

## New report of parasite-fauna of the free-tailed bat (*Tadarida brasiliensis*, Geoffroy, 1824) in Chile

Pamela Muñoz · Fernando Fredes · Eduardo Raffo ·  
Daniel González-Acuña · Lisandro Muñoz · Cesar Cid

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**Abstract** One hundred and ninety five specimens of free tailed bat (*Tadarida brasiliensis*) obtained from two regions of Chile were analyzed to determine parasite infection. From those specimens the endoparasites identified were: Trematoda: *Acanthatrium lunatum*, *Limatuoides limatulus* and *Paralecithodendrium carlsbadensis*; Cestoda: *Vampirolepis* sp.; Nematoda: *Nochtia pilosus* and *Anoplostrongylus paradoxus*. The ectoparasites identified were *Chiroptonyssus robustipes*, *Ewingnana inaequalis* and *Notoedres lasionycteris* all of them are acari species. Even though the bat specimens are from the same species on both survey sites, the results differ for each site when the parasite species identified are compared.

**Keywords** Parasites · Free-tailed bat · Chile · *Tadarida* · Endoparasites · Ectoparasites

### Introduction

In Chile there are twelve species of bats reported (Galaz and Yañez 2006) from which the free tailed bat (*Tadarida brasiliensis*) is the most abundant. It is also described as the most related to humans on urban and rural areas (Mann 1978; Gantz and Martínez 2000). Furthermore, this mammal in Chile is the main reservoir for rabies virus (Favi et al. 1999). On the other hand all the bats species present in Chile are considered as beneficial for

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P. Muñoz (✉)

Laboratorio de Parasitología Veterinaria, Instituto Patología Animal, Facultad de Ciencias Veterinarias,  
Universidad Austral de Chile, Casilla 567, Valdivia, Chile  
e-mail: pamelamunoz@docentes.uach.cl

F. Fredes

Unidad de Parasitología, Facultad de Ciencias Veterinarias y Pecuarias, Universidad de Chile,  
Santiago, Chile

E. Raffo

Servicio Agrícola y Ganadero, Valdivia, Región de Los Ríos, Chile

D. González-Acuña · L. Muñoz · C. Cid

Facultad de Medicina Veterinaria, Universidad de Concepción, Concepción, Chile

agriculture therefore they are protected by law, and hunting or capture of specimens without permission is forbidden (S.A.G. Agricultural and Livestock Service Chile 2005).

The parasitological investigation carried out in bats in Chile is scarce, and almost all the cases are isolated findings which have been performed mainly in ectoparasites. According to this, there have been identified 2 species of bat flies, the first *Basilisa silvae* on *Histiopus* sp. in Santiago (Brèthes 1913) and *Myotis atacamensis* in Coquimbo and Valparaíso; a report on an intermediate host on the Mulchen province (Guimaraes and D'Andretta 1956) and another report on *Histiopus montanus* in Chillan (Muñoz et al. 2001). The second bat fly identified is *Trichobius parasiticus* which was detected on an unidentified host and location (Guerrero 1997). There are other ectoparasites identified in bats, like four species of fleas which are described as follows: *Sternopsylla distincta distincta* in Concepción on *T. brasiliensis* (Muñoz 2002), *Rhynchopsyllus pulex* on *T. brasiliensis* in Valparaíso (Hopkins and Rothschild 1956), *Hormopsylla* sp. on *Myotis atacamensis* in Tarapacá and *Myodopsylla isidori* on *Myotis chiloensis* in Valparaíso (Beaucournu and Gallardo 1991). In addition to the previously mentioned, there have been identifications related with other parasites like mites, with 5 species described on the country: *Chiroptonyssus robustipes* on *T. brasiliensis* in Valparaíso (Radovsky 1967) and on the same host in Concepción (Muñoz 2002); *Macronyssus crosbyi* and *Eucheyletia hardii*, without description of host or location (Hoffmann and López-Campos 2000) and *Ewingana inaequalis* and *Notoedres lasionycteris* in *T. brasiliensis* in Concepción (Muñoz 2002).

Regarding to endoparasites, the existing information is practically inexistent on the country; there are some reports about this matter like the finding of a trematode of the Lecithodendridea family identified as *Chiropterotarbuis virgulatus* (Bay-Schmith 1972) and not identified endoparasites found on the intestinal lumen of three red bats (*Lasiurus boreales bonaerenses*) in the city of Chillán.

Due to the small amount of information available, the study of this mammals in Chile turns out to be interesting, not necessarily because it is the main reservoir of rabies virus or because of the importance of this specie on the ecosystem, but because it is important to advance in the knowledge of the pathogens that attacks the specie beginning with the parasitological fauna in order to describe the importance and appliance of this information on public health, biodiversity and conservation of the species.

