

**DESCRIPTION OF THE FIRST RECORD OF THE INDIAN FALSE VAMPIRE BAT
(*Megaderma lyra*) E. Geoffroy, 1810 (RHINOPOMATIDAE: CHIROPTERA) CAPTURED
FROM NORTHWESTERN PAKISTAN**

M. Salim and M. Mahmood-ul-Hassan*

Department of Forestry and Wildlife Management, University of Haripur, Haripur, Pakistan.

*Department of Zoology and Fisheries, University of Agriculture, Faisalabad

Corresponding author's Email: drmmhassan@uaf.edu.pk; drmmhassan1@gmail.com

ABSTRACT

The greater false vampire bat *Megaderma lyra* is an Indomalayan bat species. Although this species has been reported from Punjab, Sind and Baluchistan, no specimen has been captured from Khyber-Pakhtunkhwa (KP). We report its occurrence further northwest of Pakistan in Malakand district where 40 greater false vampire bats were recorded roosting in a chromite mine at *Heroshah* of tehsil Dargai. We used a hand net to capture the bats. Upon examination it was found that all were females. The captured bats were identified on the basis of their unique facial appearance, an erect and elongated nose-leaf and large oval ears that joined on the forehead. This paper documents craniomorphometric characteristics of the greater false vampire bats inhabiting northwestern part of the country and compares with previous available records.

Key words: First record; Malakand; Heroshah; Chiroptera.

INTRODUCTION

Family Megadermatidae (Chiroptera: Mammalia) is one of the eight bat families that are confined to the Old World tropics (Bates and Harrison, 1997) and consists of four genera and six species worldwide. Three genera (*Cardiaderma* Peters, 1873, *Lavia* Gray 1838 and *Macroderma* Miller, 1906) are monospecific (*C. cor*, *L. frons* and *M. gigas*) while the fourth one i.e. *Megaderma* E. Geoffroy, 1810 is represented by two species. Of these two, *M. lyra* E. Geoffroy, 1810 is a larger Oriental species that differs from its congener (*M. spasma*) by a longer forearm, short and broad tragus, deep prenasal notch and smaller post-orbital process (Csorba and Topal, 1994). It is due to these morphological differences that *M. lyra* is placed in a separate subgenus *Lyroderma* (Lekagul and McNeely, 1977).

Family Megadermatidae, represented in Pakistan only by a single species i.e. *Megaderma lyra*, is widely distributed in the south and southeast Asia from Afghanistan to southern China, Burma, Thailand, Cambodia, Laos, Vietnam, south to Sri Lanka, West Malaysia and Bangladesh (Simmons, 2005). The mammal collection of the British Museum (London) houses seven specimens of *M. lyra* from Pakistan of which six were collected from Lehtrar (Murree), Punjab and one from Baluchistan (Siddiqi, 1961). The Baluchistan specimen was collected from Lasbela (Roberts, 1997). Some specimens have also been collected from Lahore and Sialkot (Punjab), and from Sukker in Sindh (Roberts, 1997). However, this species

has never been recorded from northern Pakistan. Although these bats have been collected from Nangahar Province in Afghanistan (Gaislar, 1970), the species has not been reported from Iran (Roberts, 1997; Bates and Harrison, 1997; Simmons, 2005; Mahmood-ul-Hassan *et al.*, 2009).

This paper documents craniomorphometric characteristics of five specimens of *M. lyra* collected for the first time from District Malakand, Khyber Pakhtunkhwa.

