ECOLOGY, BEHAVIOR AND BIONOMICS

First Report of Mites (Gamasida: Laelapidae) Parasitic on Wild Rodents in Uruguay, with New Host Records

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Primer Registro de Ácaros (Gamasida: Laelapidae) Parásitos de Roedores Silvestres en Uruguay, con Nuevos Registros de Hospedadores

RESUMEN - Se presenta por primera vez información sobre ácaros lelápidos asociados a roedores silvestres en Uruguay. Se identificaron especímenes de las siguientes especies: Laelapinae: *Androlaelaps fahrenholzi* (Berlese), *Androlaelaps rotundus* (Fonseca), *Gigantolaelaps wolffsohni* (Oudemans), *Laelaps paulistanensis* Fonseca, *Laelaps manguinhosi* Fonseca y *Mysolaelaps microspinosus* Fonseca; Haemogamasinae: *Eulaelaps stabularis* (Koch). La mayoría de las asociaciones ectoparásito-hospedador se registran por primera vez. Los nuevos registros de hospedador y localidad que se presentan en este estudio coinciden con hallazgos previos en las mismas, o estrechamente relacionadas, especies hospedadoras en localidades cercanas de Sud América.

PALABRAS-CLAVE: Acari, ectoparásito, Haemogamasinae

ABSTRACT - Information is presented for the first time on laelapid mites associated with wild rodents in Uruguay. Specimens of the following species were identified: Laelapinae: *Androlaelaps fahrenholzi* (Berlese), *Androlaelaps rotundus* (Fonseca), *Gigantolaelaps wolffsohni* (Oudemans), *Laelaps paulistanensis* (Fonseca), *Laelaps manguinhosi* (Fonseca) and *Mysolaelaps microspinosus* Fonseca; Haemogamasinae: *Eulaelaps stabularis* (Koch). Most of the ectoparasite-host associations are reported for the first time. New host and locality records presented in this study are in accordance with previous findings on the same and/or related host species in nearby South American localities.

KEY WORDS: Acari, ectoparasite, Haemogamasinae

The family Laelapidae includes ectoparasite species of small mammals, mainly rodents and marsupials. These mites are usually reported in the fur of the mammals, as well as in their nests. Information on host specificity of the group is conflicting with some papers mentioning a high host specificity of some of these mites (Gettinger 1987, 1992, 1997; Gettinger & Owen 2000; Martins-Hatano *et al*. 2002), and others mentioning a broad list of hosts for several species has also been reported (Tipton *et al.* 1966, Furman 1972, Barros-Battesti *et al.* 1998, Lareschi & Mauri 1998). It is commonly unclear whether these pleioxenous or polyxenous associations correspond to accidental infestations or authentic alternative hosts. However, it is known that some environmental disturbances, such as fire, can alter the patterns of microhabitat use and species composition of rodent fauna, and consequently lead to the exchange of ectoparasitic arthropods among host species (Gettinger & Ernest 1995).

Our knowledge of laelapid mites associated with small mammals in the Neotropical Region has increased significantly since Strandtmann & Wharton (1958) listed 23 species for all of South America. Only eighteen species have been recorded associated with wild rodents in Argentina (Lareschi & Mauri 1998), while more than 50 species have been mentioned from Brazil (Whitaker & Mumford 1977; Botelho & Williams 1980; Gettinger 1987, 1992; Whitaker

& Dietz 1987; Gettinger *et al*. 2005). However, there are no reports of laelapid mites from Uruguay.

The area including Uruguay, central and eastern Argentina, and the southern most Brazilian State of Rio Grande do Sul, comprise the Pampa Province of the Chaqueña Subregion, characterized by the dominance of subtropical prairies, an undulating topography with few localities more than 300 m above the sea level (highest peaks scarcely above 500 m); templer subtropical subhumid climate, with a median yearly temperature of 17-18ºC and 1000 mm to 1200 mm of precipitation annually (Cabrera & Willink 1973, Morrone 2001). Since related or the same rodent species are thought to inhabit the different countries comprising that area (Wilson & Reeder 1993), similarity in the laelapid species may also be expected. In Argentina, most of the laelapid faunal studies have been carried out in Buenos Aires Province; lists of ectoparasite-host associations as well as the degree of infestation in the different localities in that Province have been reported (Castro *et al*. 1987, Lareschi 1996, Lareschi & Sánchez López 2000, Liljesthröm & Lareschi 2002, Lareschi *et al.* 2003a). On the other hand, there are no reports on laelapid mites associated with rodents in the Brazilian Rio Grande do Sul State. In the present study we report for the first time seven species of laelapid mites associated with wild rodents in Uruguay.