## Materials and methods

The survey was carried on different sectors of the city of Santiago (Metropolitan Region, 33°26'S; 70°38'W) and in the city of San Carlos (Bio-Bio Region, 36°25'S; 71°57'W) responding to bat infestation claims submitted to the National Health Service.

The standard response to this kind of claims is to capture the individuals with entomological nets, for rabies virus examination in order to determine the zoonotical risk for the presence of the colony on the claimers house. As a result of this practice, 163 *T. brasiliensis* specimens from Santiago and 32 specimens from San Carlos were obtained. After the obtainment of the specimens they were analyzed for rabies virus on the Public Health Institute and the animals that turned out negative for the virus were injected with 10% formaldehyde solution in the abdomen to maintain the parasitological structures that could be present on the digestive tract, then each specimen was numbered and identified, stored together on sealed plastic bags and maintained at 4°C for preservation.

Once in the laboratory, each specimen was profoundly combed over a white bottom tray for the collection of all the ectoparasites present. The animals used for this survey were

previously examined for the detection of rabies virus and were all stored together in plastic bags, due to the obvious cross contamination of ectoparasites, it was not possible to determine the intensity of the ectoparasite infection or the abundance of parasites for each individual. After the collection of the parasites, they were cleared with Nesbitt solution (40 gr. of chloral hydrate, 25 ml. of distilled water and 2.5 ml of concentrated hydrochloric acid) for 72 h, and mounted permanently in Berlesse solution (Krantz 1978).

For the endoparasite analysis, the digestive tract of each bat was directly observed for the detection of large parasites specimens, the organs were also analyzed by common flotation and sedimentation techniques as described by Thienpoint et al. (1979). The Ziehl Neelsen technique was also used with the digestive content to determine the presence of *Cryptosporidium* (Dubey et al. 1998). Each digestive segment (Stomach, small intestine and large intestine) were tied separately to avoid the mixture of the different segment content during the analysis. All the parasites detected were extracted from each segment according to the traditional parasitological necropsy techniques.

The endoparasites isolated were observed with a microscope and measured with micrometric ocular for the determination of the development state, sex, genus and species

**Table 1** List of the reported endoparasites of *Tadarida brasiliensis* with the addition of the new descriptions of the present survey

Species	Location	Reference
Trematode		
(Lecithodendriidae)		
<i>Dicrocoelium rileyi</i>	Nuevo México	Cain (1966)
<i>Limatuloides braunii</i>	Argentina	Lunaschi (2002)
<i>Limatuloides limatulus</i>	San Carlos, Chile	Present survey
<i>Ochoterenatrema caballeroi</i>	Nuevo México	Cain (1966)
<i>Ochoterenatrema labda</i>	México	Caballero (1943), Cain (1966)
<i>Paralecithodendrium carlbansis</i>	Nuevo México	Cain (1966)
<i>Prosthodendrium conturbatum</i>	Argentina	Boero and Led (1971)
<i>Prosthodendrium scabrum</i>	México	Caballero (1940) <sup>a</sup> , Caballero (1943)
<i>Suttonia talaveraensis</i>	Argentina	Lunaschi (2002)
<i>Tremajoannes buckleyi</i>	Nuevo México	Cain (1966)
<i>Acanthatrium lunatum</i>	Santiago, Chile	Present survey
<i>Paralecithodendrium carlsbadensis</i>	Santiago de Chile	Present survey
Cestode		
(Hymenolepididae)		
<i>Hymenolepis gertschi</i>	Nuevo México	Cain (1966)
<i>Vampirolepis</i> sp.	Santiago de Chile	Present survey
Nematode		
(Dipetalonematidae)		
<i>Litosomoides guiterasi</i>	Cuba	Barus and del Valle (1967)
(Trichostrongylidae)		
<i>Nochtia pilosus</i>	Santiago de Chile	Present survey
<i>Anoplostrongylus paradoxus</i> .	Santiago de Chile	Present survey
<i>Allintoshius cubaensis</i>	Cuba	Barus and del Valle (1967)
<i>Molinostrongylus delicatus</i>	Nuevo México	Cain (1966)

(if possible) using the corresponding taxonomical keys. As a final procedure, the  $\chi^2$  test was used to study the relationship between the presence of endoparasites and the gender of the host.