MATERIALS AND METHODS

Malakand district (N34°33'56" E71°55'51") is located in northwest Pakistan at an elevation of 844 m above sea level. It is bounded on the north by the district Lower Dir, on the northeast by Swat and southeast by Buner. Mardan and Charsadda districts lie in south while Bajaur and Mohmand Agencies lie in west of Malakand district. The district is surrounded by mountains on the northeast and west that separate it from Swat, Bajaur and Mohmand, respectively. The district is famous for chromite and granite mining and is typified by steppe forest in intermediate latitudes vegetated with *Juniperus macropoda*, *Franxinus xanthoxyloides*, *Pinus gerardiana*, *Artemisia maritime*, *Rheum emodi*, *Ephedra nebrodensis*, *Rosa webbiana*, *Tennisetum orientalis*, *Pistacia mutica*, *Thymus serpyllum* and *Eremurus aurantiacus*. The mammal fauna of the area includes the collared pika *Ochotona rufescens*, the migratory hamster *Cricetulus migratorius*, the stone martin *Martes foina*, the forest dormouse *Dryomys nitedula*, the Persian jird *Meriones*

persicus and the mouse-like hamster *Callomyscus bailwardi* (Roberts, 1997; Ali *et al.*, 2012).

A survey of the Malakand Division (Pakistan) was carried out to record its bat fauna. All the potential bat roosts such as mines, old and undisturbed buildings, abandoned wells and farm houses were thoroughly searched (Mahmood-ul-Hassan *et al.*, 2012). Local people were interviewed for gaining information about the exact location of various bat roosts. A handheld GPS (Garmin Etrax H) was used to record geographical coordinates. A total of 40 *M. lyra* were found roosting in a mine at Heroshah, (N34° 26.762 E71° 49.064), Tehsil Dargai. The mine was 83 m long, 1.5 m high and 2 m wide, and had been mined for the last ten years. The floor was littered with bat guano.

We used a locally made hand net to capture the bats all of which were adult females. The captured specimens were placed in separate cotton bags, weighed up to 0.1 g (Pesola Spring Balance 300g) and measured before being euthanized and preserved in absolute alcohol. Specimens were then brought to the laboratory for recording cranial measurements. The skulls (n =3) were prepared and measured following Bates *et al.* (1997, 2005) and Javid *et al.* (2012a,b). The remaining two specimens remained preserved in absolute alcohol in the BatLab, Department of Zoology and Fisheries, University of Agriculture, Faisalabad.

RESULTS

Distribution: Of the seventeen mines roosts visited, only a single colony of *M. lyra* was recorded from Heroshah where it was co-roosting with *Rousettus leschenaultii* and *Hipposideros fulvus*.

Dental Formula. 0123/2123=28

Morphology. This is a large bat with a big head and prominent muzzle. Its huge semi-naked ears, which are bluntly rounded, join in the middle of the forehead and possess bifurcated tragus. The noseleaf is simple, straight and long enough to reach almost near the forehead. The skin of the nose leaf is pink and naked with a ridge and two furrows in the middle. The eyes are quite large and prominent. The lower jaw is comparatively longer the upper one. Dorsal body fur is mouse grey and consists of long, fine and silky hair. The belly fur is a paler and more yellowish grey. Wings are broad as the fifth digit is relatively long. The second phalanx on the second metacarpal is absent. Tail does not extend beyond the inter-femoral membrane which is supported by calcars. Female have two pectoral mammae with two more false teats in the pubic region.

Table 1. Comparison of mean external body and cranial measurements (mm) of *Megaderma lyra* captured from Heroshah tehsil Dargai in Malakand district (present study) with a previous studies from South Asia (Bates and Harrison, 1997) and Pakistan (Roberts, 1997).

