PUBLIC HEALTH

Ectoparasite Occurrence Associated with Males and Females of Wild Rodents *Oligoryzomys flavescens* (Waterhouse) and *Akodon azarae* (Fischer) (Rodentia: Cricetidae: Sigmodontinae) in the Punta Lara Wetlands, Argentina

Marcela Lareschi

Centro de Estudios Parasitológicos y de Vectores, CCT La Plata, CONICET-UNLP, Calle 2 n° 584, 1900, La Plata, Argentina; mlareschi@cepave.edu.ar

Edited by Eunice Galati – FSP/UP

Neotropical Entomology 39(5):818-822 (2010)

ABSTRACT - The objective of this research was to study infestation parameters and indexes of ectoparasites associated with each sex of the wild rodents *Oligoryzomys flavescens* (Waterhouse) and *Akodon azarae* (Fischer) in the Punta Lara wetlands, Argentina. A trend towards higher mean abundance (MA) and ectoparasite specific richness was observed in males of *O. flavescens* whereas those values were similar for both *A. azarae* sexes. The prevalence of the following ectoparasites was significantly higher on males ($P < 0.05$): *Mysolaelaps microspinosus* Fonseca (65.2%) and *Hoplopleura travassosi* Werneck (73.9%) on *O. flavescens*, and *Ixodes loricatus* Neumann (71.4%) on *A. azarae*. Only *H. travassosi* mean abundance was significantly higher on males (MA = 44.1). Since *I. loricatus* and *Hoplopleura* spp. are involved in the transmission of pathogens that cause diseases in animals and humans, and whose reservoirs are rodent hosts, these results are epidemiologically important.

KEY WORDS: Chigger, flea, mite, parasite, sucking-lice, tick

Sigmodontine rodents are hosts of numerous ectoparasite species. Many of these ectoparasite species are epidemiologically important because they are involved in the transmission of pathogens that cause diseases in humans and domestic and wild animals, and whose reservoirs are rodent hosts. So, arthropods might also play an important role in epizootic diseases and their perpetuation among those rodents (Morand *et al* 2006), such as is *Polygenis* spp. (Linardi & Guimarães 2000), *Ornythonyssus bacoti* (Hirst) and *Androlaelaps* spp. (Lareschi & Mauri 1998).

Host-parasite associations are the result of evolutionary and ecological processes (Kim 1985). Individuals in a rodent population vary in ways that may affect their interactions with their parasites. For example, specimens of the same age but different sexes usually differ in their physiology, morphology, ethology and ecology, all of which may influence their ectoparasite populations (Marshall 1981).

Studies on the relationship between host sex and ectoparasite presence typically show either male or female bias of parasitism in relation to the biology and ecology of rodent species (Marshall 1981). In Argentina, the sex of the sigmodontine rodent *Scapteromys aquaticus* has been shown to affect its ectoparasite burden and richness (Lareschi 2004). In *Oxymycterus rufus*, sex influences the prevalence and mean abundance of ectoparasites, with the exception of those accidentally associated, which are similar in male and female rodents (Lareschi 2006). The ectoparasites associated with the rodents *Oligoryzomys flavescens* and *Akodon azarae* have been studied previously (Autino & Lareschi 1998, Castro & Cicchino 1998, Lareschi & Mauri 1998). The relationship between rodent sex and ectoparasite infestation has been considered for the egg distribution of lice (Phthiraptera) among different areas of host bodies (Lareschi & Liljesthröm 2000).

Previous studies have reported morphological, biological and ecological differences between the sexes of *O. flavescens* and *A. azarae* (Massoia 1961). These sex differences may affect parasitological parameters and indexes of ectoparasites associated with each host sex. Ectoparasite abundance, prevalence, preference and specific richness associated with male and female hosts are analyzed on the basis of this hypothesis.

Materials and Methods

Study area. The study was conducted in the Punta Lara wetlands, located in Buenos Aires Province 50 km N of Buenos Aires city, on the coastal fringe of La Plata river (34° 47´S; 58° 1´W) in Argentina. This region is in the ecotone between the Guyana-Brazilian and Patagonian zoogeographical Neotropical Subregions (Ringuelet 1962). The area is characterized by lowlands all along the bank of the La Plata river interspersed with embankments (“albardones”) (Descanio *et al* 1994).

