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**Bali IJCST** <ijcst2017@gmail.com>  
ke Erna, Rio, swastiwulan, hanzhola, aniendhita, ketut, Elizabeth, M.Sc, B

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**Paper Title** : NEW RECORD OF *Rhinopoma microphyllum* WITH THE INVESTED PARASITES AND MICROBES IN THE DEVELOPED ECOTOURISM AREA OF SOUTH LOMBOK ISLAND NTB  
**First /correspondent:** **Siti Rabiatal Fajri**, sitirabiatalfajri@ikipmataram.ac.id  
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**First /correspondent** : **Siti Rabiatal Fajri/** sitirabiatalfajri@ikipmataram.ac.id

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# NEW RECORD OF *Rhinopoma microphyllum* WITH THE INVESTED PARASITES AND MICROBES IN THE DEVELOPED ECOTOURISM AREA OF SOUTH LOMBOK ISLAND NTB

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**Abstract** *Rhinopoma microphyllum* is a bat species that lives in a habitat covered by grove of trees and shrubs in the primary forest vegetation. These species is included in the IUCN Red List list with Least Concern (LC) status or at the least information. This study was to describe of *R. microphyllum* as a new record in the southern of Lombok, and to examine the parasites and microbes that infest it. The study was carried out in the developed ecotourism area of southern Lombok Island of NTB during February-April 2017. A modified net and quadrant for cave ceiling was used to collect bat sample. Ectoparasite collection was done by combing the bat's hair and the falling specimens were collected. The endoparasite examination was done by the flotation methods of intestinal contents, while microbial examination was done by collecting the microbes from oral cavity and feces. The results showed the discovery of *R. microphyllum* in two ecotourism development sites, The Buwun Cave and The Gale Gale Bangkang Cave Prabu Village, Central Lombok. The endoparasit examination found 4 species of endoparasit, 1 species of *Coccidia sp*, 2 species of Trematodes from Lecithodendridae Family (*Prosthodendrium sp* and *Acanthatrium sp*) and 1 unidentified Nematode specimen. The ectoparasite examination found only 1 species, *Ischnopsyllus hexactenus* (The long Eared Bat Flea), and the microbes found from oral cavity analysis are the Gram positive Coccus (*Staphylococcus aureus*) and faecal analysis are the Coccobacil Gram negative (*Providensia penneri*).

**Key Word:** *Rhinopoma microphyllum*, Parasites, Microbes, Ecotourism, South Lombok Island

## 1. Introduction

*Rhinopoma microphyllum* is species of bat that has never been reported on the Lombok Island by earlier bat researchers. But in 2014 the existence of *R. microphyllum* has been found but not yet verified. The existence of *R. microphyllum* has been reported previously in several countries in the world such as in North Africa, Pakistan, Afghanistan, and India. While in Southeast Asia has been reported to be a new record in Sumatra and Thailand. In Pakistan has been reported in several places including Gujrat, Sakesar, Rohtas, Jehlum, Multan, and Mailsi. Meanwhile, in Khyber Pakhtunkhwa, *R. microphyllum* was only reported from Malakand Hills.

*R. microphyllum* were found to roost in crevices, small caves, mines, underground tunnels, wells, old monuments and buildings. They can adapt to environments that have relatively low humidity. This species is very active throughout the year and prefer to live in. the habitat covered by shrubs and primary forest vegetation shrub. According to the IUCN, *R. microphyllum* has belonged to IUCN Red List with the status of Least Concern (LC)

This study aims to describe and re-identify the bats of *R. microphyllum* species collected in the southern of Lombok based on their morphological characteristics and identify the parasites and microbes present in their bodies.



## 2. Materials And Methods

### 2.1 Research Site

The study was conducted in February to April 2017. The trapping of bat individuals was done in four caves in the area of tourism development the southern region of Lombok island. The four caves are Gale-Gale (Central Lombok), Buwun Cave (Central Lombok), Kenculit Cave (Central Lombok), and Raksasa Cave (East Lombok). Below is the map of the research site in Figure 1.

