COMUNICACIONES

*The community of gastrointestinal helminths in the housemouse, **Mus musculus**, in Santiago, Chile.*

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*The house mouse, **Mus musculus**, has been present in Chile since approximately 1600 AD and it is the most typically synanthropic rodent in Chile. In order to know its parasites a survey was conducted in three different localities in Santiago. The helminthes community was poor in species and only three nematodes species were found: **Syphacia obvelata**, **Aspicularis tetraptera** and **Physaloptera calnuensi**. All these species constitutes the first record in Chile. This is also the first record of **P. calnuensis** in this host. **Syphacia obvelata** was the most abundant and the most prevalent.*

Key words: *Syphacia, Aspicularis, Physaloptera, Mus musculus.*

INTRODUCTION

Mus musculus, Linnaeus, 1758 is a worldwide distributed rodent. This mouse first settled in Chile approximately four centuries ago¹. It is found in both urban and suburban enviroments, and it is the most typically synanthropic rodent in Chile². Currently, most of our knowledge about its parasites is limited to lists compiled from regions outside of the American continent^{3,4}. Moreover, they have been made without ecological data or morphometric comparisons^{5,6}. Herein we report the first record of gastrointestinal helminths of *M. musculus* in Chile and add data of parasite distribution in thee localities of Santiago , Chile.

MATERIALS AND METHODS

The survey were conducted between March and October of 2002 in Santiago, Chile. 88 mice were live-trapped using Sherman traps baited with rolled oats at each of the three localities: 1) Facultad de Ciencias Veterinarias y Pecuarias

(FAVET) of the Universidad de Chile (39 individuals) (33° 34' 20" S; 70° 37' 51" E; 620 masl.); 2) Fundo El Bosque (28) (33° 32' «50 S; 70° 48' 10" E; 454 masl); and 3) Pudahuel (21) (33° 26' 10" S; 70° 49' 20"; 464 masl).

The mice were killed using ether. Helminths were collected, fixed in 10% formalin and preserved in 70% ethanol, cleared in lactophenol, and studied under a light microscope. The prevalence (P), mean intensity (MI) and mean abundance (MA) were calculated for each locality and species found following Bush et al.⁷ (Table 1). Tables 2 - 4 list measurements of the specimens, including the mean and standard deviation, followed by the range in parentheses, and those given by previous authors. All measurements are in micrometers unless otherwise stated.

Community diversity (H) and homogeneity (J) were estimated using the Shannon-Wiener index. In keeping with Rózsa⁸, the Kruskal Wallis non-parametric ANOVA was used to compare mean abundances and mean intensities of helminths in each localities. The test of hypothesis

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of independence (Chi square) was used to compare prevalences of helminths in each localities. Specimens of helminths were deposited in the Museo Nacional De Historia Natural, Santiago, Chile (*P. calnuensis*: MNHN1537, MNHN1542, MNHN1543; *S. obvelata*: MNHN1538; *A. tetraptera*: MNHN1539, MNHN1540, MNHN1541)

RESULTS

A total of 2.405 specimens were collected and identified as three different species: *Physaloptera calnuensis* Sutton, 1989, *Aspiculuris tetraptera* (Nitzsch, 1821) Schulz, 1927 and *Syphacia obvelata* (Rudolphi, 1802) Seurat, 1916. These species were recovered from 2 infestation sites: stomach (*P. calnuensis*) and caecum-colon (*A. tetraptera*, *S. obvelata*).

Syphacia obvelata was found in the 3 localities, while *A. tetraptera* and *P. calnuensis* were found in 2, the first one in FAVET and Pudahuel, and the second in FAVET and Fundo El Bosque (Table 1).

In Chile, species of genus *Physaloptera* have been found in humans, dogs and cats^{9,10}, in the form of eggs in feces. There is no study of adult worms. *P. calnuensis* was originally described from *Calomys laucha* Fischer 1814 (Cricetidae) in Artigas, Uruguay¹¹. This paper represents the first record of this species in *M. musculus*, and in Chile. The only discrepancy found between both hosts was the tail length. This difference is

related to the different hosts and areas (Table 2).

Both *A. tetraptera* and *S. obvelata* have been found in *M. musculus* in the laboratory and in the wild^{1,12,13}.

Aspiculuris tetraptera has previously been recorded in laboratory mice from South American countries¹⁴⁻¹⁶. Other species of *Aspiculuris* found in the American continent was assigned to *A. lahoriga* Akhtar, 1955 in house mice of Mexico¹⁷. Measurements of this worm are similar to those given for *A. tetraptera* (Table 3). However, the number of caudal papillae is distinct 10 versus 14, respectively¹⁸.