Rodents. Samples of rodents were obtained in accordance with the regulations and policies of the Dirección de Administración y Difusión Conservacionista del Ministerio de Asuntos Agrarios de la Provincia de Buenos Aires. Rodents were captured from March 1990 to December 1991 in 22 trapping sessions. Captures were conducted with 7.5 cm x 15 cm x 8 cm live-trap cages, arranged in a 3 x 10 grid (30 traps total) with an inter-trap distance of 3 m. Traps were baited with oiled bread and set for one night in each trapping session. Rodents were killed with sulfuric ether and frozen in individual plastic bags in order to avoid contamination with ectoparasites from other rodents. Ulyses F. J. Pardiñas (Centro Nacional Patagónico, Puerto Madryn, Chubut, Argentina) and Carlos Galliari (Centro de Estudios Parasitológicos y de Vectores, La Plata, Argentina) identified the rodents.

Ectoparasites. The fur of the hosts was searched for ectoparasites with a magnifying lens for 30 min, and with the use of combs, tooth brushes and forceps. The ectoparasites were preserved in 70% ethanol. For taxonomic identification, mites, chiggers and ticks were cleared in lactophenol and individually mounted in Hoyer´s medium; fleas and lice were cleared by using KOH and mounted in Canadian balsam. Acari were identified in accordance with the keys, drawings and descriptions given by Strandmann & Wharton (1958), Furman (1972), Krantz (1978) and Marques *et al* (2004); fleas, in accordance with Smit (1987) and Linardi & Guimarães (2000); and lice, with Johnson (1972). Ectoparasites were differentiated as adults (males and females), larvae, nymphs and eggs (only those containing an embryo were considered, in accordance with Liljesthröm & Lareschi 2000). Representative specimens of rodents and ectoparasites were deposited at the Colección del Departamento de Entomología and the Colección del Departamento de Vertebrados, Museo de La Plata, Argentina, respectively, and are available upon request.

Data analysis. Species richness (S), mean abundance (MA), prevalence (P) (Bush *et al* 1997), specificity index (SI) (Marshall 1981) and the Sorensen Similarity index (Css) (Morales & Pino 1987) were calculated. The significance of differences in mean abundance and prevalence between host sexes was analyzed with a *t*-test (Moroney 1968) and normal deviation (N) (Snedecor & Cochran 1979), respectively. These methods match those used for other species of sigmodontine rodents (Lareschi 2004, 2006).

Results

The number of specimens of each ectoparasite species collected from hosts of different sexes and species is shown in Table 1. A total of 15 ectoparasite species were collected on both hosts. The between-gender similarity in species composition of ectoparasites was higher for *O. flavescens* (Css= 90.00%) than for *A. azarae* (Css = 70.59%).

Thirty-nine individuals of *O. flavescens* (males = 23, females = 16) were captured. *Hoplopleura travassosi* showed the highest mean abundance on both sexes, being significantly higher on males ($t = 4.40$; $P < 0.05$). *Mysolaelaps microspinosus* Fonseca and *H. travassosi* prevalence was also significantly higher on males (N = 1.97 and 2.25 respectively, $P < 0.05$). Only *P. atopus* and *A. rotundus* preferred females and, except for *L. paulistanensis* and *G. wolffsohni,* which did not show strong preference for the host sex, all the other species showed a tendency towards male hosts (Table 2).

Twenty-two individuals of *A. azarae* (males = 14, females = 8) were captured. The mean abundance did not differ significantly between host sexes ($P < 0.05$), and *H. aitkeni* was the most abundant species. Only *I. loricatus* prevalence was significantly different between sexes, being higher on males (N = 3.51; $P < 0.05$). Regarding host sex preference, *P. atopus*, *H. aitkeni* and *O. bacoti* selected females, while *A. fahrenholzi, A. rotundus* and *I. loricatus* preferred males (Table 2).

Discussion

Results show that total prevalence and total mean abundance of ectoparasites were not significantly different between sexes of both host species. However, total mean abundance as well as the ectoparasite specific richness was higher on *O. flavescens* males, in agreement with previous studies on *S. aquaticus* in Punta Lara (Lareschi 2006), and on other rodent species in Brazil (Linardi *et al* 1984). In contrast, males and females of *A. azarae* showed similar mean abundance and ectoparasite specific richness (eight for males and nine for females) in accordance with studies on *O. rufus* from Punta Lara (Lareschi 2004). These results agree with previous findings showing that the host sex influence on ectoparasites depends on the characteristics of each rodent species (Marshall 1981).

