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Ectoparasites of Bats and Rodents In Mt. Kimangkil, Bukidnon

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Abstract

Ectoparasites of bats and rodents collected in Mt. Kimangkil, Bukidnon were identified. To gather ectoparasites of bats and rodents, actual searching and direct examination of the host, clothbags and trays were made. Bats were found to harbor four families of ectoparasites, namely: Myobiidae, Nycteribiidae, Spinturmicidae, and Streblidae. Three families of ectoparasites namely: Haematopinidae, Ixodidae, and Pulicidae were found in rodents, Results showed that Family Nycteribiidae was the most abundant in bats while Haematopinidae and Ixodidae in rodents. The ectoparasites collected however, were not numerous. Observation and direct examination of the host showed that the ectoparasites didn't cause any detrimental effects on the hosts. Physiological and ecological factors may have influenced the distribution of ectoparasites on the host.

Key Words: ectoparasites, bats, rodents

Introduction

The world of animal life consists of communities of organisms, which live by eating each other. In a broad sense, all animals are parasites in that they are helpless without organisms to produce food for them (Cheng. 1973). The parasite lives in or on its host, from which it obtains nourishment, but although a parasite may weaken its host, it rarely kills it.

Ectoparasites are diverse and highly adapted group of animals that inhabit the external body surfaces of vertebrates. They may live permanently on their host, of they may occupy the host's nest and immediate environment, and visit the body of the host periodically. In their case, there is a close dependency on the host for various life-sustaining resources. The relationship between parasite and host is an ancient one, and the mechanisms by which parasites seek, identify and maintain contact with their host are sophisti-

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cated and complex.

Ectoparasites have the potential to affect the health and general well being of wildlife and domestic animal populations, and they may seriously restrict habitat and land resource use because of stress and reduced performance of animals living in a particular habitat. Development and use of land designated for recreational activities may also be affected by the threat of infestation of people and their companion animals by undesirable ectoparasites.

Ectoparasites are usually host specific or at least within related groups are carried by the host animals. These ectoparasites are introduced and distributed beyond their normal boundaries through the agency of the hosts, which we import mostly from the temperate countries. The evolutionary development can be traced from the wild animals and through proper adjustment and adaptation is transferred to domestic animals. Tracing the evolution of ectoparasites would require extensive studies on endemic wild animals in the Philippines (Cariaso and Rueda, 1986).

In the Philippines, there are very few studies conducted regarding the ectoparasites of mammals. We, therefore, conducted an investigation to find out the ectoparasites on a particular bat or rodent species and assess the occurrence of these ectoparasites in different sexes of bats.

Materials and Methods

Collected and identified individuals of bats and rodents were examined for ectoparasites Collection of ectoparasites was done by brushing and stroking the host's body. A small piece of cotton wool containing chloroform was applied to immobilize the bats and rodents and allow the ectoparasites to be flushed out from the skin and fur of the hosts. Ectoparasites were collected with forceps. After collection of ectoparasites the host was released. All collected ectoparasites were preserved in a glass vial with 70% ethanol for further processing and identification. The morphological examination of ectoparasites was done in the laboratory using the stereomicroscope. Pictures of the ectoparasites were taken by the use of Photomicrograph System (PMS). The morphological features of parasites were recorded and noted for classification and identification of ectoparasites. Key to identification and published books were used to identify the ectoparasites.

Parasite's incidence and average frequency were determined using the following formula:

$$\% \text{ Incidence} = \frac{(\#\text{of bats rodents with parasite})}{(\text{Total \# of bats rodents examined})} \times 100$$

$$\text{Average frequency} = \frac{(\text{Total \# bats/rodents examined})}{(\text{Total \# of host examined})}$$

To compute the significance of occurrence of ectoparasites between male and female host, t-test was performed.

Results and Discussion

Data on the ectoparasites collected from seven species of bats captured in Mt. Kimangkil namely, *Cynppterus brachyotis, Harpionycteris whiteheadi, Macroglossus minimus, Ptenochirus minor, Pipistrellus javanicus and Rhinolophus arcuatus* are shown in Table 1. These bats were found to harbor four families of ectoparasites namely: Myobiidae, Nycteribiidae, Spincturnicidae, and Streblidae.

The distribution of ectoparasites within a host is governed by the same forces that control the distribution of the host. These factors include temperature, moisture, mechanical barrier, chemistry of the surrounding medium, food supply, and other ecological change (cheng 1973).