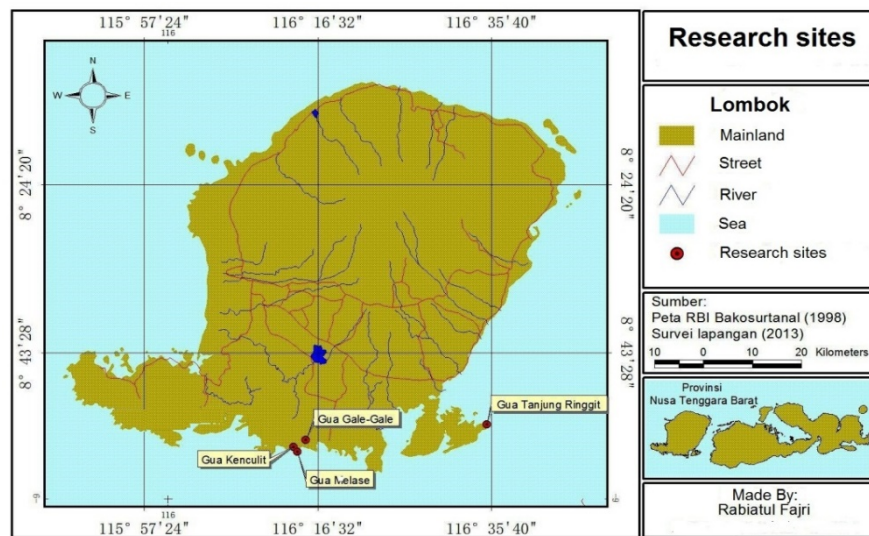


Figure 1. Research sites

### 2.2 Sample Collection

Bat species data collection is done by doing the trapping method using net Mist Mist nets, harp nets and quadrant were installed in the each of the cave.

### 2.3 Observation of Characteristics and Morphology

Bats individuals captured from each cave were transported to Biological Science Laboratory of the University of Mataram. The morphological feature were examined on the guidance method of Suyanto, 2001<sup>6</sup>.

### 2.4 Observation of Parasite

Bats inside plastic bags are removed from the bag, and then placed on a paraffin bath or white porcelain. Afterwards, the bat's hair was combed by using a comb or tooth brush to get a sample of ectoparasites. The ectoparasites found are inserted into a sample bottle containing 70% alcohol or can be directly observed to determine the type. After collecting the bat ectoparathy, then the bat is dissected for endoparasite examination in the intestines.