Previous studies on ectoparasites associated with *O. flavescens* and *A. azarae* consisted of species lists and collection localities (Autino & Lareschi 1998, Castro & Cicchino 1998, Lareschi & Mauri 1998), and all ectoparasite–host associations recorded in this study have already been mentioned in the literature (Lareschi 1996, 2000, Lareschi & Iori 1998). Host sex influence on ectoparasites was considered only when the spatial distribution of the eggs of *H. travassosi* and *H. aitkeni* on the host‘s body (*O. flavescens* and *A. azarae*, respectively) was studied. The similarity between males and females was observed although the proportion of eggs laid at each site was significantly different between rodent sexes (Lareschi & Liljeström 2000).

In the present study three significant differences in prevalence were noticed between host sexes (*M. microspinosus* and *H. travassosi* on *O. flavescens*; *I. loricatus* on *A. azarae*), and only one in mean abundance (*H. travassosi* on *O. flavescens*). Studies on ectoparasite infestation parameters and indexes corroborated the finding that *M. microspinosus* and *H. travassosi* were associated with *O. flavescens,* whereas *I. loricatus* was associated with *A. azarae* (Lareschi 1996, 2000, Beldoménico *et al* 2005). These differences observed in the prevalence and/or mean abundance of ectoparasite species agree with previous findings on sigmodontines (Lareschi 2004). These results also suggest that susceptibility to colonization by a particular ectoparasite species, expressed by its prevalence, would be more influenced by the host sex

Table 1 Number (n) of specimens of every ectoparasite species collected from males and females of Oligoryzomys flavescens and Akodon azarae. Punta Lara, Argentina (March 1990 - December 1991). F = adult females; M = adult males; L = larvae; N = nymphs; H = eggs containing an embryo.

Ectoparasite species	*Oligoryzomys flavescens*		*Akodon azarae*	
	Male (n = 23)	Female (n = 16)	Male (n = 14)	Female (n = 8)
Insecta				
Siphonaptera, Rhopalopsyllidae (fleas)				
Polygenis atopus (Jordan & Rothschild)	5F, 1M	5F, 5M	1M	1M
Polygenis axius axius (Jordan & Rothschild)	-	-	-	1M
Polygenis bohlsi bohlsi (Wagner)	-	-	-	2M
Polygenis tripus (Jordan)	-	-	-	1M
Phthiraptera, Anoplura, Hoplopleuridae (sucking-lice)				
Hoplopleura travassosi Werneck	65F, 60M, 145N, 745H	18F,10M, 15N, 164H	-	-
Hoplopleura aitkeni Johnson	-	-	60F,26M, 189N, 680H	60F, 37M, 116N, 84H
Acari				
Parasitiformes, Gamasida, Laelapidae (laelapid mites)				
Androlaelaps fahrenholzi (Berlese)	21F, 2M, 1N	9F, 1N	18F	5F
Androlaelaps rotundus (Fonseca)	2F	1F	72F, 7M, 1N	27F, 10M, 7N
Gigantolaelaps wolffsohni (Oudemans)	34F	19 F	-	-
Laelaps manguinhosi Fonseca	42F, 2N	14F, 1N	-	-
Laelaps paulistanensis Fonseca	26F	22F	2F	-
Mysolaelaps microspinosus Fonseca	88F	38F	-	-
Macronyssidae (rat mite)				
Ornithonyssus bacoti (Hirst)	2N	-	2N	2N
Parasitiformes, Ixodida, Ixodidae (ticks)				
Ixodes loricatus Neumann	7L	2L	9N, 21L	2L
Acariformes, Actinedida, Trombiculidae (chiggers)				
Eutrombicula alfreddugesi (Oudemans)	1L	-	1L	-
Total	1249	324	825	471

than by its abundance which would be related to an individual density-dependent response of the host to a certain ectoparasite burden (Liljesthröm & Lareschi 2001). In addition, all the significant differences in prevalence mentioned above showed higher values for males, in agreement with other similar studies (Linardi *et al* 1984, Lareschi 2006).

