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Food and Feeding Ecology of the Rat Tailed Bat in the Rajasthan Desert

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Advani R., 1981: Food and feeding ecology of the rat tailed bat in the Rajasthan Desert. Acta theriol., 26, 15: 269—272 [With 1 Table].

The Rat tailed Bat, *Rhinopoma microphyllum kinneari* (Wrougthon, 1912) collected from various districts of Rajasthan, is mainly an insectivorous species. The alimentary tracts of bats were dissected and the stomach contents were analysed group-wise. *Coleoptera*, *Lepidoptera* and *Orthoptera* are consumed throughout the year, while *Hymenoptera* is devoured in all but winter season. During summer and monsoon months *Isoptera* is a very preferred diet of bats. *Neuroptera* and *Dictyoptera* are consumed in winter and post monsoon seasons, depending upon their availability in the nature. Presence of bats' own fur in the gut during summer and monsoon months well concides with their breeding season. Presence of various polyphagous insect pest species of crops in the gut of individuals shows that this bat has a promising role in the management of harmful insects in the crop ecosystem.

[AICRP on Rodent Control, Central Arid Zone Research Institute, Jodhpur, India].

I. INTRODUCTION

Rajasthan has a rich fauna of bats with at least eighteen species known to occur within the State. Out of them, the Larger Rat-tailed Bat or Mouse-tailed Bat, *Rhinopoma microphyllum kinneari* (Wroughton, 1912) (*Rhinopomatidae*), is a well abundant species — adapted to the arid and semi regions of India. Despite being so numerous in various parts of northern India, remarkably little is known about the biology of this bat except few earlier reports (Brosset, 1962; Prakash, 1960, 1963; Sinha & Advani, 1976). To fill up this gap, the present studies were undertaken to investigate the food composition and seasonal variations in the feeding pattern of this species.

II. METHODS

The bats were collected during various faunistic surveys conducted by Desert Regional Station, Zoological Survey of India, Jodhpur, from 1975 to 1977. Collections were made mainly from nine districts — Dungarpur, Banswara, Jhalawar, Boondi, Tonk, Ajmer, Sawai Mathopur, Jodhpur and Kota, well distributed in the arid and semi arid parts of Rajasthan. In all 176 individuals were collected

and examined (Table 1). After anaesthesia bats were dissected and their alimentary tracts were cut open. The stomach contents were taken out with the help of brush and small forceps and then dried on the filter paper at room temperature. Later, these were sorted out groupwise (various insect orders, bat fur etc.) and weighed on the physical balance to calculate their per cent occurrence in the gut contents, following the methodology adopted by Murton *et al.* (1964). The seasonal fluctuations in the feeding pattern were worked out by pooling data among four seasons occurring in the Indian desert. Some observations on its foraging behaviour and roosting habits were also recorded visually.

III. RESULTS

The examination of the stomach contents reveals that the *R. m. kinneari* is a primarily insectivorous species. There are no traces of any kind of vegetation or any other animal remains except insects in the stomachs to be considered as its food item.

During winter season the species mostly banks upon the *Coleoptera*, followed by *Lepidoptera*, *Orthoptera*, *Neuroptera*, and *Dictyoptera* in decreasing order (Table 1). Bat's own fur is present in a meagre percentage (3.3) which is not considered as a food item as it is probably taken during allogrooming or fighting among individuals of population. In summer season, the individuals thrive upon a variety of insects. The percentage of *Coleoptera* in the food declines to about half of the winter season. *Isoptera* of species *Odontotermes obesus*, *Microtermes obessi* and *Anacanthotermes* sp. and *Lepidoptera* occur in about equal proportions

Table 1

Seasonal fluctuations in stomach contents of *Rhinopoma microphyllum kinneari* expressed in percent of total dry mass.