Eleven species of *Syphacia* have been recorded in America, included *S. obvelata*^{14,16,19,20}. However, among them, only one species, *S. phyllotios* has been recovered in Chile from *Phyllotis darwini* Waterhouse, 1837²⁸. Therefore

Table 2. Main morphological features and measurements of *Physaloptera calnuensis*

Reference	1989 ¹¹	This paper
Host	<i>Calomys laucha</i>	<i>Mus musculus</i>
Localities	Uruguay	Santiago. Chile
Male (N)	?	2
Total length (mm)	17.1	17.46 (16.75 - 18.17)
Width	610	730 (720 - 740)
Muscular oesophagus	330	410 (380 - 440)
Glandular oesophagus (mm)	2.99	3.05 (2.95 - 3.15)
Tail length	580	400

Table 1. Epidemiology of each helminth species of *Mus musculus*

	n°	P	MI	MA	Range
<i>Syphacia obvelata</i>					
FAVET	411	28.2	37.36	10.54	187
F. El Bosque	1211	39.3	110.1	43.25	590
Pudahuel	377	19	94.25	17.95	275
Total	1999	29.55	76.88	22.72	590
<i>Aspiculuris tetraptera</i>					
FAVET	4	5.1	2	0.1	2
Pudahuel	396	14.3	132	18.86	302
Total	400	5.68	80	4.55	302
<i>Physaloptera calnuensis</i>					
FAVET	2	5.13	1	0.051	1
F. El Bosque	4	7.14	2	0.14	3
Total	6	4.55	1.5	0.068	3

Table 3. Main morphological features and measurements of *Aspiculuris* species from America

Reference	2005 ¹⁷	1994 ¹⁴	This paper
Parasite	<i>A. lahoriga</i>	<i>A. tetraptera</i>	<i>A. tetraptera</i>
Host	<i>Mus musculus</i>	<i>Mus musculus</i>	<i>Mus musculus</i>
Localities	Metztitlán. Hidalgo. Mexico	Río de Janeiro. Brasil	Santiago. Chile
Male (N)			10
Total length (mm)		2.4 - 3.1	3.393 ± 0.427 (2.65 - 3.95)
Dfae ⁽¹⁾ - nerve ring		115 - 140	129 ± 13 (115 - 145)
Oesophagus bulb length			133 ± 12 (110 - 140)
Oesophagus length		288 - 360	375 ± 25 (320 - 390)
Cervical alae length			347 ± 27 (310 - 400)
Dfae - excretory pore		619	854 ± 56 (750 - 910)
Width		175 - 21	202 ± 23 (170 - 250)
Tail length		144 - 172	178 ± 9 (162 - 187)
Caudal papillae - Dfpe ⁽²⁾			99 ± 9 (88 - 112)
Female (N)			10
Total length (mm)		3.1 - 3.6	3.881 ± 0.286 (3.53 - 4.51)
Dfae - nerve ring		158 - 216	140 ± 13 (0.12 - 0.162)
Oesophagus bulb length			152 ± 6 (140 - 160)
Oesophagus length		331 - 433	425 ± 15 (400 - 450)
Cervical alae length			392 ± 18 (350 - 420)
Dfae - excretory pore		734 - 936	888 ± 32 (860 - 950)
Dfae - vulva (mm)		1.1 - 1.4	1.61 ± 0.038 (1.55 - 1.67)
Width		175 - 245	260 ± 17 (230 - 270)
Eggs width	28 (24 - 40)	0.036 - 0.053	46 ± 5 (43 - 52)
Eggs length	76 (66 - 91)	72 - 90	87 ± 5 (84 - 92)
Tail length		360 - 486	477 ± 67 (347 - 537)

(1): Dfae = distance from anterior end. (2): Dfpe = Distance from posterior end.

S. obvelata is the second report of this genus and the first of this species in Chile. Measurements of *S. obvelata* in this paper are similar to those given by previous authors^{14,21,22} (Table 4).

Syphacia obvelata was the species with highest values of P, IM and AM (Table 1). There were not significant differences in the prevalence, mean intensity and mean abundance between sites either within parasite species neither at the component community level. (Table 1). Pudahuel was the site with the highest diversity and homogeneity (Table 5).

DISCUSSION

The low richness of parasite communities in this study is notable. In contrast, in *M. musculus* from Mexico, a component community of 6 different species was found¹⁷. However, a study carried out on several chilean rodent species²³,

showed that in Chile the low parasitic richness is not an uncommon result. This case was also observed in studies on invasive species of Chile such as hares (*Lepus europaeus* Pallas, 1778) and rabbits (*Oryctolagus cuniculus* Linnaeus, 1758)^{24,25}. This could be due to extrinsic factors such as a lack of vectors or intermediate hosts; the possibility that the invasive mouse could have shed its parasites in the process of colonization^{26,27}; or due to geographic barriers for colonizations (such as The Andes Mountains or the Atacama Desert) which make Chile similar to an island. Low parasite richness is frequent in introduced hosts in island as occurs in Southern Indian Ocean and in Formentera (Balearic) island^{12,13}. Future studies will clarify the effect of these factors on the richness of parasites in Chilean rodents.