This result suggests that particular characteristics and strategies of this rodent sex would influence its ectoparasite population. Studies on the home range size and overlapping of wild rodents show that the average distance traveled by males in the breeding season is greater than that traveled by females (Bonaventura *et al* 1990). Furthermore, interspecific competition limits the use of territory by females during the reproductive season (Dalby 1975). Therefore, males would have better chances of a greater number of contacts with potential mates, which may affect the ectoparasite uptake. Of all the ectoparasite species identified, *O. bacoti* and *E. alfreddugesi* infested only males of *O. flavescens*, whereas only females of *A. azarae* were parasitized with *E. alfreddugesi*, *L. paulistanenesi* and fleas (except for *P. atopus*, which was also found on males). The occurrence of all of these species with only one host sex as well as their low prevalence and mean abundance values suggest accidental associations.

Oligoryzomys flavescens and *A. azarae,* which are important reservoirs of significant human viruses (Gómez Villafañe *et al* 2005, Pardiñas *et al* 2006), are representative sigmodontine species of the Buenos Aires Province (Massoia 1961, Pardiñas *et al* 2004, 2006, Udrizar Sauthier 2005). The conservation of biodiversity as well as population control of rodents might be difficult unless the factors governing the dynamics of their populations and communities, including parasites (Morand *et al* 2006), are understood. The results obtained in the present study contribute to such an understanding.

Table 2 Mean abundance (MA), standard deviation (SD), prevalence (%) and preference (SI) of ectoparasites collected from *Oligoryzomys flavescens* and *Akodon azarae* males and females. Punta Lara, Argentina (March 1990 - December 1991).

Ectoparasite	*Oligoryzomys flavescens*								*Akodon azarae*							
	Male				Female				Male				Female			
	MA	SD	(%)	SI	MA	SD	(%)	SI	MA	SD	(%)	SI	MA	SD	(%)	SI
A. fahrenholzi	1.0	1.9	39.1	119.5	0.6	1.1	37.5	71.3	1.3	1.8	42.9	121.9	0.6	0.7	50.0	58.5
A. rotundus	0.1	0.4	4.3	100.0	0.1	0.3	6.3	75.0	5.7	5.2	78.6	101.2	5.5	7.7	75.0	97.5
E. alfreddugesi	0.1	0.2	4.3	-	-	-	-	-	0.1	0.3	7.14	-	-	-	-	-
G. wolffsohni	1.5	1.6	65.2	108.1	1.2	1.9	50.0	86.8	-	-	-	-	-	-	-	-
H. aitkeni	-	-	-	-	-		-	-	49.1	50.3	64.3	98.2	51.6	92.8	37.5	103.2
H. travassosi	44.1[1]	65.3	73.9[1]	140.8	12.9	33.1	43.8	41.3	-	-	-	-	-	-	-	-
I. loricatus	0.3	0.5	26.1	130.4	0.1	0.3	12.5	52.2	2.4	3.2	71.4[1]	147.8	0.3	0.7	12.5	15.7
L. manguinhosi	1.9	3.0	52.2	126.5	0.9	2.7	25.0	61.6	-	-	-	-	-	-	-	-
L. paulistanensis	1.1	1.6	43.5	91.8	1.4	1.8	50.0	111.4	0.1	0.5	7.1	-	-	-	-	-
M. microspinosus	3.8	5.6	65.2[1]	117.1	2.4	6.3	31.3	72.5	-	-	-	-	-	-	-	-
O. bacoti	0.1	0.4	4.3	-	-	-	-	-	0.1	0.5	7.1	77. 8	0.3	0.7	12.5	138.9
P. atopus	0.3	0.5	21.7	73.2	0.6	1.10	37.5	146.3	0.1	0.30	7.1	78.9	0.1	0.4	12.5	277.8
P. a. axius	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.4	12.5	-
P. tripus	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.4	12.5	-
P. b. bohlsi	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.7	12.5	-
Total	54.3	74.6	91.3		20.3	45.1	93.8		58.9	51.3	92.9		58.9	98.8	87.5	

[1]Satistically significant ($P < 0.05$).