Body Parameters	Mean±SD		Range		Roberts, 1997
	Bates and Harrison	Present study	Bates and Harrison	Present study	
Head and Body	82.8± 5.9	85.40±2.41	70.0-95.0	82.00-88.00	76-94
Ear	37.9± 1.8	38.14±3.63	31.5-45.0	31.70-40.00	33-40
Forearm	66.4±2.2	70.00±0.71	56.0-71.5	69.00-71.00	65-72
Wing span	416.7±32.4	452.00±1.58	396-454	450.00-454.00	
Hind foot	16.7±1.4	18.00±1.22	14.0-20.0	17.00-20.00	45-47
Nose-leaf height	-	10.00±0.00	-	10.00-10.00	
Greatest skull length	28.7± 0.6	29.60±0.46	27.1-30.2	29.10-30.01	
Condylacanine length	25.4±0.5	26.37±0.21	24.5-27.8	26.20-26.60	
Zygomatic Breadth	16.4±0.4	17.01±0.01	15.4-17.1	17.00-17.01	
Breadth of the braincase	12.2±0.2	12.57±0.25	11.8-12.9	12.30-12.80	
Post-orbital constriction	4.7±0.1	4.97±0.12	4.3-5.2	4.90-5.10	
Maxillary tooth row length	11.2±0.3	11.40±0.10	10.6-12.1	11.30-11.50	
Mandibular tooth row length	12.2±0.3	11.94±0.04	11.6-12.2	11.90-11.98	
Mandible length	19.8±0.5	20.04±0.03	18.8-21.2	20.01-20.07	

Body Mass and External Body Measurements. The mean body mass of the five *M. lyra* was 52.40g ± 3.58 (SD). Their head and body length was 85.56 mm ± 2.40 (SD) while their ear was 38.19 mm ± 3.65 (SD) long. Mean thumb and forearm length was 11.80 mm ± 0.44 (SD) and 70.06 mm ± 0.69 (SD), respectively. The tragus

height was 13.00 mm ± 0.01 (SD). The nose leaf height was 10.00 mm ± 0.00 (SD). The length of 2nd metacarpal was 57.43 mm ± 1.50 (SD). The mean length of 1st phalanx on 2nd metacarpal was 8.09 mm ± 1.51 (SD). The mean length of 3rd metacarpal was 51.43 mm ± 0.88 (SD) while that of 1st and 2nd phalanges on 3rd metacarpal were

29.63 mm \pm 1.11 (SD) and 51.43 mm \pm 0.52 (SD), respectively. The mean length of 4th metacarpal was 56.25 mm \pm 0.42 (SD). The mean length of 1st and 2nd phalanges on 4th metacarpal was 18.43 mm \pm 0.88 (SD) and 24.27 mm \pm 0.75 (SD), respectively. The mean length of 5th metacarpal was 60.85 mm \pm 0.82 (SD) while that of 1st phalanx on 5th metacarpal was 21.22 mm \pm 0.44 (SD). The length of 2nd phalanx on 5th metacarpal was 20.62 mm \pm 0.52 (SD). The mean wing span was 452.00 mm \pm 1.58 (SD). Their tibia and calcar were 36.33 mm \pm 1.07 (SD) and 9.86 mm \pm 1.01 (SD), respectively while the length of hind foot was 18.08 mm \pm 1.17 (SD).

Cranial Measurements. Mean greatest length of skull of the three specimens was 29.60 mm \pm 0.46 (SD) (Plate 2). The breadth of braincase was 12.57 mm \pm 0.25 (SD) while that of zygomatic bone was 17.01 mm \pm 0.01 (SD). The post-orbital constriction was 4.97 mm \pm 0.12 (SD) long. The mean condylo-canine length was 26.37 mm \pm 0.21 (SD). Anterior and posterior palatal widths measured 5.79 mm \pm 0.14 (SD) and 9.93 mm \pm 0.13 (SD), respectively. The maxillary toothrow length was 11.40 mm \pm 0.10 (SD). The mandibular tooth row length was 11.94 mm \pm 0.04 (SD). The mandible length was measured as 20.04 mm \pm 0.03 (SD).

