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OCCURRENCE OF *Rhinopoma microphyllum* (Brunnich, 1782) IN KHYBER PAKHTOONKHAWA, PAKISTAN

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ABSTRACT

The present study was conducted to explore the bats of Khyber Pakhtunkhwa, Pakistan. During the present study 52 bats were collected through the mist nets from FR, Peshawar in District Peshawar and Mazdurabad and Ghanu Deri from District Mardan for a period of two years from July 2011 to May 2013. They were identified on the basis of morphological and cranial measurements. Mean (±SD) of the body mass (BM), head and body length (HBL), forearm length (FA) and wingspan (WS) were identified as 19.09±1.36mm, 65.29±2.20 mm, 68.71±1.05 mm and 197±9.7 mm, respectively.The tail is shorter than the forearm proportionally. While the skull is sagittal and measured ascondylo-canine length (CCL) 18.61±0.21mm, greater skull length (GTL) 19.64±0.21 mm and Zygomatic breadth (ZB)12.13±0.15 mm.There were no significant ($P<0.05$) morphological and cranial variations among all the samples collected from the study area. On the basis of morphological and cranial measurements the species was identified as *R. microphyllum*for the first time and after 27 years from the Khyber Pakhtunkhwa.

Keywords: *Chiroptera,* morphology, Charsadda, greater Asiatic yellow bat, Pakistan.

INTRODUCTION

Greater Mouse-tailed bat, *Rhinopoma microphyllum* (Brunnich, 1782) belonging to genus Rhinopoma (E. Geoffroy, 1818) and family Rhinopomatidae,is a medium sized bat with free tail, larger in body size than the *Rhinopoma hardwickii* and *Rhinopoma muscatellum*. The face of this species is glandular, the ears are connected across the forehead, and the feet are slender but larger than the *Rhinopoma hardwickii* (Bates and Harrison, 1997).Its distribution range extends from northern Africa through southwest Asia to Afghanistan, Pakistan and India. In southwest Asia, there is only a single record from Sumatra and Thailand. InPakistan this species was recorded from Gujrat, Sakesar, Rohtas, Jehlum, Multan, Mailsi(Lindsay, 1927; Roberts, 1977)while in Khyber Pakhtunkhwa *R. microphyllum* was only recorded from Malakand Hills (Roberts, 1977). They live in arid areas, where rainfall is usually less than 300 mm and with sparse vegetation. This is a true desert species which is adapted to this habitat by having valved nostrils (Sharifi, 2002). *Rhinopoma microphyllum* roosts in crevices, small caves, mines, underground tunnels, wells, old monuments and buildings.They can tolerate low relative humidity and light and accumulate fat during the autumn and remain active throughout the year (Aulagnier and Palmeirim, 2008).*Rhinopoma microphyllum* lives in large colonies from few to hundreds individuals. It also cohabits with *Rhinopoma hardwickii* and *Taphozusperforatus* (Badwaik, 1992), *Mega derma lyra* and *Taphozusnudiventris* (Brosset, 1962). According to Roberts (1977) it migrates in mid-October in Punjab and in mid-May. The tongue of this species is highly adapted for insect feeding and may play an important role in the control of pest insects in the crop ecosystem (Agarwal and Gupta, 1982).

Bats are an important bio-indicator (Jones et al. 2009) and are known to play a significant role in pollination and seed dispersal (Marshall, 1983; Fujita and Tuttle, 1991; Rainey *et al.* 1995; Banack, 1998). Unfortunately, habitat loss is a major threat to the existing bat populations around the world (IUCN, 2009).There are 50 bat species, belonging to 8 families and 26 genera, while complete taxa is still unknown (Roberts, 1997).

The current study was planned to record the distribution of Greater mouse-tailed bats in Khyber Pakhtoonkhawa and to study their morphometric characteristics.

MATERIALS AND METHODS

Study area: The present research was carried out on bats in two districts of Khyber Pakhtoonkhawa (KP), Pakistan. Bats were collected over a duration of two years (July, 2011- May, 2013) form Mardan district and Frontier region of Peshawar district. Mist nets of 6m, 9m, and 12m size were used for capturing the bats from a variety of habitats such as croplands, woodlands, mainlands, crevices, caves, old buildings, ponds and canals. The collected specimen were brought to the laboratory for morphological and cranial measurements and identified by comparing with Bates and Harrison (1997). Bats more than the desired samples were released. Data was analyzed statistically by using statistica® by least significant difference (LSD) at $p<0.05$.