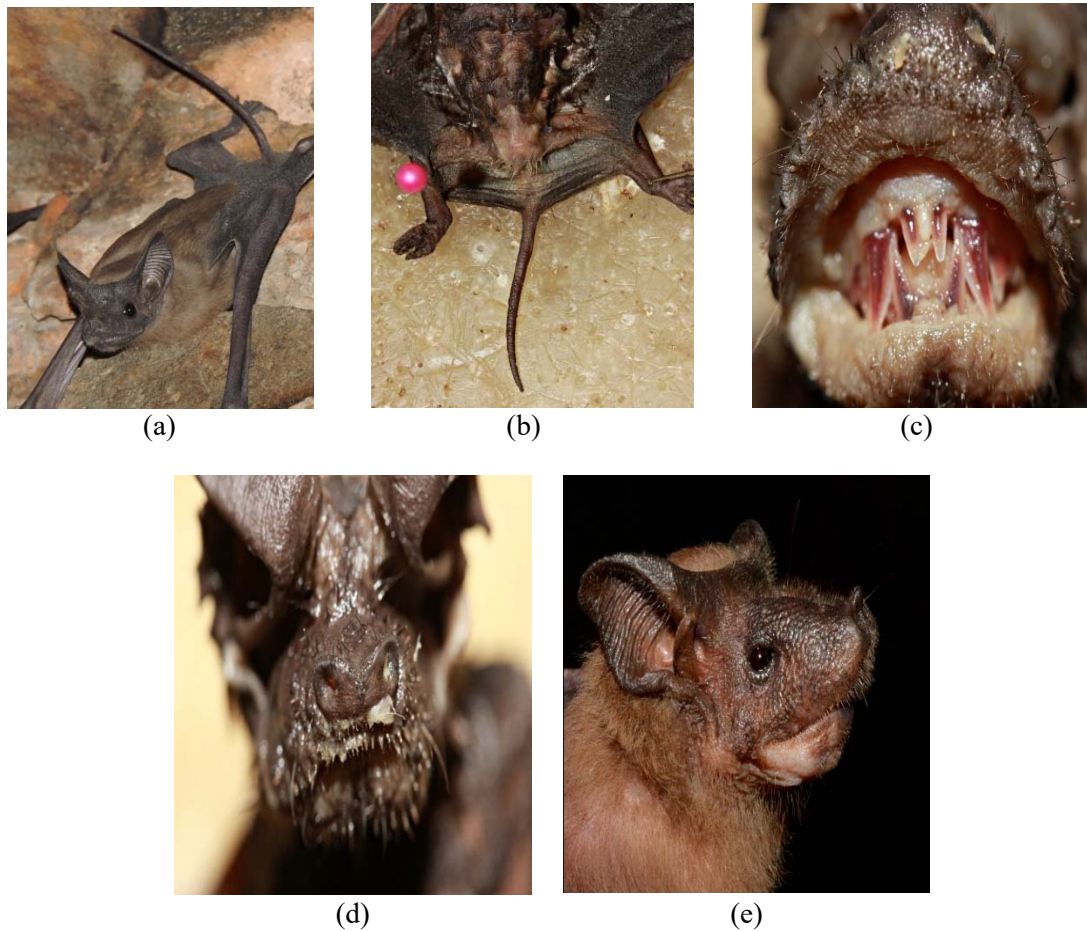
### 2.5 Observation of Microbial

Microbe samples were collected from oral cavity and feces from the bats. The identification of the bacteria can be based on the observation of morphological colony, microscopic observations using various staining reaction and biochemical tests.

## 3. Results

### 3.1 Morphological Characteristics of *Rhinopoma microphyllum*

The result of morphological analysis of *Rhinopoma microphyllum* can be seen in Figure 2.

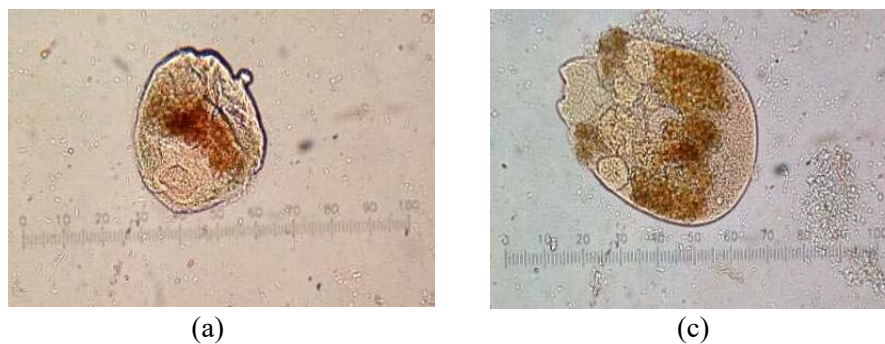


**Figure 2.** Morphological Characteristics of *Rhinopoma microphyllum*. (A) *Rhinopoma microphyllum* species, (b) There is a tail, not a whole tail is immersed in the intercellular skin membrane, and a free tail sticking at the ends of the intercellular skin membrane, (c) Large inner series of teeth, half canines. Upper incisors outer recessed between the incisors and canines I<sub>2</sub> side in contact with the canines, (d) There is a simple folds over the nose, narrow the nostrils, the area between the nostrils bare, (e) developed good tragus

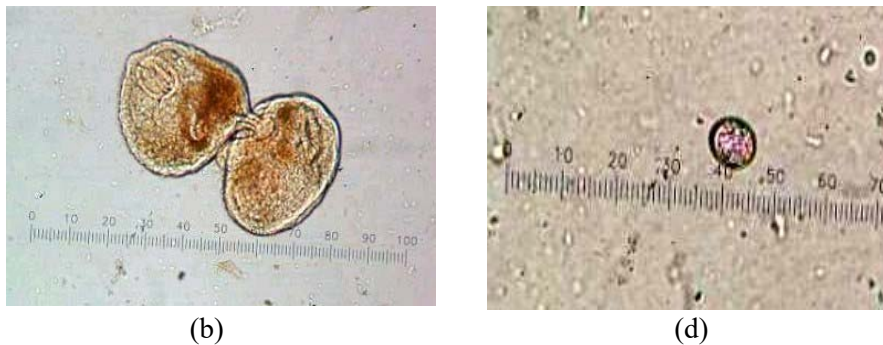
### 3.2 Parasites Investing of *Rhinopoma microphyllum*

Parasite was collected from 20 *Rhinopoma microphyllum*. Observations parasite consists of two observations, namely the observation of endoparasites and ectoparasites. Sampling endoparasite of the feces and intestines and making ectoparasites with body hair combed bat and bat wings.