More infestation of males at 82% compared to female bats could be due to the fact that more male individuals of bats were examined than females It appears that sex of bats does not

Table 1. *Ectoparasites collected from bats in Mt. Kimangkil, Bukidnon showing the total number of ectoparasites per family and frequency of occurrence in the bat species.*

# OF BATS SPECIES EXAMINED	# OF INDIVIDUALS EXAMINED	ECTOPARASITES FOUND	TOTAL # OF ECTOPARASITES	AVERAGE FREQUENCY
6	35	Nycteribiidae	54	1.5
2	14	Spinturmicidae	19	1.3
2	10	Streblidae	5	0.5
3	17	Myobiidae	5	0.3

Ectoparasites of Family Nyteribiidae have the highest average frequency at 1.5 ectoparasites per host. The abundance of Family Nyteribiidae might be due to their unique development. The female nycteribiids leave the hosts only to deposit the young on the roost at the time of offsping deposition or at adult emergence. On the other hand, rate of infestation of Family Myobiidae (0.3) was very low. This might be due to the ecological and physiological properties of the host which may not meet the requirement of the parasite. Spinturmicidae and Streblidae had higher average frequency of 1.3 and 0.5, respectively.

Nycteribiids are exclusively parasitic on bats. Members of this family are spiderlike pupiparous, and, like the Streblidae, parasitic exclusively on bats. These flies have become extremely specialized and modified in appearance , as blood sucking parasites of bats. They move about with great agility, rather like spiders, and hence are difficult to catch. All are external parasites living on the skin and the fur of bats. Nycteribiids infested six out of seven species of bats examined namely: *C. brachyotis, H. fischeri, H. whiteheadi, M. minimus, P. javanicus,* and *P. minor.*

Ectoparasites of Family Spincturmicidae were found infesting two species of bats namely, *C. brachyotis and P. javanicus*. They suck blood and other body fluids. The Streblids on the other hand, are winged or wingles and known as bat files were found infesting two specieis of bats namely: *H. fischeri and R. arcuatus*. The presence of their wings gave them the ability to transfer to other hosts or to have a number of hosts.

Myobiids were found infesting three species of bats, *Cynopterus brachyotis, haplonycteris whitehead and macroglossus minimus*. These mites have a pair of legs modified for grasping hairs. They feed on blood and other body fulids of the host.

Table 2 shows the sex of the bats infested with ectoparasites. The occurrence of ectoparasites on both sexes was also computed using T-test. The data showed that 78% of the bats were infested with ectoparasites. Seventy five percent of the female bats and 82% of males were infested with ectoparasites The computed value showed that the ectoparasites were distributed in both sexes. However, there was no significanr difference between two sexes at 0.5 level of significance that might affect the distribution of the ectoparasites. Ectoparasites present in both sexes were not specific on a specific sex of the host.

Table 2. *List of bats collected showing the sex of bats infested with ectoparasites*

BATS COLLECTED	# OF BATS COLLECTED		BATS INFESTED WITH ECTOPARASITES	
	Female	Male	Female	Male
Cynopterus brachyotis	3	5	-	5
Haplonycteris fischeri	4	4	3	1
Harpionycteris whitehead	6	1	6	1
Macroglossus minimus	-	2	-	1
Pipistrellus javanicus	3	3	3	3
Ptenochirus minor	4	3	3	3
Rhinolophus arcuatus	-	-	-	3
TOTAL	20	17	15	14
% of bats infested with ectoparasite ectoparasite			75%	82%
Average infestation			78%	

affect the distribution of ectoparasites since bat species have the same habitat, food supply and physiological component which are the main requirements for the development and distribution of ectoparasites. The requirement for the development and survival in the physical environment outside their host include favorable temperature, adequate moisture, sufficient oxygen, and in some parasitic stages, nutriment.

Ectoparasites present and average frequencies of occurrence in rodent species are shown in Table 3. The five species of rodents examined were *Apomys insigngs, Batonys salomonseni, Bullimus bagobus, Rattus everetti,* and *Tarsomys apoensis.* These rodents were found harboring three family groups of ectoparasites belonging to Families haemotopinidae, Ixodidae, and Pulicidae.