This is the first research of gastrointestinal helminth fauna of the *M. musculus* in Chile, and it also provides a new host and locality record.

Table 4. Main morphological features and measurements of *Syphacia* species from America

Reference Parasite Host	1957 ²¹ <i>S. obvelata</i> <i>Mus musculus</i>	1994 ¹⁴ <i>S. obvelata</i> <i>Mus musculus</i>	1971 ²² <i>S. obvelata</i> Several species Several Countries	1979 ²⁸ <i>S. phyllotios</i> <i>Phyllotis</i> <i>darwini</i> Malleco Chile	This paper <i>S. obvelata</i> <i>Mus musculus</i> Santiago. Chile
Localities	USA	Río de Janeiro. Brasil			
Male (N)	20	5	11	2	10
Total length(mm)	1,334	1 - 1.1	1.35 (1.13 - 1.61)	1.4	1.04 ± 0.3 (0.88-1.23)
Width	131	50 - 72	146 (131 - 172)	140	150 ± 40 (120-190)
Dfae ⁽¹⁾ -nerve ring		90 - 97		110	100 ± 2 (90-120)
Dfae -excretory pore	0,302	79		265	190 ± 28 (170-220)
Oesophagus bulb length					60 ± 5 (50-67)
Oesophagus length		144 - 158	226 (188 - 249)	210	210 ± 30 (180-260)
Dfae - ant. Mamelon	0,47			360	330 ± 70 (280-450)
Dfae - mid. Mamelon	0,618			510	420 ± 90 (330-520)
Dfae - post. mamelon				0.75	0.57 ± 0.12 (0.5-0.8)
Tail length	0,122	72 - 90	149 (122 - 172)	80	130 ± 20 (110-170)
Diameter of plateau			29 (21 - 34)		30 ± 5 (23-40)
Length - ant. Mamelon				80	50 ± 9 (40-60)
Length - mid. Mamelon				75	50 ± 7 (40-63)
Length - post. mamelon				85	50 ± 10 (45-68)
length of crenele					15 ± 2 (10-18)
length of spicule		72 - 82	78 (68 - 89)	76 - 82	77 ± 11 (55-85)
length of gubernaculum		25 - 39	34 (26 - 39)	33 - 42	32 ± 5 (25-40)
Caudal papillae-Dfpe ⁽²⁾				46	90 ± 10 (75-118)
Female (N)	20	5	25	5	10
Total length(mm)	5,203	4.5 - 5	4.69 (3.72 - 5.61)	6	4.28 ± 0.48 (3.7-4.8)
Width	0,312	245 - 350	316 (234 -372)	375	320 ± 65 (290-400)
Dfae-nerve ring		82 - 90		185	120 ± 5 (115-125)
Dfae-excretpore	0,523	86		65	350 ± 110 (250-510)
Oesophagus bulb Length					0.11 ± 0.016 (0.085-0.126)
Oesophagus lenth		316 - 324	362 (329 - 431)	462	360 ± 30 (320-400)
Dfae - vulva	0,874	662 - 806	590 (450 - 740)	850	550 ± 170 (430-790)
Tail length	0,762	518	780 (680 - 890)	750	670 ± 70 (600 770)
Egg length	0,134	118 - 126	(99 - 118)	75	136 ± 3 (132-140)
Egg width	0,036	43 - 54	(36 - 41)	3	40 ± 9 (31-50)
Diameter of plateau			46 (36 - 50)		54 ± 7 (45-62)

(1): Dfae = distance from anterior end. (2): Dfpe = distance from posterior end.

Table 5. Diversities (H) and equities (J) of component communities of *M musculus* in each localities

FAVET	F. El Bosque	Pudahuel
H	0.1218	0.0319
J	0.0769	0.0319

RESUMEN

El ratón doméstico, *Mus musculus*, está en Chile desde aproximadamente el 1600 DC. y es

el más sinantrópico de los roedores chilenos. Para conocer sus parásitos se realizó un estudio en tres diferentes localidades de Santiago. La comunidad de helmintos fue pobre en especies y

sólo se encontraron tres especies de helmintos: *Syphacia obvelata*, *Aspiculuris tetraptera* y *Physaloptera calnuensis*; todas estas especies constituyen el primer registro para Chile. Esté es también el primer hallazgo de *P. calnuensis* en este hospedador. *Syphacia obvelata* fue la especie más prevalente y abundante.

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