RESULTS

The present research was conducted to record bats of Districts Mardan and Peshawar for the first time. During 2 years (July-May, 2011-2013) a total of 52 bats were collected from District Peshawar and Mardan Peshawar and its adjacent areas in KP, Pakistan. *R. microphyllum* were abundant bats and were collected from Village Mazdurabad in District Mardan and FR, Peshawar in District Peshawar (Fig 1 and 2).

Morphometric measurements: The bats were identified on the basis of morphometric measurements such as body weight (BW), head and body length (HBL), forearm length (FA), wingspan (WS), tibia length (TB) were measured. In addition to morphological and cranial analysis, some physical features such as fur colour and facial structure were also recorded. Mean body weight, head and body length and forearm length of *R. microphyllum* collected from study areas were as 19.09±1.36g, 65.29±2.2mm and 68.71±1mm, respectively. While wingspan, tibia and hind foot were recorded as 197.49±9.76mm, 26.91±1.14mm and 15.93±0.43mm, respectively (Table 1).

Table 1. Morphometric and cranial measurements of the *Rhinopoma microphyllum* collected from District Peshawar and Mardan, KP, Pakistan

Body measurements	Mean±SD	Cranial measurements	Mean±SD
Body mass	19.09±1.36	Condylocanine length	18.61±0.21
Head and body length	65.29±2.20	Maxillary tooth row length	7.38±0.26
Tail length	57.20±2.80	Mandibular tooth row length	7.88±0.21
Ear length	21.69±0.63	Greatest length of the skull	19.64±0.21
Thumb with claw length	15.43±0.24	Mandible length	14.41±0.26
Forearm length	68.71±1.05	Anterior palatal width	9.31±0.27
2^{nd}metacarpal length	52.02±1.63	Zygomatic breadth	12.13±0.15
1phalanx on 2^{nd} metacarpal length	5.03±0.21	Breadth of the braincase	8.62±0.22
2^{nd}phalanx on 2^{nd}metacarpal length	4.36±0.31	Posterior palatal width	4.96±0.19
3^{rd}metacarpal length	52.41±1.86	Post orbital constriction	2.66±0.23
1phalaxn on 3^{rd}metacarpal length	9.97±0.42		
2^{nd}phalanx on 3^{rd}metacarpal length	16.80±2.63		
4^{th}metacarpal length	41.93±1.27		
1^{st}phalanx on 4^{th}metacarpal length	15.23±0.62		
2^{nd}phalanx 4^{th}metacarpal length	11.11±0.56		
5^{th}metacarpal length	47.10±0.66		
1^{st}phalanx on 5^{th}metacarpal length	11.16±0.30		
2^{nd}phalanx on 5^{th} metacarpal length	9.78±0.47		
Wingspan	197.49±9.76		
Tibia length	26.91±1.14		
Hind foot length	15.93±0.43		

Cranial measurements: Mean cranial data, i.e. condylocanine length (CCL), the greatest length of the skull (GTL), zygomatic breadth (ZB), maxillary tooth-row length (C-M^3) and mandible length (C-M_3), were recorded as 18.61±0.2 mm, 19.64±0.21 mm, 12.13±0.1, 7.38±0.26 mm and 7.88±0.21, respectively (Table 2).

Table 2. Comparison of mean external body and cranial measurements of *Rhinopoma microphyllum* with comparison of mean external body and cranial measurements with Bates and Harrison, 1997, Roberts, 1997 and Srinivasulu *et al.*, 2010

R. microphyllum	Mean±SD	Roberts, 1997	Bates and Harrison, 1997	Srinivasulu *et al.*, 2010
Body mass	19.09±1.36	14 g		
Head and body length	65.29±2.20	81mm (74-90mm)	75.3±6.2 (30)	60.0-84.0 mm
Tail length	57.20±2.80	50mm (46-55mm),48-62mm	58.1±5.6(30)	50.0-70.0mm
Ear length	21.69±0.63	20.5mm(19-22mm)	19.7±1.1(31)	18.0-22.0mm
Thumb with claw length	15.43±0.24	15.5mm(15-16mm)	15.0±1.0(23)	
Forearm length	68.71±1.05	68mm(61-71mm), 60-72mm	68.0±3.3(32)	59.5-74.6mm
Hind foot length	15.93±0.43			14.0-18.0mm
Condylocanine length	18.61±0.21	-	-	17.2-22.7 mm
CM^n	7.38±0.26	-	-	7.0-8.0 mm
CM_n	7.88±0.21	-	-	7.6-8.6 mm
M	14.41±0.26	-	-	13.7-15.8 mm

