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Ectoparasites of lesser mouse eared bat, *Myotis blythii* from Kermanshah Iran

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ABSTRACT

Objective: To identify the ectoparasits of lesser mouse eared bat, *Myotis blythii* inside the Mahi-Dasth cave in Kermanshah province, Iran. **Methods:** A total of 30 lasser mouse eared bat (*Myotis blythii*) in a cave close to Kermanshah city were hunted with special net and were transported to the laboratory. After anesthetizing by chloroform, ectoparasites from these bats were removed and identified. **Results:** The ectoparasites include flies, ticks and mites. The 39 identified flies belonged to two families including *Strebilidae* (7.7%) and *Nycteribiidae* (92.3%). A total number of 5 ticks of larval, nymphal and adult stages of *Ixodes vespertilionis* and 18 mites from *Spiturnicidae* family were identified. **Conclusions:** The result of this study is a clue for the identification of ectoparasites from bats and implication of possible prevention measures for diseases transmitted by ectoparasites.

1. Introduction

The eared bat (*Chiroptera: Vespertilionidae*) are the only order of mammals that can fly. Their wings differ with that of birds and are developed in a different way. The skin of its wing is leathery and elastic which makes its extension in length. *Chiroptera* is divided into fruit and insectivorous bats subclasses. Insectivorous bats hunt at nights, but fruit bats utilize their vision and smell senses to find fruits and tree essences. Fruit bats feed the fruits in early morning and late evenings. Bats are social animals, and they reside in large groups in caves or on trees. There are about 1 000 species through all over the world, except in the south and north poles. In Iran, all spices are insectivorous, except one of fruit bat that lives in southern part of the nation[1]. The Bats live in regions with cold, warm and moist climate conditions and hide in the places such as caves, mountain holes, under the roof of old buildings , empty ceiling, abandoned buildings or storages. The history of diseases that are transmitted by bats goes back to the early twentieth century. Some deaths cases reported in the United State of America, these victims had direct or indirect interaction with bats. Since then different human disease and mortality is referred to the bats, such as rabies, histoplasmosis, river fever ROSS, Japanese encephalitis, cryptosporidiosis, fungal diseases[2]. In spite of transmission of the above mentioned diseases, actinomycets and ectoparasits including flies, ticks, mites, bugs, lice were found in their nests. Bats flies belong to two families of *Streblidae* and *Nycteribiidae*. They have sucking mouthparts and feed on bat blood. There are several reports of bat flies in the worldwide[3, 4].

The aim of this study was to identify the ectoparasits of lesser mouse eared bat, *Myotis blythii* inside the Mahi-Dasth cave in Kermanshah. The results are an indication of co-evoluation between bat and ectoparasites and possible importance of ectoparasite in disease transmission.

2. Material and methods

2.1. Study area

The Kermanshah province with an area of 24 434 km^2, is located in Midwest of Iran. It is restricted from north to the province of Kurdistan, from south to Lorestan and Illam, from east to Hamedan and west to Iraq. Kermanshah is a mountainous area that is located between Iran's highland and Mesopotamia plain, and the Zagros mountain range is extended all over the province, which is parallel to confines of this province forming an area of upland field between them (Figure 1). Thus, Kermanshah province has the Mediterranean damp climate. There are various caves and

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mirages including the Mahi-Dasth Limy cave in this area.

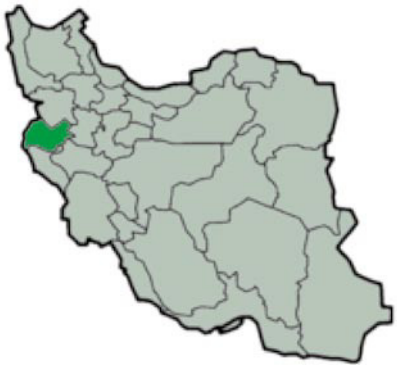

Figure 1. The map of study area, Kermanshah province, Iran.

2.2. Bat collection

A total of 30 bats of *Myotis blythii* (Figure 2) were hunted with special net from the cave, and were transported to the laboratory with safety principles.

In the laboratory, the hunted baths were made unconscious with either ether or chloroform. Then ectoparasits were separated from the bats by using insecticide spray.

2.3. Ectoparasite collection and identification

Ectoparasites were collected with clips, and moved into plastic tubes with 70% ethanol. Specific information including collection date, collector's name was written on the tubes. Species identification was carried out in the laboratory of School of Public Health in Tehran University of Medical Sciences. Specifically bat flies were separated from other extoparasites, and were identified according to valid systematic key.

3. Results

Figure 2. The lesser mouse-eared bat (*Myotis blythii*) from Wikipedia.