Season and sample size	Insect orders % in the stomach							Unsortable insect mass	Bat fur[1]
	Coleo.	Iso.	Neuro.	Lepido.	Hymeno.	Ortho.	Dictyo.		
Winter (Dec. — Feb.) N=38	43.8	—	12.2	13.0	—	12.3	8.4	8.0	3.3
Summer (Mar. — June) N=42	21.0	20.2	—	20.1	13.2	11.0	—	3.3	11.2
Monsoon (July — Sept.) N=48	18.9	48.5	—	13.4	4.2	5.0	—	2.2	7.9
Post-monsoon (Oct. — Nov.) N=48	40.1	—	3.5	8.8	10.8	15.2	13.2	6.4	2.0

[1] Not to be considered as a food item

of the total dried food mass. *Orthoptera* and *Hymenoptera* are also devoured in appreciable proportions. Occurrence of bats' fur (11.2%) in the stomach contents is highest during this season. During monsoon months, percentage of termites increases enormously to a tune of 45.5, more then two times of the previous season. These are followed by

Coleoptera (adults of white grub, *Holotrichia* sp.), *Lepidoptera* (including Red Hairy caterpillar, *Amsacta moorei*), *Orthoptera* and *Hymenoptera*. The post monsoon witnesses increased percentage of beetles at about same level of winter season. *Orthoptera* and *Dictyoptera*, occurring in abundance during this season are consumed in 15.2 and 13.2 per cent respectively, followed by *Hymenoptera*, *Lepidoptera* and *Neuroptera*.

The Rat tailed bats, are swift in flight and do not hunt far from their roosting places, skimming over pond, lake or reservoir to take water. The bats emerge from roosting places immediately after dusk and are active before half an hour of the dawn. Many individuals captured in mist nets were having several insect's parts adhered to their bodies especially the interfemoral membrane. This species is highly gregarious, roosting in rock cave, old tombs, deserted buildings and in wells, having higher relative humidity and low temperature. Their colony is easily detectable from a distance due to strong and unpleasantly characteristic smell emanating from these bats and their faeces. On disturbance these bats wag their tails rapidly to and fro in right and left directions alternately.

IV. DISCUSSION

The Rat tailed Bat, *R. microphyllum kinneari* is an anthropophilic species, being found in close vicinity or in midst of human habitations and occurring even the remotest rural areas. Its habitat has certainly an impact on its feeding ecology particularly in deciding proportions of types of insect orders.

Their feeding pattern closely resembles that of the Desert Scotophilus, *Scotophilus heathi heathi* Horsefield, 1831 which is also an essentially insectivorous bat (Advani, 1980a). The feeding habits of *R. m. kinneari* markedly differ from those of the Indian false vampire, *Megaderma lyra lyra* (Geoffroy, 1810) which depends upon an equal proportion of insect as well as the vertebrate animal diet (Advani, 1980b) on an annual basis. As concluded from the examination of stomach contents, this species feeds upon a variety of insects of moderate sizes. Though Brosset (1962) states that *R. microphyllum* feeds mostly on smaller insects such as *Diptera* due to their comparatively weak dentition. But, as dipteran insects may not be available in the nature throughout the year, the reliance of bat upon other insects belonging to different orders is essential to survive. Moreover, it probably also depends upon the availability and abundance of an insect at a place.

During winter season when the species undergoes torpid state and is relatively inactive, the individuals feed upon the insects available in their near vicinity like small beetles, house crickets and cockroaches. The bats can also subsist upon their own fat reserves which they accumulate after the monsoon season in the extreme winter conditions. Preference for termites during summer and monsoon seasons is quite obvious, as during these months these winged, soft bodied insects emerge in the form of swarms after first few showers of rains in the desert. In post monsoon season, the increase in beetle diet at a tune of winter season coincides with their relative abundance in the environment.

The occurrence of bats' own fur in highest percentage during summer

and then the monsoon in the stomach, is explainable on the grounds that the breeding season of *R. m. kinneari* occurs from June to August in the Rajasthan desert (Prakash, 1960; Sinha & Advani, 1976) when there are inter and intra-sexual fights.

Regarding its foraging behaviour, the emergence period of this species is also after dusk, as of the verspertilionid bat *Pipistrellus mimus mimus* (Prakash, 1963). The drinking behaviour of this species by skimming over water surfaces is also very similar to those of *Scotophilus* and *Pipistrellus* species (Advani, 1980a). Attachment of insect parts (elytra, wings etc.) on the interfemoral membrane of bats, indicates on the possibility of its role as receptacle for large insects during insects during flight.

The feeding of bats on some of the most prominent insect pests of various crops in Rajasthan, like White grub, Red hairy Caterpillar, many polyphagous grasshoppers, and termites, show that this species is managing the harmful insect population in the natural crop ecosystem. In some stomachs, nymphal stages of the Desert Locust, *Schistocerca gregaria* also showed there presence.

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