The results of endoparasit examination were 4 species of endoparasit, 1 species *Coccidia sp*, 2 species of trematode from Lecithodendridae Family (*Prosthodendrium sp* and *Acanthatrium sp*) and 1 nematode specimen. On ectoparasite examination found 1 species of ectoparasites *Ischnopsyllus hexactenus* (The long Eared Bat Flea). Here's a picture of each species in Figure 3.

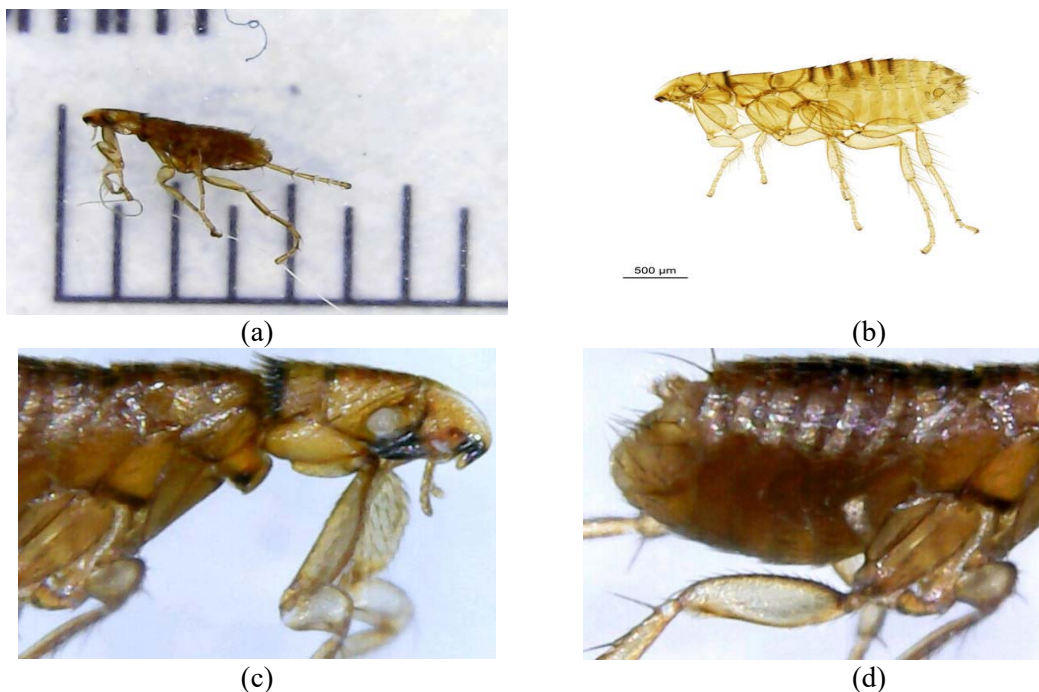






**Figure 3.** (a) *Acanthatrium* sp (b) Conjugation *Acanthatrium* sp, (c) *Prosthodendrium* sp, (d) *Coccidia* sp

While observations ectoparasites only found one species of ectoparasites that *Ischnopsyllus hexactenus* (The long eared Bat Flea). The following image *Ischnopsyllus hexactenus* in Figure 4 below.



**Figure 4.** (a). Full body, (b) Full body (Kolenati, 1856), (c) Thorax, (d) Abdomen

### 3.3 Microbes Investing *Rhinopoma microphyllum*

Microbial collections in *Rhinopoma microphyllum* were performed by sampling microbes in the oral cavity, nostrils and feces. Further identification of bacteria that invested in *R. microphyllum* body. Identification of bacteria can be done based on morphological colony observations, microscopic observations using various staining reactions and biochemical tests. Microbes found from oral cavity analysis were Gram Positive Cocci (*Staphylococcus aureus*) and feces analysis was Gram Coccobacilli Negative (*Providencia penneri*).