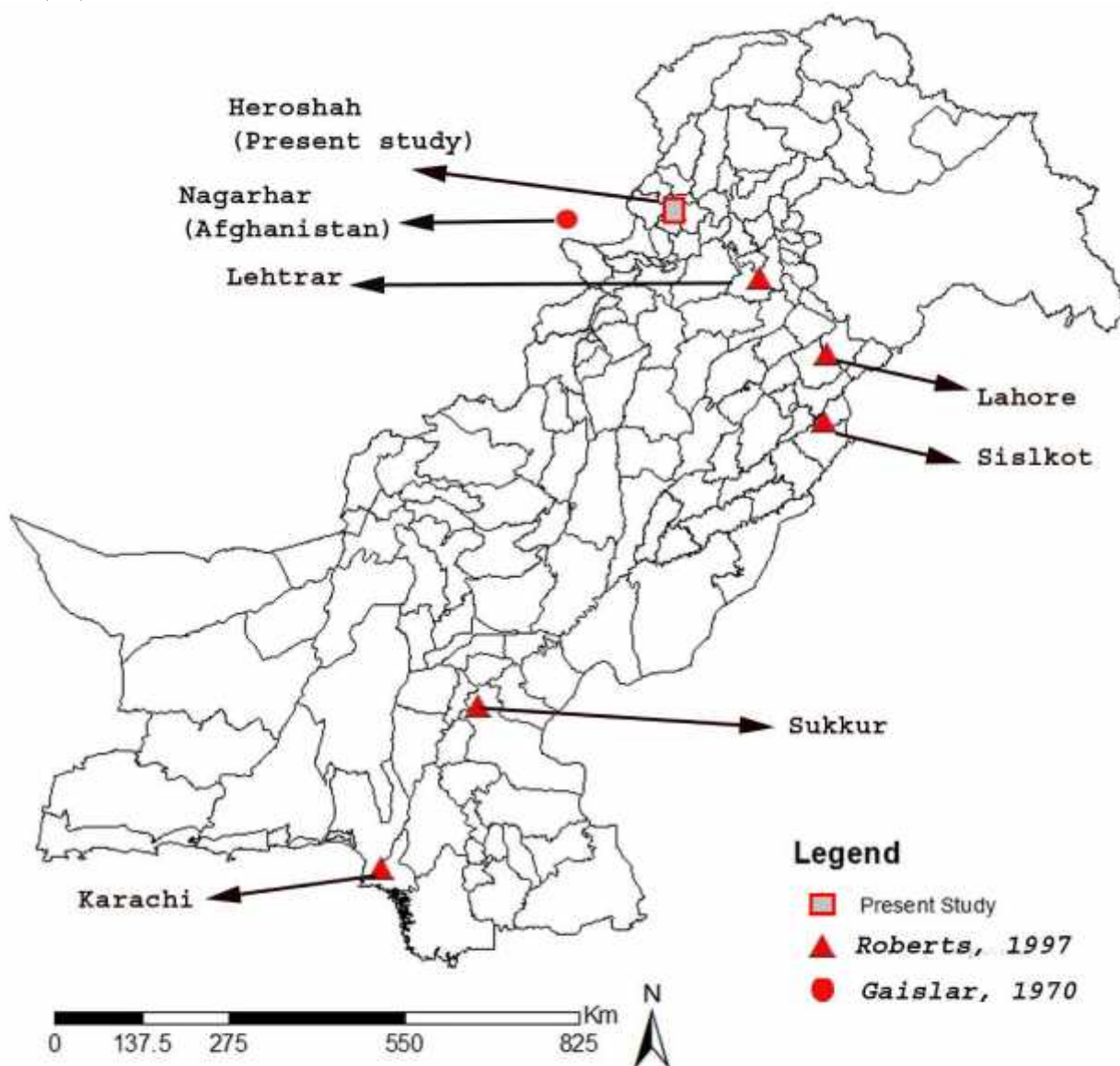


plate I. Map showing the roosting places of *Megaderma lyra* recorded from Pakistan and Afghanistan along with the first record from a cromite mine at Heroshah in tehsil Dargai of district Malakand in northern Pakistan.