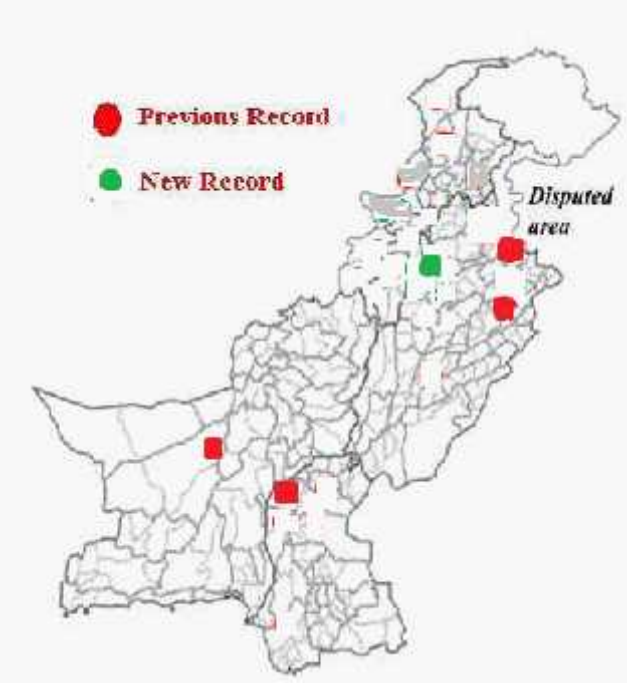

Fig. 1. Map of Pakistan highlighted with red shows old record of The greater mouse-tailed bat, *Rhinopoma microphyllum* Brunnich, 1782 and highlighted with green shows new record (Present study)

Fig. 2. *Rhinopoma microphyllum* recorded from northwestern parts of Khyber Pakhtunkhwa, Pakistan May 2011 to July 2013.

DISCUSSION

R. microphyllum is a medium sized bat with a free tail. The face is glandular and the ears are connected across the forehead. The eyes of this species are developed. The muzzle is terminated in a noseleaf structure. Pinna is large and has ten transverse ridges. The tragus of the ear is well developed. The feet are slender, but larger than in *R. hardwickii*. Plagiopatagium is broad and that form most of the wing membrane. Inter-femoral membrane is short and encloses one fourth of the tail. *Rhinopoma microphyllum*is found in a variety of habitats, including old buildings, crevices and cracks, among crown and leaves of palms and tree cavities singly or a colony of 50 individuals. It emerges late from the roosting site and fly at a steady speed (Bates and Harrison, 1997). During the present study, they were found in a cave in the mountainous region of FR,

Peshawar. This cave is about 50 km away from the main Baghbanan road at the south. This was an old cave, comprised of 168 individuals of both males and females living together in a single colony. The floor of the cave was filled with bat guano. While in District Mardan they were recorded from Mazdurabad, 3 km away from Mardan city. The roost was present in an old mud made building crevices, comprised of about 50 individuals. This roost was also present in an agriculture land farm and vegetation landscapes. According to Bates and Harrison (1997), mean head and body length (HBL) and forearm length (FA) were as 75.3±6.2 mm, 68±3.3 mm, respectively. While in the present study HBL and FA were recorded as 65.29± 2.2 mm and 68.71±1mm, respectively. Both HBL and FA fall within the range recorded by Bates and Harrison (1997). *Rhinopoma microphyllum* is distinguished from *R. hardwickii* and *R. muscatellum* by its large size. The greater length of the skull 18-22 mm and the forearm 57-72 mm. While, in *R. hardwickii* and *R. muscatellum* the forearm length is 46-63 and skull length is 14-19 mm (Qumsiyeh and Jones, 1986).During the present study the skull length measured was 19.17-20.42 mm. This showed that there was no any morphometric variations among*R. microphyllum* of KP and already recorded from sub-continent.

Conclusion: During the present research *R. microphyllum*was explored for the first time and identified as the most abundant species in two Districts Peshawar and Mardan of Khyber Pakhtunkhwa. This bat was common in the old buildings, crevices and cracks of the walls in the study area.

Recommendations: Further study on their biology, ecology and conservation will be needed to cover the complete aspects of their study. While, their genetic analysis will be a new addition to the field of genetics. Some important conservation measures are needed immediately to protect them.

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