93rd new record of Myanmar bat species. The species, *Rhinolophus steno* was found to occur in India Single Rock Cave, in Mon State and Sanite Cave in Mandalay Division. This species ranges Tailand, Malaysia, Sumatra and Java (Corbet and Hill, 1992). It is also recorded from Myanmar for the first time.

Six species of studied bats; *Rhinolophus pusillus*, *R. macrotis*, *R. trifoliatus*, *R. thomasi*, *Myotis siligorensis* and *Ia io* were only recorded from Shan Plateau. Among these, the species *Ia io* is recorded from Hta-aim Cave in Shan State of Myanmar for the first time. This species is known from

north-east India, Nepal, southern China, Northern Thailand, Laos and Northern Vietnam (Bates and Harrison, 1997). *Rhinolophus pusillus* ranges from India, Thailand and Malaysia to Mentawai Islands and Java. Previous records from Myanmar include Bago in Bago Division (Dobson, 1876); Hai Bum in Kachin State (Carter, 1943); Myitkyina (LACM); Sagaing in Sagaing Division (Dobson, 1876); Alaungdaw Kathapa (Bates, personal communication). The species, *R. macrotis* ranges from Pakistan, north India, Nepal to southern China, Vietnam, Malaysia, Sumatra and Philippines (Bates and Harrison, 1997). This species was included in the checklist of Myanmar bats in Bates *et al.* (2000) on the basis of Map 44 in Corbet and Hill (1992). *Rhinolophus trifolius* ranges from northern India, Myanmar and Thailand to Java and Borneo (Bates and Harrison, 1997). In Myanmar, previous records include Gokteik Gorge in Shan State (in Ryley, 1914); Bankachon in Taninthayi Division (Wroughton, 1915); Chin Hill in Chin State (Wroughton, 1916); Kindat, Nam Tamai Valley, Taron Valley in Kachin State (BMNH). *Rhinolophus thomasi* ranges Myanmar, Thailand, Vietnam, Yunan and China (Tun Yin, 1993). There is only one previous records from Myanmar: Taho, Kayin Hill in Kayin State (Andersen, 1905). The species, *Myotis siligorensis* ranges Indo-China, Hai Bum in North Myanmar (Tun Yin, 1993).

Emballonura monticola, *Rhinolophus rouxii* and *Myotis muricola* were only found to occur in Taninthayi Division. The species *Emballonura monticola* ranges from southern Myanmar, Taninthayi, northern Thailand, Malaysia, Indonesia, Borneo and certain adjacent islands and the Philippines (Tun Yin, 1993). *Rhinolophus rouxii* ranges from India and Sri Lanka to Southern China and Vietnam (Bates and Harrison, 1997) and Northern Myanmar (Lal, 1981). *Myotis muricola* ranges from Afghanistan to Taiwan, New Guinea and Northern Myanmar (Bates and Harrison, 1997).

Two species of studied bats; *Rhinolophus* sp. and *R. shameli* were observed only in Mandalay Division. The putative new horseshoe bat species, *Rhinolophus* sp. was noted in the deeper recesses of the Payataung Cave, Patheingyi Township of Mandalay Division, and *R. shameli*, *Hipposideros larvatus* and *H. pomona* were caught together with this species. It is an example of the-Megaphylus group of *Rhinolophus* that are distinguished from other horseshoe bats by their noseleaf having a rounded connecting process of the sella. Other members of this group of bats that occur in Myanmar are *R. affinis* and the recently recorded *R. stheno* and *R. malayanus* (Bates *et al.*, 2000). Of these species, the Htonebo horseshoe bats closely resemble *R. malayanus*, which is the smallest of the group. However, those found at

Payataung Cave have smaller forearm and tibia measurements suggesting they may be taxonomically separate to *R. malayanus*. The species, *R. shameli* ranges Myanmar, Thailand and Cambodia (Corbet and Hill, 1992). Previous record from Myanmar includes Sagaing Division (Dobson, 1876). This species therefore seen to be distributed in central Myanmar.