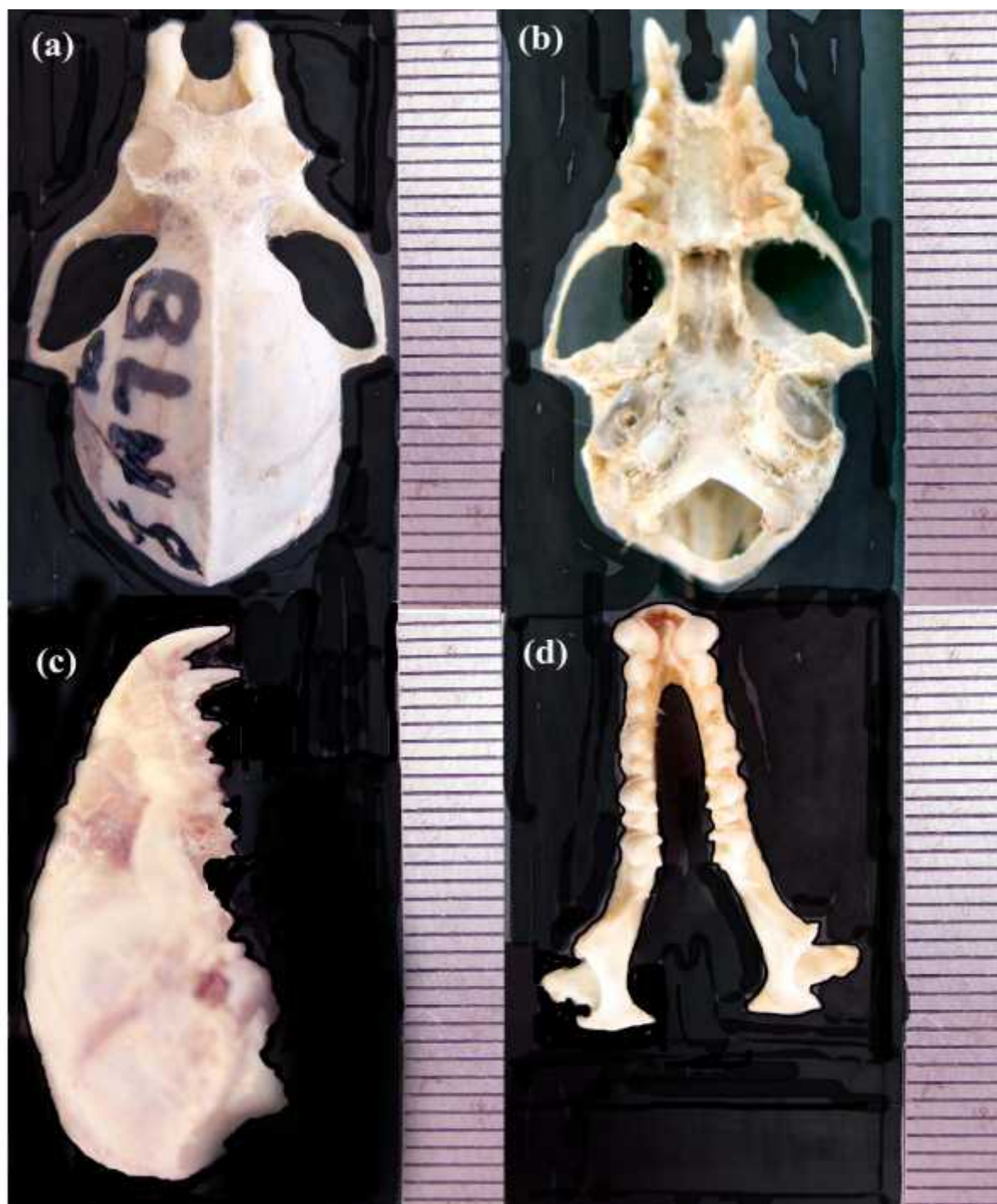


Plate 2. Dorsal (a), Ventral (b) and Lateral (c) view of the skull of *Megaderma lyra* and dorsal view (d) of the lower jaw of a specimen (BatLab 4 9) Captured form Heroshah in Tehsil Dargai of District Malakand.