Acknowledgments

This study is part of the author's doctoral dissertation at the Universidad Nacional de La Plata (Argentina). I thank G Liljesthröm (Centro de Estudios Parasitológicos y de Vectores, Argentina) for his help with the statistical analyses, P M Linardi (Universidade Federal de Minas Gerais, Belo Horizonte, Brazil), A Cicchino (Universidad de Mar del Plata, Argentina) and U F J Pardiñas for comments on an earlier version of my doctoral dissertation. My thanks are also due to U F J Pardiñas and C Galliari for rodent identification and to Lucas Garbin (CEPAVE) for the English revision. The taxonomic identification of ticks was verified by S Nava and A Guglielmone (Instituto Nacional de Tecnología Agropecuaria, Estación Experimental Agropecuaria Rafaela, Argentina), that of rat mites and chiggers by R Mauri (CEPAVE), and of lice by D Castro (Museo de la Plata) and A Cicchino. I also thank the Department of Areas Protegidas y Difusión Conservacionista del Ministerio de Asuntos Agrarios de la Provincia de Buenos Aires for its assistance and permission for the undertaking of this research. The study was funded by Universidad Nacional de La Plata, Argentina (projects N520 and N541), and Agencia Nacional de Promoción Científica y Tecnológica, Ministerio de Educación de la Nación Argentina (projects PICT 21546 and 33019).

References

Autino A, Lareschi M (1998) Siphonaptera, p.279-290. In Morrone J J, Coscarón S (dir) Biodiversidad de artrópodos argentinos. Una perspectiva biotaxonómica. La Plata, Ediciones Sur, 599p.

Beldoménico P M, Lareschi M, Nava S, Mangold A J, Guglielmone A A (2005) The parasitism of immature stages of *Ixodes loricatus* Neumann, 1899 (Acari: Ixodidae) on wild rodents. Associates and host preference in riparian localities of Argentina. Exp Appl Acarol 36: 139-148.

Bonaventura S M, Piantanida M J, Gurini L, Sánchez López M I (1990) Habitat selection in population of cricetinae rodents in the region Delta (Argentina). Mamm 55: 339-354.

Bush A O, Lafferty K D, Lotz J M, Shostak A W (1997) Parasitology meets ecology on its own terms: Margolis et al. revisited. J Parasitol 83: 575-583.

Castro D, Cicchino A (1998) Anoplura, p.125-139. In Morrone J J, Coscarón S (dir) Biodiversidad de artrópodos argentinos. Una perspectiva biotaxonómica. La Plata, Ediciones Sur, 599p.

Dalby P (1975) Biology of Pampa rodents, Balcarce área, Argentina. Publ Mus Mich St Univ Biol Ser 5: 149-272.

Dascanio L M, Barrera M, Frangi J (1994) Biomass structure and dry matter dynamics of subtropical alluvial and exotic Ligustrum forest at the Río de la Plata, Argentina. Vegetatio 115: 61-76.

Furman D P (1972) Laelapid mites (Laelapidae: Laelapinae) of Venezuela. Brigh Young Univ Scie, Bull Biol Ser 27: 1-58.

Gomez Villafañe I E, Miño M, Cavia R, Hodara K, Courtalón P, Sauárez O, Bush M (2005) Roedores. Guía de la Provincia de Buenos Aires. L.O.L.A., Buenos Aires, 100p.

Johnson P T (1972) Sucking lice of Venezuelan rodents, with remarks on related species (Anoplura). Brigh Young Univ Scie, Bull Biol Ser 17: 1-62.

Kim K Ch (1985) Coevolution of parasitic arthropods and mammals. London University Press, London, 682p.

Krantz G W (1978). A manual of acarology. Oregon State University Book Stores, Corvallis, 509p.

Lareschi M (1996) Nuevas citas de ácaros parásitos de roedores para la provincia de Buenos Aires. Rev Soc Entomol Argent 55: 66.

Lareschi M (2004) Ectoparásitos asociados a los machos y a las hembras de *Oxymycterus rufus* (Rodentia: Muridae). Estudio comparativo en la selva marginal del río de La Plata, Argentina. Rev Soc Entomol Argent 63: 39-44.

Lareschi M (2006) Interrelationship between the sex of the water rat *Scapteromys aquaticus* and its infestation with ectoparasites in La Plata river marshland, Argentina. Rev Biol Trop 54: 673-679.