The only one species, *Rhinolophus lepidus* was collected from Sagaing Division in the present study. This species ranges from Alghanistan, India, Myanmar and Thailand to Southern China, Malaysia and Sumatra. In Myanmar, previous records include Bagan (Wroughton, 1915), Kindat (Wroughton, 1916) and Nam Tamai valley (Bates and Harrison, 1997). This species is a widespread and fairly common species throughout its range, including the drier zones of Myanmar (Tun Yin, 1993).

The species *Myotis horsfieldii* was found to occur in Mon State. This species is known from southern China, Thailand and India to western Malaysia, Vietnam, Java, Bali, Sulawes, Borneo, Philippines (Bates, Hendrichsen, Walston and Hayes, 1999) and Lao PDR (Francis, Guillen and Robinson, 1999). The single specimen from Mudon Township of Mon State was collected over a small water course in a mist net and its surrounding area is adjacent to Kyauk-Ta-Lone Village.

The species *Myotis hasseltii* is observed to roost mainly under bridges although only one specimen was captured from human dwelling in Thongwa, Yangon Division. These could be mistaken as a piscivore as they are found in foraging on the water surface of Kandawgyi lake near Karawaik Hotel in Yangon. This species ranges from Sri Lanka and North-east India to Myanmar, Thailand, Cambodia, Western Malaysia and Indonesia (Bates and Harrison, 1997).

The species *Tadarida plicata* roosts in Shwedagon Pagoda (Yangon), Bee throne Palace (Bago), and in Linno and Damathat Caves (Kayin and Mon States). The guano of this species is noted to serve as a good fertilizer for cultivated crops and is extensively utilized as fertilizer in Pa-an where a large colony of this species occupy in Lino Cave of this town in Kayin State. This species ranges from India and Sri Lanka to Myanmar, Southern China and Vietnam, Southeast to Philippines and Indonesia (Bates and Harrison, 1997).

Summary and Conclusion

Distribution of 45 insectivorous bat species; *Craseonycteris thonglongyai*, *Emballonura monticola*, *Taphozous melanopogon*, *T. theobaldi*, *T. longiminus*, *Megaderma lyra*, *M. spasma*, *Rhinolophus affinis*, *R. rouxii*, *R. pusillus*, *R. lepidus*, *R. macrotis*, *R. trifolius*, *R. pearsoni*, *R. malayanus*, *R. stheno*, *R. thomasi*, *R. shameli*, *R. acuminatus*, *R. marshalli*, *Rhinolophus* sp., *Hipposideros pomona*, *H. larvatus*, *H. armiger*, *H. lylei*, *H. ater*, *H. fulvus*, *Aselliscus stoliczkanus*, *Tadarida plicata*, *Myotis siligorensis*, *M. muricola*, *M. horsfieldii*, *M. hasseltii*, *M. chinensis*, *Scotophilus heathii*, *S. kuhlii*, *Ia io*, *Pippisterillus javanicus*, *P. pulveratus*, *P. coromandra*, *P. paterculus*, *P. affinis*, *P. ceylonicus*, *Miniopterus pusillus* and *M. magnater* were recorded from Myanmar.

The distribution of Myanmar bat species was reviewed by Bates and Harrison (1997) and further surveys were recently conducted by Bates *et al.*, 2001 and 2002. They reported that the bat fauna of Myanmar with 92 species. The figure compares favorably to the 119 species known from the Indian Subcontinent (India, Pakistan, Sri Lanka and Nepal-Bates and Harrison, 1997). It exceeds the 71 currently known from Vietnam (Corbet and Hill, 1992; Bates *et al.*, 1999) and is comparable to the 76 species recently positively identified from Lao PDR (Francis *et al.*, 1999). It suggests that future research, targeted at areas that have not been extensively collected in the past, or, conversely, areas that are already known to be diverse but have not been researched using modern methods, may be particularly productive.

The informatics data given in this study would surely serve as an invaluable source of reference. However, due to time limitation, this work could not include more information than what is given now.

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