

Short Note

Predation on the Kelaart's Pipistrelle Bat, *Pipistrellus ceylonicus* Kelaart (Chiroptera: Vespertilionidae), by the Reddish Parachute Tarantula, *Poecilotheria rufilata* Pocock (Araneae: Theraphosidae), in Chinnar Wildlife Sanctuary, Kerala, India

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Compared to other mammals, Chiropterans (bats) have never been claimed to form important components in the diet of many predators¹, although only a few attempts have been made to document the diversity of predators of any particular bat species and the effects of predation on its population. However, because bats are long-lived and reproduce slowly, the impact of predation on their populations is probably greater than assumed². Most available data on bat predation and bat predators are sparse or anecdotal, but a few detailed natural history studies have provided important information on this topic^{1,2}.

A large variety of vertebrates prey on bats (reviewed in¹) while the few reports of invertebrate predation involve cockroaches, ants, beetle larvae, and spiders¹. Because of their carnivorous tendency, terrestrial habitat, and either gregarious foraging or large body size, a diversity of arthropods, including praying mantises, wasps, mygalomorph spiders, scorpions, solpugids, decapod crustaceans, and scolopendrid centipedes, are potential bat predators¹. However, reports on bat predation by

invertebrates are usually anecdotal. In contrast, in many chiropteran trophic studies the corollary is found, that is arthropods are reported to be common food items of bats.

The spider genus *Poecilotheria* is made up of arboreal species that can be found in India and Sri Lanka. The genus is placed within the poorly studied family Theraphosidae³. The current lack of information on this spider family is probably largely due to the difficulties in observing individuals in the wild, and a generally low yield of specimens from field collection efforts. Little is known about the behaviour and food habits of members of the *Poecilotheria* genus, or indeed of the Theraphosidae family, of spiders, and even fewer studies that document the species in the wild. However, from what information is available, many insects and spiders have been reported to be common food items in the diet of several larger species in the genus². Nevertheless, in this short communication we report the predation of the Kelaart's Pipistrelle bat, *Pipistrellus ceylonicus* Kelaart, 1852 (Chiroptera, Vespertilionidae), by the Reddish Parachute

tarantula spider, *Poecilotheria rufilata* Pocock, 1899 (Araneae, Theraphosidae), in Chinnar Wildlife Sanctuary, Kerala.

P. rufilata is classified as an endangered species in the IUCN Red list⁴ and is endemic to the southern region of the Western Ghats at an altitude of less than 500 m amsl. The area of occurrence, encompassing known and inferred distribution, is less than 5,000 km², while the area of occupancy is less than 2,000 km² covering Trivandrum^{4,6}, Ponnudi, Kallar and Peppara Dam⁷ in Kerala, and Agastyavanam Reserve⁷ in Tamil Nadu.

The observation reported here was made on the 10th November 2011 inside a building owned by the Kerala Forest Department at Chinnar Wildlife Sanctuary, which covers a total area of 90.42 km² and is situated (10°15'-10°22'N, 77°05'-77°15'E) between the Amaravati Wildlife Sanctuary in Tamil Nadu and the Eravikulam National Park in Kerala at an elevation of 500 m amsl. Apart from the dry thorn forests it has a wide array of habitat types, such as deciduous forests, dry thorny forest, riparian types, sholas and grasslands, due to the significant variation in altitude and rainfall, and these are interspersed with plains, hillocks, rocks and cliffs that provide microhabitats for varied forms of life. The area is situated in the rain shadow region of the Western Ghats, getting rain mostly during the North-East monsoons (October-December).

The observation took place in a damp place in a concrete building, with a low light level. For roosting, vertebrates and invertebrates tend to shift from their natural microhabitats to manmade structural sites. The spider was anchored about 1.2 m from the nearest vertical wall and 1.5 m from the ground. Since the spider and bat were easily visible to us, we are confident that we did not overlook them or other specimens

during a careful 30 min examination of this area using flashlights, and so the examination was concluded at 19:30 hrs to limit disturbance. Observations were made from less than 1 m away. We report here on the predation events, by analysis of the pictures taken at the time with a Canon EOS Rebel SXi camera. Both the predator and prey were not collected as we did not have collection permission, and so the identifications were made from the photographs taken at different angles with reference to the original and subsequent descriptions⁸⁻¹⁰. During the same observation period, 17 young bats were recorded roosting at the roof of the building at the same site as where the predation event occurred. Note, however, that the spider (*P. rufilata*) and its bat prey (*P. ceylonicus*) were about 10 m away from the bat roosting site and were hidden from direct sight of the roost by a wall. We used the average length to calculate, by proportion, the predator and prey sizes in the pictures. The bat has a zygomatic width of 10-10.9 mm and length of 5.5 to 6.0 cm¹⁰, whereas the spider had a length of 27 mm, width of 19 mm and total body length of 65 mm, and so would weigh about 28 to 85 grams⁸. The spider was holding the bat with its fore legs and the bat was apparently dead (Fig. 1). We suggest that the bat was alive when captured and was brought down to the observed site after tranquilizing it, although we did not observe this. This notion, and that the spider killed the young bat *in situ* shortly before we found them, is based upon the absence of rigor mortis, the presence of fresh blood in wounds, and the cleanliness of the pelage, which all indicate that the bat died shortly before the observation was made and had not been transported far or from any other distant place. Note that the bat roosting time including the time of entrance into and



FIGURE 1. A tarantula spider (*Poecilotheria rufilata*), holding and eating a freshly-killed Kelaart's pipistrelle bat (*Pipistrellus ceylonicus*), while anchored on the wall in a building at Chinnar Wildlife Sanctuary, Kerala.

emergence time from roosts to support this is, however, not known, whilst the breeding cycle of *P. ceylonicus* is reported to be aseasonal¹¹ and so the age of the assumed young bat cannot be deduced.

Although spider predation is well documented in the literature, reports of spiders preying upon bats are scarce. Theraphosidae that prey upon chiropterans have been reported before, highlighting the family of spiders as important predators^{9,12}. These spiders have nocturnal opportunist predator habits, and are generally found near dry environments^{3,12}. Information about the hunting behaviour of Theraphosidae spiders is, however, still scarce³, but as stated bats have been recorded as prey. The relationship between prey and predator size is an important determinant of the predation pressure¹³. In this way, younger bats with a small body size and weight are potential

prey to invertebrate predators. In general, arachnids play a key role in food webs acting as important predators and linking different trophic levels³. The predation event described in this note highlights the generalist and trophic opportunism of spiders, where their diet composition may be related to the availability of resources. The role of invertebrates as predators is well documented in the terrestrial environment, but these observations in accord with others highlight that spiders can perform two actions that most other bat predators cannot. First, they climb walls to catch and eat perching bats, which would most likely be related to the capacity of tarantulas to detect prey vibrations¹⁴. Second, they can subdue bats substantially heavier than themselves. Such capabilities may allow large spiders to prey on bats in what otherwise would be safe roosts.

Theraphosids are common in the tropics, and are of medical and pharmacological interest. Despite their importance, little information exists on their behaviour under natural conditions. On the other hand, most observations of predation on bats involve easily observed raptorial birds around North American caves¹⁵. There is little information on other predators of bats, particularly in the tropics where bats and their enemies are the most diverse. Further research is needed, both to learn more about the foraging ecology of theraphosids, especially of the large ones, and to evaluate the impact of diverse predators on tropical bat populations.

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