Figure 3. *Strebilidae* family

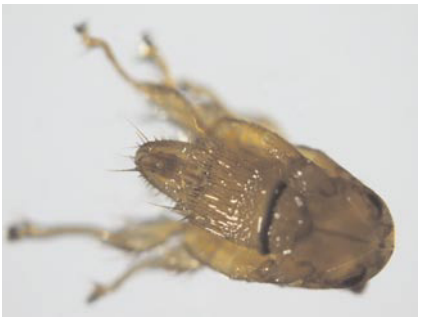

Figure 4. *Nycteribiidae* family

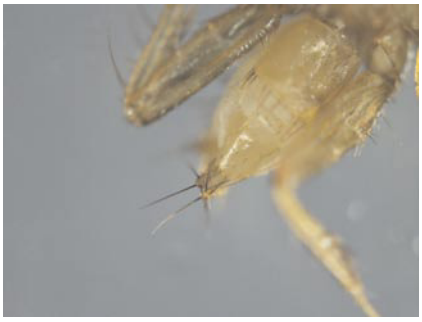

Figure 5. *Basillia ortiza* (female)

Figure 6. *Basillia anceps* (female)

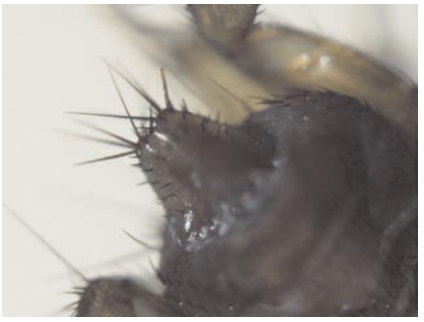

Figure 7. *Basillia tiptoni* (female)

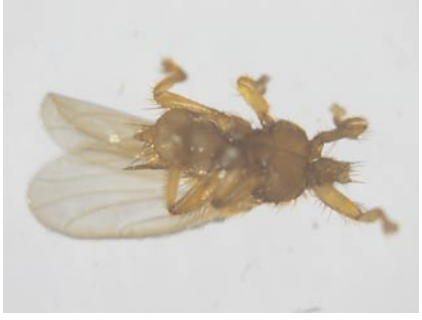

Figure 8. *Paratrichobius dunni*

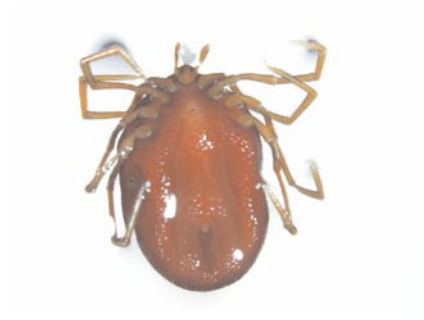

Figure 9. Adult *Ixodes vespertilionis*

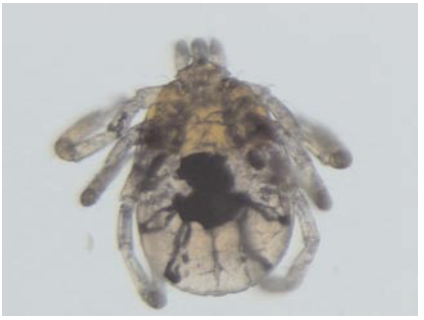

Figure 10. Larvae of *Ixodes vespertilionis*

The ectoparasites include flies, ticks and mites. The 39 identified flies belonged to two families including *Strebilidae* (7.7%) and *Nycteribiidae* (92.3%). Figure 3 and 4 showed two genera of these families, which were *Basillia* (92.3%) and *Paratrichobius* (7.7%). The identified flies were *Basillia ortizi* (7.7%), *Basillia anceps* (41%), *Basillia tiptoni* (43.6%), and *Paratrichobius dunni* (7.7%) (Figures 5, 6, 7, 8).

A total number of 5 ticks of larval, nymphal and adult stages of *Ixodes vespertilionis* were identified (Figure 9, 10). 18 mites identified were all from *Spiturnicidae* family.

4. Discussion

Four species of bat flies including *Paratrichobius dunni* (7.7%), *Basillia tiptoni* (43.6%), *Basillia anceps* (41%) and *Basillia ortizi* (7.7%) were identified in this study. In a parallel study carried out in Canada, one species of parasitic bug (*Hemiptera: Cimicidae*), 3 species of fleas (*Siphonaptera: Ischnopsyllidae*), and 2 species of parasitic flies (*Diptera: Nycteribiidae*) were collected from 9 specimens of bats (*Chiroptera: Vespertilionidae*) were found.

Some differences in ectoparasite infestation can be attributed to differences in roosting behavior of the host[5]. Of 3 860 Colombian bats, belonging to 109 species, 135 individuals (32%) of 100 species were infected with ectoparasites[6]. There are also several reports of ectoparasites from bat[7]. A total of 443 bat flies were found in 218 infested bats which belonged to 11 genera and 17 species of *Streblidae* (426 specimens) and one genus and two species of *Nycteribiidae* (17 specimens). The most abundant species were *Megistopoda proxima* (23.9%), *Paratrichobius longicrus* (16.7%), *Trichobius joblingi* (13.3%), and *Paraeuctenodes similis* (7%)[4,5, 7]. Fourteen species of five genera of *Streblidae* and two species of two genera of *Nycteribiidae*, were collected for Roraima Brazil. In this study, we present that there are at least 2 genus and three species of *Nycteribiidae* and one species of *Streblidae* families of bat flies in Iran. Further studies in other areas of country should also be carried out for identification of other families, genus and species.

In 2006, a study on seasonal variation of ectoparasite load in *Myotis blythii* in western Iran were carried out. Batfly (*Nycteribidae*), tick (*Ixodidae*), and mite (*Spinturnicidae*) were identified during their study period. It can be concluded that the patterns of parasite load during this time differed considerably among species. However, the parasite load increased markedly in pregnant females in spring and early summer.

Host specificity may result either from restricted dispersal capacity or from fixed coevolutionary host-parasite adaptations. Knowledge of those proximal mechanisms leading to particular host specificity is fundamental to understand host-parasite interactions and potential co-evolution of parasites and hosts[8].

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgments

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