## Results and discussion

Regarding to the Santiago city bats, the endoparasites found were the following: inside the stomach it was possible to evidence the presence of two kinds of parasites, the trematode *Acanthatrium lunatum* and the nematode *Nochitia pilosus*. In the small intestine the presence of three kinds of parasites was demonstrated, the parasites involved were identified as the cestode *Vampirolepis* sp., the nematode *Anoplostrongylus paradoxus* and the trematode *Paralecithodendrium carlsbadensis*. It was not possible to determine the species of the cestoda specimens found, this could be explained because the genus is poorly described, and/or because it represents a new species for the genus, therefore more profound investigation is required.

**Table 2** List of the reported ectoparasites of Chilean Chiroptera with the addition of the descriptions of the present survey

Species	Location	Reference
Insecta		
(Nycteribiidae)		
<i>Basilia silvae</i>	Santiago, Coquimbo, Valparaíso, Chillan	Brêthes (1913), Guimaraes and D'Andretta (1956), Muñoz et al. (2001)
(Streblidae)		
<i>Trichobius parasiticus</i>	Unknown	Guerrero (1997)
(Ischnopsyllidae)		
<i>Sternopsylla distincta distincta</i>	Concepción	Muñoz (2002)
<i>Hormopsylla</i> sp.	Tarapacá	Beaucournu and Gallardo (1991)
<i>Myodopsylla isidori</i>	Valparaíso	Beaucournu and Gallardo (1991)
(Pulicidae)		
<i>Rhynchopsyllus pulex</i>	Valparaíso	Hopkins and Rothschild (1956)
Arachnida		
(Macronyssidae)		
<i>Chiroptonyssus robustipes</i>	Valparaíso, Concepción	Radovsky (1967), Muñoz (2002). Present survey
<i>Macronyssus crosbyi</i>	Unknown	Hoffmann and López-Campos (2000)
(Cheyletidae)		
<i>Eucheyletia hardii</i>	Unknown	Hoffmann and López-Campos (2000)
(Myobiidae)		
<i>Ewingana inaequalis</i>	Concepción	Muñoz (2002). Present survey
(Labidocarpidae)		
<i>Notoedres lasionycteris</i>	Concepción	Muñoz (2002). Present survey

On the San Carlos city specimens, it was possible to detect only the presence of one kind of endoparasite, the trematode *Limatuoides limatulus* this specie was detected by Lunaschi (2004) over the same host but in Argentina.

No parasitological structure was found in the large intestine or the rectal ampulla. The Ziehl-Neelsen dye exam did not revealed any positive samples. The statistical analysis showed no differences that could evidence the association of parasitism and sex of the host.

The Table 1 shows the reports of endoparasites on *T. brasiliensis* and all the endoparasites isolated on this survey, all of them represent new descriptions for the host species with the exception of *L. limatulus*.

In Santiago as well as in San Carlos the following ectoparasites were collected *Chiroptonyssus robustipes* (Ewing 1925) *Ewingnana inaequalis* (Ewing 1938) and *Notoedres lasionycteris* (Boyd and Bernstein 1950). This results demonstrate a lower variety of ectoparasites that the description of Durden et al. (1992) who isolated five species of acari and one hemiptera parasitizing *T. brasiliensis* at the United States.

*C. robustipes*, is common in *Tadarida brasiliensis* (Davis et al. 1962; Yunker and Radovsky 1966; Radovsky 1967; Whitaker and Wilson 1974; Durden et al. 1992; Morales-Malacara 1996; Lareschi and Mauri 1998; Hoffmann and López-Campos 2000), and the presence on this host in Chile had already been described by Muñoz (2002) in the city of Concepción, it was also described by Radovsky (1967) in the city of Valparaiso and at that time it was described as the most southern finding of the parasite.

The *Notoedres lasionycteris* record is the second for Chile and South America, the first report was made by Muñoz (2002) it is also the second report on *T. b. brasiliensis*, because the prior findings were over other bat species or subspecies as *Tadarida minuta*, *Tadarida laticaudata yucatanica*; *Tadarida brasiliensis muscula* and *Eptesicus fuscus dutertreus* in Cuba (Dusbábek 1970).

The Table 2 shows the reports of ectoparasites on Chilean bat species including the ones isolated on this survey.

It is very interesting to note the differences found over the species of endoparasites present when the animals from the two localities are compared, considering that they are the same bat specie, this fact may be related with the possible differences of the feeding substrate of both populations involved on this survey, in order to demonstrate this thesis, more and mayor studies must be carried out.

Finally, bats and their anthropophilic habits represent a potential risk for humans. Therefore it is necessary to improve and intensify the education of the population to avoid possible zoonosis associated to bat species, and at the same time, preserve Chiroptera species that have enormous ecological value. It is also very recommendable to continue the monitoring of chiroptera populations, because eventually they could acquire unknown or exotic diseases for the country affecting actual populations.

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