

Original Research Article

New Record of a Phoretic Pseudoscorpion Species, *Chelifer museorum* (Arachnida: Pseudoscorpiones) Associated with Pelage of Bats in Lakhimpur-Kheri, Uttar Pradesh, India

ABSTRACT

Thirty seven pseudoscorpion specimens were collected from abdominal furs of little Indian bat (*Pipistrellus coromandra*) captured from 6 different roosts in Lakhimpur-Kheri, Uttar Pradesh, India. Out of 25 captured bats, 7 bats (2 males and 5 females) were found to be associated with pseudoscorpions. Collected pseudoscorpion species was identified as *Chelifer* (*Cheiridium*) *museorum* belongs to the class Arachnida, order Pseudoscorpiones and family Cheiridiidae. It was a new record of phoretic association of pseudoscorpion species with pelage of bats. This phoretic association was found as commensalism and for the purpose of food and distribution.

Key Words: Arachnids; Pseudoscorpion; Phoretic Association; Mammals; Pelage; Commensalism.

1. INTRODUCTION

Pseudoscorpions are one of the oldest ancestries of terrestrial arthropods which belong to class Arachnida and order Pseudoscorpiones (Shear, 1991; Shear *et al.*, 1989). They are tiny (2 to 8mm in length), secretive arachnids that live in moist places, crevices of rocks, leaf litter, old books, under tree bark and other sheltered habitats (Jones, 1970; Weygoldt, 1969; Witt & Dill, 1996). They are found in natural and man-made habitats. Some species of pseudoscorpions live in the nests of birds (Bhattacharyya, 1990; Turienzo *et al.*, 2010) and rodents (Rodentia: Muridae) (Beier, 1948; Francke & Villegas-Guzman, 2006; Hoff & Clawson, 1952) whereby they get shelter and food from the nest by feeding on ectoparasites such as larval and adult fleas (Ratnaweera *et al.*, 2010; Thanee *et al.*, 2009). Some pseudoscorpion species are also found to be associated with mammals. They occur mostly reported from Asia, Africa and Australia (Beier, 1948). Pseudoscorpion species, *Lasocherenes* was recorded in caves related to bat guano and in mammal nests (Beier, 1948, 1963). Three pseudoscorpion species, *Chelifer cancroides* (Linnaeus, 1758), *Dinocheirus panzeri* (C.L. Koch, 1837) and *Allochernes wideri* (C.L. Koch, 1843) were recorded from mammal nest in Slovakia (Christophoryová, 2010). Pseudoscorpions are an important group of predators which occupy almost all terrestrial habitats and feed on a variety of small arthropods (moth larvae of clothes, beetle larvae of carpet, booklice, ants, mites and small flies). They have less developed eyes and kill the prey using trichobothria on their pedipalps. Prey are captured with the help of pedipalps and moved to the chelicerae (Weygoldt 1969; Witt & Dill 1996). Verner (1959) published the first record of pseudoscorpion species, *Diplothemnus insolitus* (Chamberlin, 1933) from guano of bat species, *Myotis myotis* and *Myotis oxygnathus*. Kovac *et al.*, 2007 reported a pseudoscorpion species, *Neobisium carcinoides* (Hermann, 1804) from guano of bat colony in a cave. There are only two records of pseudoscorpion species from India. *Megachernes himalayensis* was recorded from the northern regions of Uttarakhand (Ellingsen, 1914) and Jammu and Kashmir (Beier, 1978). Despite of previous records of pseudoscorpions in India, the distribution, abundance and the life history of pseudoscorpions is poorly known. The presence of pseudoscorpions on the pelage of bats and their roosts in India has not been reported

previously. This study was conducted to investigate ectoparasites of bats and the association of bats with other animal species.

2. MATERIALS AND METHODS

The research on the ectoparasites of bats was carried out in Lakhimpur-Kheri, Uttar Pradesh, India during the period of 2013 to 2018. Pseudoscorpions were incidentally collected from the abdominal furs of the little Indian bat, *Pipistrellus coromandra* during an investigation of their ectoparasites. Pseudoscorpion specimens were extracted from the pelage of live bats that were captured carefully from their roosts. The pseudoscorpion specimens were preserved in 70% ethyl alcohol and were studied as permanent slide mount (Gardner, 1996). The camera lucida microscope was used for their morphological measurements. All pseudoscorpion specimens were identified using the key Christophoryová *et al.* (2011d). Permanent slides of all pseudoscorpion specimens were deposited to Biodiversity and Wildlife Laboratory, Department of Zoology, University of Lucknow, Uttar Pradesh, India.

3. RESULTS AND DISCUSSION

A total of 37 pseudoscorpion specimens were collected from the dorsal and ventral furs of the live bat species, *Pipistrellus coromandra* captured from 6 different roosts in Lakhimpur-Kheri, Uttar Pradesh, India in 2017-2018 (Fig. 1). Out of 25 captured bats, 7 bats (2 males and 5 females) were found to be associated with pseudoscorpions. Collected pseudoscorpion species was identified as *Chelifer (Cheiridium) museorum* (Leach, 1817) belongs to the class Arachnida, order Pseudoscorpiones and family Cheiridiidae. They were mostly collected from the abdominal furs of bats. *Chelifer museorum* is also known as book pseudoscorpion. They were measured 0.89 to 1.36 mm in length. The pedipalps were very long (longer than body), measuring 0.97 to 1.64 mm when extended. The body was teardrop-shaped and colour ranged from yellowish to dark brown however, the pedipalps are typically dark brown. The abdomen had 12 segments, but only 10 of which were easily visible. On dorsal surface, tergite contained pigment granules that were interlaced together. The cephalothorax had one pair of less developed eyes (Fig. 2). This pseudoscorpion species were found only to be associated with those bats that were heavily infested with ectoparasites.



Fig. 1. The Little Indian Bat (*P. coromandra*)



Fig. 2. *Chelifer (Cheiridium) museorum* (Leach, 1817) collected from the pelage of *P. coromandra*. Scale bars: 1 mm.

4. CONCLUSION

Previous studies revealed that pseudoscorpions are not the ectoparasites of bats. They are tiny arachnids that live in a wide range of natural and man-made habitats where sufficient moisture is present. In India, pseudoscorpion species, *Megachernes himalayensis* was recorded from the northern regions of Uttarakhand by Ellingsen in 1914 and Jammu and Kashmir by Beier in 1978. Despite previous records in India, information on the distribution, abundance and the life history of pseudoscorpions has not been documented. This is a new record of phoretic association of pseudoscorpion species, *Chelifer museorum* with the pelage of little Indian bat, *Pipistrellus coromandra* in India. They were found to be associated with bats that were heavily infested with ectoparasites. No pseudoscorpions were recorded on bats that were not infested with ectoparasites. Krumpal and Cyprich (1988) reported this association as a regular phenomenon of pseudoscorpions seeking for bird nests as a food source, a refuge and a breeding location. Species of *Megachernes* were found to be obligate commensals with mammals, occurring in their nest and phoretically in their pelage (Beier, 1948; Martens, 1975; Durden, 1991). The association of this pseudoscorpion species with bats was analyzed on the basis of some previous studies and found that they exhibit a form of commensalism (Phoresis) with bats. They regularly visit the furs of bats for food source and shelter where they feed on larvae and nymphs of bat flies, ticks or mites. This association may be considered as obligate commensalism with bat species.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Authors hereby declare that No generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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