## 4. Discussion

Morphological characteristics *Rhinopoma microphyllum* reported in ecotourism development areas south of Lombok Island is relatively small, has a tragus that is very well developed. In addition, it has a pointy molar bulge. *R. microphyllum* tail is not entirely immersed in the intercellular skin membrane. Free tail sticking at the end of the intercellular skin membrane. Interstellar skin membrane is very small. *R. microphyllum* has gray black hair, short dorsal hair and wing hair, intercellular skin layers and

partially underneath bare abdomen. *R. microphyllum* tail is very long and mostly free. While the nose of *R. microphyllum* has a fold, located at the top of the nostrils. Large ears connecting to the forehead, *R. microphyllum* eye is more developed than the other Microchiroptera members. *R. microphyllum* has a slimmer leg than the foot of *R. hardwickii*.

Habitats, including old buildings, crevices between crowns and leaves of palm trees and single tree cavities or colonies of 50 individuals. It appears late from the site perched and flies at a steady pace (Bates and Harrison, 1997). Some of the habitats previously reported by researchers are North Africa, Pakistan, Afghanistan and India. While in Southeast Asia has been reported to be a new record in Sumatra and Thailand. In Pakistan, it has been reported in several places including Gujrat, Sakesar, Rohtas, Jehlum, Multan, and Mailsi. Meanwhile, Khyber Pakhtunkhwa *R. microphyllum* was only reported from Malakand Hills. Rahman, et al also reported, their *R. microphyllum* was found in a cave in the mountainous area of FR, Peshawar. This cave is about 50 km from the main road of Baghbanan in the south. This is an old cave, made up of 168 male and female individuals who live together in a colony. The cave floor is filled with bat guano. While in Mardan District, they are recorded from Mazdurabad, 3 km from Mardan City hotel. The place is perched in the crevices of the building, consisting of about 50 individuals. The perch is also present on agricultural farms and vegetation landscapes.

In the endoparasite examination, 4 endoparasites were obtained, one species of Coccidia sp, two species of trematoda from the Lecithodendridae Family (*Prosthodendrium sp* and *Acanthatrium sp*) and one nematode specimen. In Southeast Asia bats that are invested by parasites, endoparasites, ectoparasites, bacteria, helminths, viruses, pathogens, fungi and diseases have been reported since 1959 -2012. The presence of parasites in the body of bats is strongly influenced by breeding, roosting and the number of colonies with the number of colonies obtaining the highest percentage of 43, 1%.

There are 14 Coccidia reported from all bats around the world and all belong to the genus Eimeria. While in Japan, in 1980, we collected 6 bat species from 5 locations and examined their feces for Cococidian cysts. Cococidian cysts is only 2 bats, *Pipistrellus javanicus* (Vespertilionidae), and *Rhinolophus ferrumequinum* (Rhinolophidae), contains oocyst Coccidian. In conclusion, this study is the first study to report on the presence of *Coccidia sp* on bat species of *R. microphyllum*. In addition to bats, *Coccidian sp* also infects other small mammals such as rats, rabbits, and hamsters. Du szynski et al. (1988) suggested that eating habits of bats could lead to low rates of infections in the bat population, although researchers found that insectivorous bats were not tend to be infected by Coccidia than fruit-eating bats.

The existence of two species of trematoda from the Lecithodendridae Family (*Prosthodendrium sp* and *Acanthatrium sp*) in species *R. microphyllum* was never reported before. The existence of the Lecithodendridae Family (*Prosthodendrium sp* and *Acanthatrium sp*) in bats has been reported to exist in the *Epitesiscus focus* species since 1936-1940. A recent study in 2011 reported the existence of the Lecithodendridae Family (*Prosthodendrium sp* and *Acanthatrium sp*) in bats at Iowa Washington mentioned that there are 16 individual of *Prosthodendrium sp* and *Acanthatrium sp* on the bats of the *Epitesiscus focus* species. In addition, there are 15 species of Lecithodendridae Family reported to infect *Epitesiscus focus* in Wisconsin and Minnesota. These 15 species include *Acanthatrium eptesici*, *A. microcanthum*, *A. oligacanthum*, *A. pipistrelli*, *Allasogonoporus marginalis*, *Glyptoporus uocephilus*, *Ochoterentrema breckenridgei*, *O. diminutum*, *O. travassosi*, *Paralecithodendrium chilostomum*, *P. macnabi*, *P. naviculin*, *P. nocomis*, *P. swanoni*, and *P. transversum*. The new host the Digeinea: Lecithodendridae from the Eastern *Pipistrelle*, *Perimyotis subflavus* (Chiroptera: Vespertilionidae).