DISCUSSION

The bat fauna of Pakistan is the least explored both in terms of the number of bat species and their distribution (Mahmood-ul-Hassan and Nameer, 2006). Most of the studies on bats of the country were done

during the British reign, and as such no major reference bat collection is available in any museum of the country even today. Descriptions of some bats (e.g. *Hipposideros cineraceus* and *Triaenops persicus*) are based only on a single specimen and have not been collected afterwards from the country. Siddiqi (1961), Roberts (1977, 1997), Bates and Harrison(1997), Mahmood-ul-Hassan *et al.*

(2009) and Srinivasulu *et al.* (2010) are the main sources of information on the bat fauna of the country but mainly relied on reviews. Mahmood-ul-Hassan *et al.* (2011) and Javid *et al.* (2012a, b) have made some recent efforts to redefine distribution and status of some bat species in Punjab, Pakistan. The bat fauna of northern Pakistan has however remained unexplored so far. Detailed knowledge about almost all the bat species is currently lacking thereby making a perplexing situation regarding their taxonomy and distribution.

The new bat species are generally recorded from the area that either has remained least surveyed or the species have changed their distribution ranges over the past few decades. Both these situations are true in case of Pakistan. The cavernicolous roost from which these *M. lyra* were recorded lies in the northwest of Lehtrar (Murree) Punjab at 167.8 km and 115.6 degrees and southwest of Nangarhar Province Afghanistan at 112.2 km and 259.2 degree and represents the first record of *M. lyra* from northern Pakistan.

The false vampires are neither blood sucking nor the members of family Desmodontidae which are confined to South America (Roberts, 1997). They belong to an ancient family of carnivorous bats and are placed in super family Rhinolophoidae along with rhinopomatid and rhinolophid bats in the Suborder Yinpterochiroptera (Springer *et al.*, 2001; Teeling *et al.*, 2005; Jones and Teeling, 2006).

Like most of the Oriental bat species, *M. lyra* colonized Pakistan from the south through the savannah type vegetation of the Rann of Katch as well as from the north through the Himalayan foothills (Mahmood-ul-Hassan *et al.*, 2009). Its colonies have been recorded in man-made structures such as temples, cellars, natural caves and open wells (Brosset, 1962; Eates, 1968; Roberts, 1997) and diet includes small mammals, birds, frogs and fishes as well as large insects (Hill and Smith, 1984). Owing to its feeding habits, the false vampire bat is acknowledged as a good friend of farmers and is rewarded with protection by farmers, who call it the “goddess Laxmi” and provide it food during harsh weather (Mahmood-ul-Hassan and Nameer, 2006). Colonies ranging from 25 to 240 individuals, consume rats and mice, which destroy different grains stored in bags (Sinha, 1986).

The cranio-morphometric comparison of the bat specimens captured from Heroshah revealed that the bats captured from northern Pakistan averaged a bit larger than those reported by Bates and Harrison (1997). All their body parameters however were in the ranges recorded by Bates and Harrison (1997) and Roberts (1997) (Table 1).

Acknowledgements: This study was partly funded by the Rufford Small Grants Foundation (UK) and Bat Conservation International (USA). The financial

assistance provided by these funding agencies is gratefully acknowledged.