Tabel 3. *List of ectoparasites collected from rodents showing total number of ectoparasites per family and frequency of occurrence on the rodent species.*

# RODENT SPECIES EXAMINED	# OF INDIVIDUALS EXAMINED	ECTOPARASITE FOUND	TOTAL # OF ECTOPARASITES	AVERAGE FREQUENCY
2	8	Haematopinidae	10	1.67
4	8	Ixodidae	11	1.375
1	1	Pulicidae	4	4.0

Ectoparasites of Family Ixodidae were found to be common in the rodent species being found in four of the five species examined. However, Family Pulicidae has the highest average frequency of occurrence on the rodent species at are four ectoparasites per host followed by ectoparasites belonging to families Haematopinidae (1.67) and Ixodidae (1.375).

Family Pulicidae or the fleas were found only on the fur of *B. salomonseni.* Family Pulicidae might be a host-specific ectoparasite since it was only found on one species of rodent which is the *B salomonseni.* The high frequency of occurrence in a particular host implies that they were more adaptive to that host.

Ectoparasites fo Family haematopinidae had infested two species of rodents namely *A. insignis* and *T. apoensis.* Family Haematopinidae has an average frequency of occurrence in rodent species at 1.67 ectoparasites per individual. Family Haematopinide is fairly large group and is also present in horses, cattle, hogs,sheep, and other animals and have sucking mouthparts, which might be a great help for them to reach the needed nutrients for growth and reproduction.

Family Ixodidae had infested four species, *A. insignis B. bagobus R. everetti* and *T. apoensis.* These parasites have an average frequency of occurrence of 1.375 ectoparasites per individual in rodent species. Engemann and Hegner (1981) reported that ticks of this family attach firmly to their host and remain upon them, sucking blood, for days and even weeks. The lesion resulting from tick bite is due largely to inflammatory responses of the host, although tick secretion do cause some vascular trauma.

The ectoparasites and their number collected from bats and rodents do not necessarily mean that these were the only parasites found on the host. It is possible that while the

bats and rodents were being handled during the retrieval and collection, some of the ectoparasites could have flown away or dropped off.

The different frequency of occurrence of ectoparasites collected from bats and rodents of different sampling sites could be due to some factors: ecological and physiological. The mobility of the ectoparasites and their transfer between the hosts may also have affected the frequency of occurrence.

Parasites can develop physiological association with the host such that they simply cannot exist on the chemical content of the blood or other body fluid except on normal host. This is undoubtedly much more common in internal parasites, but can surely be a factor in blood-feeding ectoparasites (Whittaker,2988). Bloodsucking arthropods serve as the route which malaria and related protozoans and the microfilarie of filarois mematodes escape from the body and which further developments occurs. Development and use of land designated for recreational activities may also be affected by the threat of infestation of people and their companion animals by undesirable ectoparasites.

Ectoparasites affect their host by mechanical injury, such as devouring blood and by toxic effects, either by liberating toxic products or by stimulating allergic reactions. A host may protect itself by increasing resistance to harmful effects which permits the parasite to become injurious again, whereas improved resistance may lead to complete elimination of parasites.

Parasitism has deleterious effects on the host, It may be manifested in lowered vitality, reduced rate of reproduction slower growth, or death of the infected individuals. This might result in population decline of species or it may lead to a change in the population through the selection of resistant species or strain. High infestation of bats and rodents specially on the endemic species namely: *H. fischeri, H. whiteheadi, P. minor, A. insignis,* and *R. everetti* may cause population decline in these particular bat and rodent species.

The ectoparasites of bats and rodents are not well known in the Philippines despite the significance of these organisms to man, domestic animals, and wildlife. Additional information is needed on the physiological and ecological relationship of the ectoparasites.

References Cited

Cariaso, B.L. and L.M. Rueda. 1986 Guide to Philippine Flora and Fauna. Volume XII Natural Resources Management Center, Ministry of Natural Resources and University of the Philippines. 1-65.

Cheng, T.C. 1973. General Parasitology. Academic Press. New York.

Engermamn, J.G. and R.W. Hegner. 1970. Invertebrate Zoology. 3rd edition Macmillan Publishing co., Incorporated New York

Whittaker, J.O. 1988. Collecting and preserving Ectoparasites for Ecological Study. A Thomas H. Kunz (ed) 1988. in ecological and Behavioral Methods for the study of Bats. Smithsonian Institution Press, Washington, D.C. 459-474.