A retrospective study of ectoparasites on Indian pipistrelle bat (*Pipistrellus coromandra*)

Dr. Pradeep Kumar, Dr. Jitendra Tiwari, Dr. Daya Shanker and Dr. Alok Kumar Singh

**Abstract**

*Pipistrellus coromandra* (Gray) is a species of bat belonging to family Vespertilionidae. It is also named as Indian pipistrelle because of its ubiquitous presence throughout India and for its jerky, erratic flight. In the present study 82 Indian pipistrelle including 28 males and 54 females were examined for the presence of ectoparasites over a period of three years between July 2014 and June 2017. Bats were found infested with one fly of *Basilia* spp. (6.09%), two mites of *Chiroptonyssus* spp. (30.48%) and *Spinturnix* spp. (23.17%) along with a soft tick of *Argas* spp. (13.41%). About 60 (73.17%) animals under the study were found infested with any one or multiple ectoparasites. No internal parasite however, was found in the faecal examination. Monitoring the ectoparasites of Indian pipistrelle bat is important because the animals is notoriously known to resides in close proximity with human shelters during day time and entering into houses in search of insects at dusk, possibly acting as a source of infections to humans and other companion animals. However, literature is lacking information regarding types of parasitic infections of this common bat. As per the available literature, this is the first documentation of parasitic infestation of *Pipistrellus coromandra*.

**Keywords:** bats, ectoparasites, Mathura, occurrence, Uttar Pradesh

**1. Introduction**

Bats are the only mammals capable of true flight. These are actively mobile during night and have a wide distribution throughout the world. India has 123 species of bats including both fructivorous and insectivorous types [19]. *Pipistrellus coromandra* bats, under family Vespertilionidae, are commonly known as Indian pipistrelle because of its ubiquitous presence throughout India and for its jerky, erratic flight [16]. This widely distributed species is found throughout most of South Asia, parts of southern China and much of mainland Southeast Asia [5]. The animal is found in varied habitat from forested regions, agricultural landscapes to urban areas. It roosts in trees, crevices in walls, ceilings of houses, tiles of huts, old buildings, temples, under bark and tree hollows in small groups of few individuals [16].

Warm blooded animals like mammals are usually found infested with ectoparasites. Chances of getting infestation increases in case of bats because of the presence of a dense hair coat over their body. Bats have been reported parasitized by a number of ectoparasites including mites, bat flies, ticks and fleas and simultaneous infestation by some or all of these parasites are possible [21]. Previous studies suggest that two families of flies namely Nycteribiidae and Streblidae are exclusively bat ectoparasites [2]. Various parasitic mites were also recorded on bats by other workers [10, 14].

Indian Pipistrelle is a small sized insectivorous bat that hunts on flies, ants and other small insects. These bats frequently found residing in the cracks and crevices of the residential buildings of the Veterinary University Mathura and often enter the residential buildings in search of their food. In the present study, 82 adult *Pipistrellus coromandra* bats were collected over a period of three years after they get injured with ceiling fans in the households. Bats are often neglected by workers from being studied for their parasitic load largely due to their social rejection, isolated habitats and thereby unavailability of the samples and marginally also due to misconception of their relation with vampires. The present study reported the parasitic infestations of *Pipistrellus coromandra* from Mathura district of northern India. This is the first study of its type reporting the parasitic infestations of this common roaming bat. Furthermore, the study will be helpful in determining the ability of these bats as vectors of zoonotic as well as veterinary health importance parasites as these bats often resides...
in close proximity of human households.

2. Materials and Methods
In the present study, a total of 82 bats were collected from the Veterinary University, DUVASU campus of Mathura after being injured in households from July 2014 to June 2017. The animals were carried to the Parasitology department of the University after securing properly in comfortable cotton beddings and were placed in the cages until treated for the injuries. The bats were identified as *Pipistrellus coromandra* (Fig.1) on the basis of their morphological characters. The season of collection and sex wise distribution of the animals were also recorded for further studies.

In the laboratory, bats were examined thoroughly under the lens for ectoparasites. All the parts of body especially of the underside of wings, neck and inguinal regions were observed with the help of soft camel hair brush. The macroscopic ectoparasites were collected with forceps and preserved in 70% ethyl alcohol. The mange like regions over the surface coat was brushed and the material was again collected in 70% ethyl alcohol. The collected material was further processed as per the recommended guidelines for determination of mites [20].

For the diagnosis of enteric parasites, faecal material was collected in a sterile polybag and further examined for parasitic infection through faecal floatation method [20]. Approximately two grams of sample was triturate with pastel and mortar in 15 ml saturated salt solution. The solution was sieved in a 15 ml tube, centrifuged at 1500 rpm for 3 minutes and the supernatant was examined on low power of microscope for the presence of parasitic stages.

The individual macroscopic parasitic samples were examined microscopically and images were captured with the help of Motic Digital Microscope (DMWB series) and measured with the Motic Image Plus 2.0 ML software. To identify the collected parasites keys given elsewhere [1, 7, 6, 17] were taken into account. The holotype of the permanent mounts of the ticks, bat fly and mites were prepared on glass slides using DPX mountant and stored in the museum of Parasitology Department of Veterinary University Mathura.

3. Results and Discussion
In the present study, out of the 82 injured bats 73 (89%) were collected during summer and monsoon season of the year and
only nine (11%) were collected during the colder months of the year. This wide difference between the two periods of the year can be understood with the fact that electric fans are used in the households only during the hotter climatic conditions and the bats entered in the premises in search of insects getting hurt by these fans. Abundance of insects around the artificial light sources in the human households during monsoon season might also be responsible for this wide variation in injury rate of bats during the two seasons.