In conclusion, this study became the first study to report the existence of the Family Lecithodendridae (*Prosthodendrium sp* and *Acanthatrium sp*) in *R. microphyllum*.

The presence of endoparasites in bats has an abundance of  $48.2 \pm 7$  particularly in the Lecithodendridae Family. In addition, male bats have an abundance of smaller endoparasites than female bats due to the influence of sex hormones on female bats. On examination of the 28S DNA sequence of the rRNA gene from the Lecithodendriid specimen using PCR-based detection, the Lecithodendridae family has a potential reservoir of toxoplasma gondii apicomplexan with a prevalence value of 10%.

While on ectoparasite observation only found 1 species ectoparasit *Ischnopsyllus hexactenus* (The long Eared Bat Flea). *Ischnopsyllus hexactenus* is one of the flea family specifically found in bats and not

found in other mammal species. Bats that once hosted *Ischnopsyllus hexactenus* were *Myotis frater* and *Murina hilgendorfi* and *Pipistrellus pipistrellus*. This study also became the first study to report the existence of *Ischnopsyllus hexactenus* (The long Eared Bat Flea) in the bat species of *R. microphyllum*. *Ischnopsyllus hexactenus* is an ectoparasite that can be a vector of some pathogenic bacteria zoonosis including trypanosomes. The abundance of *Ischnopsyllus hexactenus* in bats is quite high, even able to make bats as its sole host.

Microbes found in bat species *R. microphyllum* from oral cavity analysis were Gram Positive Coccus (*Staphylococcus aureus*) and feces analysis was Gram Coccobacilli Negative (*Providencia penneri*). At the moment, bats are at the center of attention in the study of infectious diseases, due to their well-known status as reservoir species for various infectious agents. Nevertheless, the study of infection in bats is largely confined to the identification of specific and extremely rare pathogens that observe the effects it has on the body of the bat itself. *Staphylococcus aureus* bacteria is a normal microflora that is very often found in humans and other mammals such as goats, cattle and pigs. *Staphylococcus aureus* is commonly found in the upper respiratory tract and skin. The presence of *S. aureus* in the upper respiratory tract and skin in individuals rarely causes disease, healthy individuals usually only serve as a carrier. Serious infection will occur when host resistance weakens due to hormonal changes; The presence of disease, injury, or treatment using steroids or other drugs that affect immunity so that there is weakening of the host. *S. aureus* can cause dermatosis disease, if the individual is infected by *S. aureus* will be difficult to cure because it can cause other germs to form colonization on the infected body part that will weaken the host.

The presence of *Staphylococcus aureus* in bats has been previously reported, colonization detecting *S. aureus* is higher by 4-6% than in *S. schweitzeri* by 4%. The presence of *Staphylococcus aureus* is found in two of the four species of fruit bats, namely *Rousettus aegyptiacus* and *Micropteropus pusillus*, but not in insect bats. The presence of *Staphylococcus aureus* is mostly found in fruit-eating bats (Megachiroptera), and very rarely found in the microchiroptera bat species, yet there is not even a single researcher reporting the presence of *Staphylococcus aureus* in the Microchiroptera bats. This the study is different because the presence of *Staphylococcus aureus* is found in insectivorous bats (Microchiroptera).

## 5. Conclusion

*R. microphyllum* was found in two ecotourism development sites, The Buwun Cave and The Gale Gale Bangkang Cave Prabu Village, Central Lombok. The endoparasite examination found 4 species of endoparasite, 1 species of *Coccidia sp*, 2 species of Trematodes from Lecithodendridae Family (*Prosthodendrium sp* and *Acanthatrium sp*) and 1 unidentified Nematode specimen. The ectoparasite examination found only 1 species, *Ischnopsyllus hexactenus* (The long Eared Bat Flea), and the microbes found from oral cavity analysis are the Gram Positive Coccus (*Staphylococcus aureus*) and feces analysis are the Coccobacil Gram Negative (*Providencia penneri*).

## 6. Acknowledgements

We thank our Director, DRPM Ristekdikti for the research fund. The Rector of IKIP Mataram for the support and encouragements. The Chairman of LPPM of IKIP Mataram for the writing and research guidance. In addition, I thank to the lectures of Mataram University for the support in guiding me for research standard. Furthermore, I thank the Biology students of IKIP Mataram and Mataram University for the dedication to promote ecotourism to visitors and tourists.

## 7. Reference

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