Lareschi M, Iori A (1998). Nuevas citas de Siphonaptera (Rhopalopsyllidae; Hystrichopsyllidae) parásitos de roedores de la provincia de Buenos Aires, Argentina. Revta Bras Ent 41: 165-168.

Lareschi. M, Liljesthröm G (2000) Distribución espacial de los huevos de tres especies del género *Hoplopleura* Enderlein (Phthiraptera: Hoplopleuridae) ectoparásitas de roedores (Rodentia: Muridae: Sigmodontinae). Rev Soc Entomol Argent 59: 16-18.

Lareschi M, Mauri R (1998) Dermanyssoidea, p.581-590. In Morrone J J, Coscarón S (dir) Biodiversidad de artrópodos argentinos. Una perspectiva biotaxonómica. La Plata, Editorial Sur, 599p.

Liljesthröm G, Lareschi M (2001) Fecundity of *Hoplopleura scapteromydis* (Phthiraptera, Hoplopleuridae) ectoparasite of *Scapteromys aquaticus* (Rodentia: Muridae) in Río de la Plata marshland, Argentina. J Parasitol 87: 951-956.

Linardi P M, Botelho J R, Cunha H C, Moreira N S (1984) Ectoparasitos de roedores da região urbana de Belo Horizonte, MG. I. Interação entre ectoparasitos e hospedeiros. Mem Inst Oswaldo Cruz 79: 239-247.

Linardi P M, Guimarães R L (2000) Sifonápteros do Brasil. São Paulo, Ed. MZUSP, FAPESP, 291p.

Marques S, Barros-Battesti D M, Onofrio V C, Famadas K M, Faccini J L H and Keirans J E (2004) Redescription of larva, nymph and adults of *Ixodes* (*I.*) *loricatus* Neumann, 1899 (Acari: Ixodidae) based on light and scanning electron microscopy. Syst Parasitol 59: 135-146.

Marshall A G (1981) The ecology of ectoparasitic insects. New York, Academic Press, 459p.

Massoia E (1961) Nota sobre Cricétidos de la Selva Marginal de Punta Lara. Publ Mus Mem Cs Nat. Mar del Plata 1: 115-134.

Morales G, Pino L A (1987) Parasitología cuantitativa. Caracas, Fundación Fondo Editorial. Acta científica venezolana, 132p.

Morand S, Krasnov B, Poulin R, Degen A A (2006) Micromammals and macroparasites: Who is who and how they interact?, p. 3-9. In Morand S, Krasnov B, Poulin R (eds) Micromammals and macroparasites. From Evolutionary Ecology to Management. Tokyo, Springer, 666p.

Moroney M J (1968) Hechos y estadisticas. Buenos Aires, Eudeba, 440p.

Pardiñas U F J, Abba A, Merino M (2004) Micromamíferos (Didelphimorphia y Rodentia) del sudoeste de la Provincia de Buenos Aires (Argentina): taxonomía y distribución. Mastozool Neotrop 11: 211-232.

Pardiñas U F J, D'Elía G, Teta P, Ortiz P, Jayat P, Cirignoli S (2006) Akodontini Vorontsov, 1959 (sensu D'Elía, 2003), p.146-166. In Barquez R M, Díaz M M, Ojeda R A (eds) Mamíferos de Argentina. Sistemática y distribución. Mendoza, Sociedad Argentina para el Estudio de los Mamíferos (SAREM), 359p.

Ringuelet R (1962) Rasgos faunísticos de las reservas Naturales de la provincia de Buenos Aires. Physis 23: 83-92.

Smit F G A M (1987) An illustrated catalogue of the Rothschild Collection of fleas (Siphonaptera) in the British Museum (Natural History). Vol VII. Malacopsylloidea. British Museum (Natural History), Oxford, Oxford University Press, 380p.

Snedecor G W, Cochran W G (1979) Métodos estadísticos. México, Compania Editorial Continental S.A., 703p.

Strandmann R W, Wharton G W (1958) Manual of Mesostigmatid mites. Contrib. N°4 of the Institute of Acarology, Maryland, 330p.

Udrizar-Sauthier D E, Abba A M, Pagano L G, Pardiñas U F J (2005) Ingreso de micromamíferos brasílicos en la Provincia de Buenos Aires, Argentina. Mastozool Neotrop 12: 91-95.

Received 06/XI/09. Accepted 16/III/10.