The examination of the injured animals collected in this study revealed that 60 (73.17%) of the total 82 bats were infested with any one or multiple ectoparasites. The bats are naturally covered with a dense coating of fine hairs over their body. This coating might be helpful in providing favorable environment for the ectoparasites as it helps in getting covered-up beneath the coat and also it helps in the making a strong hold over the body when the bat flies. Similar high prevalence of the ectoparasites was also reported in some previous studies [4, 14].

The ectoparasites collected during study include wingless fly, mites and larvae of soft tick. The percentage occurrence of these ectoparasites is given in Table 1. About six percent of the animals were found infected with a wingless fly of Basilia spp. (Fig.2). The fly was identified on the basis of morphological characters given elsewhere [6]. This small fly comes under the family Nycteribiidae under Hippoboscid group of dipteran flies. Basilia spp. are highly specialized ectoparasites of bats and are commonly called as bat fly. Like fleas, Nycteribids possess several ctenide or combs that facilitate the host attachment and prevent them from being brushed backwards from the fur [3].

A total of eight flies were collected from the animals under the study. The collected specimens were in the range of 3.0 - 3.5 mm in size. The microscopic study of the flies revealed the following morphological characteristics of the fly.

Head – Vertex with 15 setae near anterior margin, between the eyes. Anterior margin of each genae with seven to nine setae and post-genae with two setae. Eyes with two lenses on a pigmented base. Head inserted in the middle of the thorax.

Thorax – Wider than long. Notopleura with 11 setae. Thoracic ctenidium with 13 spines. Second and third femora with bare anterior surface lacking sensory hairs near base. Sensila in the anterior margin of second and third femur are absent. Tibiae with four conspicuous transverse rows of setae on grooves, the proximal of which is least conspicuous. Second tergite with convergent lateral margins and third sternite visible under the second sternite.

Abdomen – All the four sternite have discal setae. Second sternite wider than long, abdominal ctenidium with 35 juxtaposed spines. Genitalia with straight aedeagal apodeme. Aedeagus small, parallel sided. Anterior margin of first tergite are subtrapezoid.

The bat fly lives in between fur and on the wing membrane of bats where they feed the blood [9]. This fly was reported on bat by various scientists from different states of India [22, 23].

In this study, mites were found as most common parasitic infestation of bats and 44 (53.65%) of the animals were found infested with any one or both types of mites. This high rate of infestation of mites might be due to their social habit of living in small groups in close contact with each other. Mites are permanent ectoparasites of their hosts the only possible mode of transmission of them is by close physical contact and thus living habits of Indian pipistrelle favors their transmission from one infected animal to the rest of them in the group. Similar high occurrence of mites was also reported by other workers in India [11, 1].

On the basis of morphological characters the mites under this study were identified as Chiroptonyssus spp. and Spinturnix spp. The Chiroptonyssus spp. (Fig.3) was the most abundant and prevalent in the present study, being found in 25 (30.48%) bats. This mite had robust legs and well developed spines over their body. This result agrees with the previous studies [9, 15, 18].

Mites of Spinturnix spp. had long peritreme. The body bends ventrally between second and third coxae. A row of setae were present posterior to stigmata. Anal shield had terminal opening with a short post anal seta present. These mites were collected mostly under the wing membrane of bats. Occurrence of these mites over other types of bats was also reported by different workers from various parts of world [13, 14, 23].

During the study period, soft tick infestation was found in 13.41% of the collected bats. Based on the morphologic characteristics the larvae were identified as of Argas spp. (Fig.4) of argasidae family. The collected larvae were of about 3mm long and 3mm wide in size with brownish to yellow colour, peripherally translucent with slightly darker coloration in middle portion. Body outline were subcircular with finely granulated body integument. Larva of Argas spp. reported over bats by from northwest Iran. Parasitic stages of Argas spp. have been described previously by various scientists [8, 12].

4. Conclusion

Pipistrellus coromandra is the most common insectivorous bat in India that is also found in various other parts of the world. Reports about occurrence of ectoparasites of this bat are not available. Therefore, the present study was conducted to detect the occurrence of various ectoparasites of this species of bat for a period of three years. In this study, the animals were found infested with three different types of parasites including bat fly of Basilia spp., mites of Chiroptonyssus spp. and Spinturnix spp. and larvae of Argas spp. This is the first reporting of ectoparasites of Pipistrellus coromandra that is notoriously famous for its stay near the human population. Further studies are needed to detect the role of these ectoparasites in the transmission of pathogens of zoonotic or veterinary importance.

5. Acknowledgements

Authors are thankful to Veterinary University, (DUVASU) Mathura for providing necessary facilities to conduct the research work.

Table 1: Percentage prevalence of ectoparasites over Indian pipistrelle

<table>
<thead>
<tr>
<th>Infestation</th>
<th>No. of infected bats</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bat fly (Basilia spp.)</td>
<td>05</td>
<td>6.09%</td>
</tr>
<tr>
<td>Mite (Chiroptonyssus spp.)</td>
<td>25</td>
<td>30.48%</td>
</tr>
<tr>
<td>Mite (Spinturnix spp.)</td>
<td>19</td>
<td>23.17%</td>
</tr>
<tr>
<td>Soft tick (Argas spp.)</td>
<td>11</td>
<td>13.41%</td>
</tr>
</tbody>
</table>

6. References