ABSTRACT: Seven species belonging to 5 genera of 4 families were recorded during May 2011 and September 2012 in Charsadda, Kohat, Mardan, Nowshera and Peshawar, Khyber Pakhtunkhwa, Pakistan. The bat species included: one fruit bat species (Pteropus giganteus; Pteropodidae), one fulvus leaf-nosed bat (Hipposideros fulvus; Hipposideridae), one greater mouse-tailed bat (Rhinopoma microphyllum; Rhinopomitidae), three Pipistrellus bats of Vespertilionidae (Indian Pipistrellus, Pipistrellus coromandus; least Pipistrellus, P. tenuis; Jawan Pipistrellus, P. javinacum) and one greater Asiatic yellow house bat (Scotophilus heathii; Vespertilionidae). A detailed study is required for further exploration of bat fauna in the study areas.

Keywords: Bat, Charsadda, Chiroptera, Kohat, Mardan, Nowshera, Peshawar

INTRODUCTION

Order Chiroptera is divided into Megachiroptera (fruit bats) and Microchiroptera (insectivores bats) (Koopman, 1993; Bates and Harrison, 1997; Wilson and Reeder, 2005). The bats exist everywhere, except Antarctic, Arctic and some isolated oceanic islands (Hutson et al., 2001). They comprise of 1150 recognized extant species (Schipper et al., 2008) and are major contributor to mammalian biodiversity (Mayer et al., 2010). In the Indian subcontinent, 119 bat species have been recorded belonging to 8 families and 37 genera from Afghanistan, Nepal, India, Pakistan, Sri Lanka, Northern Myanmar and Maldives (Bates and Harrison, 1997). These bat species are now striving hard to survive in the region (Bates and Harrison, 1997). Bats comprise greater than one fourth of the known mammal species in Pakistan (Roberts, 1997) but are the least studied mammals (Mahmood-ul-Hassan et al., 2009). It is still unclear about the exact number of the bat species, although more than 50 species of bats representing 26 genera of 8 families are reported in Pakistan.

The ecological services of the bats are very well acknowledged in the whole Europe (Fujita and Tuttle, 1991; Michelbergh et al., 1992). They are forecasting climate variations and habitat decline of an ecosystem as they are considered as universally important bio-environmental-indicators (Jones et al., 2009). Pakistan is an agriculture country and the most of the areas are under the cultivation of different types of crops and fruits. Fruit bats are often labeled as pests in Pakistan because they eat plenty of fruits. Local practitioners kill them for their body fats (Roberts, 1997).

Peshawar (34° 0’ 28″ North, 71° 34’ 24″ East) is the capital of Khyber Pakhtunkhwa, which is situated in a large valley near the eastern end of the Khyber Pass. The Charsadda, Kohat, Mardan and Nowshera are adjacent area of the Peshawar. Most of the areas are under the cultivation of different types of crops providing habitat for different kind of invertebrates and vertebrates (Perveen and Jamal, 2012). Bats are a dominant category of the community; however, very limited studies had been on them in the past because most researchers regard them as less important mammal (Butt and Beg, 2001). Bats play an important role in the agro-ecosystem of Pakistan,
particular, particularly those fruit bats dispersing seeds and pollinating the plants (Mickleberg et al., 1992). About 400 plant products, derived from 163 plants species depends upon fruit bats for seed dispersal and pollination that are useful to man (Fujita and Tuttle, 1991). Keeping in view the importance of this group, the present study is design to prepare the checklist of first recorded of bats of Peshawar and adjacent areas of Pakistan.

MATERIALS AND METHODS

Bats were collected from Charsada, Kohat, Mardan, Noshera and Peshawar, Khyber Pakhtunkhwa, Pakistan during May 2011-September 2012 by different mist nets of 6, 9, and 12 m sizes (each with five shelves and 16x16 mesh sized) were used to capture bats. They were erected 2.5 m high in “L” or “V” shape above the ground. All the nets were opened simultaneously at sunset and were continued to operate, depending on the weather conditions, for two hours after sunset. The total mist net area in each session was 120 m². The sampling efforts were remained the same throughout the study and a total of 216 mist net nights were utilized. The collected specimens were brought in the laboratory. They were preserved first at low temperature in a freezer before being weighed and measured, then in plastic jars containing 70% alcohol permanently.

Collected bats were identified through morphometric and cranial measurements with the help of keys of bates (Bates and Harrison, 1997; Roberts, 1997; Srinivasulu et al., 2010), experts and already preserved specimen available in the Museum, Department of Zoology, Hazara University. Each specimen were given a specific field number and mentioned collector’s name, date and time of capture, exact locality, sex, tehsil and district’s names on a tag.