REFERENCES

- Ali, H., F. M. Qamar, M. S. Ahmad, U. Khan, A. H. Habib, A. A. Chaudhry, F. Ashraf and B. N. Khan (2012). Ecological ranking of districts of Pakistan: A geospatial approach. *Pakistan J. Bot.* 44: 263-268.
- Bates, P. J. J. and D. L. Harrison (1997). *Bats of the Indian Subcontinent*. Harrison Zoological Museum, UK. Pp 258.
- Bates, P. J. J., T. V. Dinh and S. Bumrungsri (2005). Voucher specimen preparation: bats. Part of the Darwin Initiative Project: Taxonomic initiative for Southeast Asian bat studies (Vietnam, Thailand, Cambodia and Lao PDR). 12pp.
- Brosset, A. (1962). The Bats of Central and Western India., III. *J. Bombay Nat. Hist. Soc.* 59: 1-57 (Part I); 583-624 (Part II); 707-747 (Part III).
- Eates, K. R. (1968). An Introduction to the Vertebrate Fauna of Sind and Khairpur State. Chapter iii. West Pakistan Gazetteer-Sind Region, Government of West Pakistan. *Mammalia*: 33-52.
- Csorba, G. and G. Topal (1994). First record and taxonomic status of *Megaderm alyra* from Vietnam (Mammalia: Chiroptera). *Annls. Hist.-nat. Mus. Natn. Hung.* 86: 125-132.
- Gaisler, J. (1970). The bats (Chiroptera) collected in Afghanistan by Czechoslovak expedition of 1965-67 *Prirodovedne. Pr. Cesk. Akad.Ved.* 4, 6: 1-56.
- Javid, A., M. Mahmood-ul-Hassan, M. Afzal, M. Sajid Nadeem and S. M. Hussain (2012a). Recent record of the least pipistrelle *Pipistrellus tenuis* (Vespertilionidae: Chiroptera) from the Margalla Hills National Park Pakistan. *J. Anim. Pl. Sci.* 22: 1042-1047.
- Javid, A., M. Mahmood-ul-Hassan, M. S. Nadeem N. Rana and N. Khan (2012b). First record of the lesser mouse-tailed bat *Rhinopoma hardwickii* (Rhinopomatidae: Chiroptera) from southern Punjab, Pakistan. *J. Anim. Pl. Sci.* 22: 278-282.
- Jones, G. and E. C. Teeling (2006). The evolution of echolocation in bats. *Trends in Ecology and Evolution.* 21: 149-156.
- Lekagul, B. and J. A. McNeely (1977). *Mammals of Thailand*. Sahakarnbhat Co., Bangkok. Pp.758
- Mahmood-ul-Hassan, M. and P. O. Nameer (2006). Diversity, role and threats to the survival of bats in Pakistan. *J. Anim. Pl. Sci.* 16: 38 – 42.
- Mahmood-ul-Hassan, M., A. Javid, S. Ashraf and M. S. Nadeem (2012). An extra-limital record of the

- Egyptian Tomb Bat (*Taphozous perforatus*) from Pakistan. Mammalia. 76: 227-292.
- Mahmood-ul-Hassan, M., G. Jones and C. Dietz (2009). Bats of Pakistan. The least known mammals. Verlag Dr. Muller. Saarbrücken, Germany. Pp. 168.
- Roberts, T. J. (1977). The Mammals of Pakistan. Earnest Benn Ltd. UK.
- Roberts, T. J. (1997). Mammals of Pakistan. Revised Ed. Oxford Univ. Press. Oxford.
- Siddiqi, M. S. (1961). Checklist of Mammals of Pakistan with particular reference to the mammalian collection in British Museum (Nat. Hist.), London. Biologia 7: 93-255.
- Simmmons, N. B. (2005). Chiroptera. In. Mammals Species of the World – A Taxonomic and Geographic Reference. (Eds.) Wilson, D. E. and Reeder, D. M. 3rd Ed. I. John Hopkins Univ. Press. USA.
- Sinha, Y. P. (1986). The Bats of Bihar: Taxonomy and field ecology. Record Zool. Surv. India. Misc. Pub. Occ. Pap. No. 77: 1-60.
- Springer, M. S., E. C. Teeling, O. Madsen, M. J. Stanhope and W. W. deJong (2001). Integrated fossil and molecular data reconstruct bat echolocation. PNAS. 98:6241-6246.
- Srinivasulu, C., P. A. Racey and S. Mistry. (2010). A key to the bats (Mammalia: Chiroptera) of South Asia. J. Threat. Taxa 2: 1001 – 1076.
- Teeling, E. C., M. S. Springer, O. Madsen, P. J. J. Bates, S. J. O'Brien and W. J. Murphy (2005). A molecular phylogeny for bats illuminates biogeography and the fossil record. Science. 307: 580-584.