RESULTS

A total of 213 individuals were captured and preserved, while 7 species of bats belonging to 5 genera and 4 families with 5:1 male and female gender ratio were reported from Charsadda, Kohat, Mardan, Nowshera and Peshawar, Khyber Pakhtunkhwa, Pakistan during May 2011-September 2012 as follows:

**Phylum: Chordata**

**Sub-Phylum: Vertebrata**

**Class: Mammalia**

**Order: Chiroptera**

**Suborder: Megachiroptera**

**Family: Pteropodidae Gray, 1821**

Genus: *Pteropus* Brisson, 1762

Flying fox, *P. giganteus* (Brunnich, 1782)

**Suborder: Microchiroptera**

**Family: Vespertilionidae Gray, 1821**

Genus: *Rousettus* Montfort, 1829

Rousettus, *R. microphyllum* (Brunnich, 1792)

**Family: Hipposideridae Lydekker, 1891**

Genus: *Hipposideros* Gray, 1831

Fulvus Leaf-nosed bat, *H. fulvus* Gray, 1838

**Family: Vespertilionidae Gray, 1821**

Genus: *Pipistrellus* Kaup, 1829

Indian Pipistrellus, *P. coromanda* (Gray, 1838)

Java Pipistrellus, *P. javanicus* (Gray, 1838)

Least Pipistrellus, *P. tenuis* (Temminck, 1840)

Genus: *Scotophilus* Leech 1821

Greater Asiatic yellow house bat, *S. heathii* (Horsefield, 1831)

**DISCUSSION**

At the present, the checklist of the bats of the Charsadda, Kohat, Mardan, Nowshera and Peshawar, Khyber Pakhtunkhwa, Pakistan, the first and pioneering research was done during May 2011-September 2012. Presently, the *P. giganteus* documented from Charsadda which is the area found in the vicinity of Peshawar while this species is the first and new record in this area. They are the fruit bats, therefore, their presence in this area is due to richly availability of fruit orchards like persimmon, loquat and litchi. However, another species belong to genus Rousettus was not reported during the present research. Walker and Molur (2003) considered family Pteropodidae as data deficient in South Asia while Murray (1884) and Eates (1968) reported the colonies of *P. giganteus* from Malir in Karachi. Fifteen years ago, *P. giganteus* was reported as rare species in Pakistan (Roberts, 1997). However, large colonies of them were observed from Baghi-Jinnah in Lahore (personal observation in 2012). Moreover, Roberts (1997) also reported this species from Mohlandar Mango Garden, Governor House, Lahore in 1992. Furthermore, he was also reported them from Jhelum in Multan, Malisi in Punjab and Malakand in Khyber Pakhtunkhwa, Pakistan (Roberts, 1997).

During the present research, *P. javanicus* was recorded from Peshawar, however, Roberts (1997) reported from Gharial in Murree Hills, but very little information is available about them in Pakistan. Roberts (1997) also recorded *P. tenuis* from Chitral and Sinha (1980) in Malakand. Three mentioned areas, i.e., Murree Hills, Chitral and Sinha were located in the province, Khyber Pakhtunkhwa, therefore, one can argue that this species found in diverse habitat, ecological, geographical and climatological factors of the areas.

During the present research, *R. microphyllum* was reported for the first time from Takht Bahi and Frontier Region (FR) are found in the vicinity of Peshawar. Therefore, they are abundant in these two areas, because the environmental factors, i.e., geographical occurrence, temperature and food availability were favorable for them.
Roberts (1997) reported P. coromandra from Dir, Chitral and Swat districts while this species was also collected in the present study from Peshawar district but is not first time.

Scotophilus heathii was also reported from Islamabad, Multan, Lahore, Kashmore, Sakkar, Jacobabad, Mirpur, Sakro, Dadu, Landi, Malir and Karachi (Sindh) (Wroughton, 1916; Lindsay, 1926; Siddiqui, 1960; Taber et al., 1967; Walton, 1974; Robert, 1997). During the present research, they were also collected from Charsada, Kohat, Mardan, Noshera, and Peshawar, Khyber Pakhtunkhwa. Roberts (1997) reported H. fulvus from Sukkar and Thatta (Southern Sindh) as well as Panjir and Khoshab (Southern Baluchistan), Rawalpindi and Chaklala while during the present research they were collected from Peshawar. The present research area, Peshawar is more toward the Northern-South of the adjacent areas and away from the equator. The chiropteran biodiversity of Pakistan included 50 species, 25 genera and 8 families (Mahmood-ul Hassan and Nameer, 2006) while in the present research 7 species, 5 genera and 4 families were identified within the limited territory of Peshawar and its four areas found in vicinity for the first time. All reported species were earlier defined in other areas of Pakistan but they were reported in Charsadda, Kohat, Mardan, Nowshera and Peshawar, Khyber Pakhtunkhwa, Pakistan for the first time. The biodiversity differences were due to geographical and ecological differences. As the insects are the main source of food for Microchiroptera bats as they are abundant in the warm areas, therefore, the biodiversity was different among the research areas. Therefore, diverse bat fauna is found in Charsadda, Kohat, Mardan, Nowshera and Peshawar, Khyber Pakhtunkhwa, Pakistan. The present study is continuing for further bats finding in the study areas.

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