Materials and Methods

Uruguay is situated in southern-eastern South America. Río Uruguay and Río de la Plata bound the country on the south-west, and separating it from the Argentinean Provinces of Buenos Aires, Entre Ríos and Corrientes; in the north, Uruguay borders the Brazilian State of Rio Grande do Sul (Fig. 1). The country is situated between the 30º and 35º South parallels and the 53º and 58º West meridians. Locality names and coordinates for each sampling point (Fig. 1) are: 1) Parque Lecocq, Montevideo County (34°47'S; 56°22'W). 2) Melilla, Montevideo County (34°47'S; 56°14'W). 3) Arroyo Carrasco, Montevideo County (34°52'S; 56°01'W). 4) Instituto Nacional de Investigación Agropecuaria (INIA) Las Brujas, Canelones County (34°40'S; 56°20'W). 5) Arroyo Tropa Vieja, Canelones County (34°45'S; 55°50'W). 6) Cerro Pan de Azúcar, Maldonado County (34°37'S; 55°19'W). 7) Piriápolis, Maldonado County (34°48'S; 55°17'W). 8) Barra del Arroyo Maldonado, Maldonado County (34°55'S;54°50'W). 9) Posada La Laguna, Maldonado County (34°20'S; 54°42'W). 10) Castillos, Rocha County (34º12'S; 53º50'W). 11) La Coronilla, Rocha County (33º53'S; 53º30'W). 12) Quebrada de los Cuervos, Treinta y Tres County (32º58'S; 54º25'W). 13) Paso Centurión, Cerro Largo County (32°10'S; 53°45'W). 14) Establecimiento de Compañía Oriental Forestadora Uruguaya S.A. (COFUSA), Rivera County (31°16'S; 55°13'W). 15) Arroyo Pelado, Artigas County (30º29'S; 56º56'W). 16) Arroyo Cufré, Colonia County (34º21'S; 57º07'W). 17) Balneario Kiyú, San José County (34°38'S; 56°45'W). 18) Arroyo Illescas (Capilla del Sauce), Florida County (33º25'S; 55º37'W).

Seventy-seven wild rodents were captured in Uruguay from 1999 to 2003 and identified following the descriptions given by González (2001) and the nomenclature of Wilson & Reeder (1993) as: *Akodon azarae* (Fischer), *Deltamys kempi* Thomas, *Lundomys molitor* (Winge), *Oligoryzomys delticola* (Thomas), *Oligoryzomys flavescens* (Waterhouse), *Oligoryzomys* sp., *Scapteromys tumidus* (Waterhouse), *Oxymycterus nasutus* (Waterhouse), and *Bolomys obscurus* (Waterhouse) (Muridae, Sigmodontinae). Each rodent was brushed thoroughly with a toothbrush to remove the mites (see Lareschi 1996 for further information on ectoparasite collection), fixed in 96% ethanol, cleared in lactophenol and mounted in Hoyer´s medium for taxonomic identification. Voucher specimens were deposited in the collections of Entomología del Museo de la Plata, Argentina (MLP) and Laboratorio de Parasitología, Instituto Butantan, São Paulo, Brasil (IBSP).

Results and Discussion

The list of mite specimens collected is given below. Locality, number of specimens of each sex (M = male; F = female), host species, collector name, collection date (day/month/year) or period of collection, when available, are also given. A summary with the number of hosts of all the species examined and the values of mean intensity (MI = number of mites collected / number of host parasitized) (Bush *et al*. 1997) is also given. A brief report including comments on geographical distribution and host species previously known is also included for each species.

Family Laelapidae, Subfamily Laelapinae

Androlaelaps fahrenholzi (Berlese)

Type-host. "Wild rat"
Type-locality. Urbana, Illinois, USA
New records. Balneario Kiyú: 21F, *A. azarae*, J.M. Venzal and G. de Souza, 03/ix/2000; 1M and 3F, *S. tumidus*, JMV and GS, 6/ii72000-3/ix/2000. Paso Centurión: 1F, *O. delticola*, E.M. González, -/iv/2002. Forestal COFUSA: 1F, *Oligoryzomys* sp., JMV, 8/i/2000. Piriápolis: 33F, *S. tumidus*, G. Fregueiro, 20/vii/1998; Arroyo Maldonado: 1F, *O. nasutus,* JMV and GS, 28/v/2000. Barra del Arroyo Maldonado: 61F, *O. nasutus*, JMV and GS, 6/I/1999-28/V/2000. 37F, *S. tumidus*, JMV, GF and GS, 6/i/1999-14/xi/1999. Arroyo Tropa Vieja: 9F, *S. tumidus*, O. Castro and O. Correa, 19/i/2000. Quebrada de los Cuervos: 4F, *O. nasutus*, EMG, 3/vi/1999. Castillos: 3F, *O. nasutus,* JMV, 25/viii/2002. La Coronilla: 3F, *O. delticola,* Alejandro Olmos and Federico Acahaval. 11F, *O. nasutus,* AO and FA.
Summary. *A. azarae*: N = 21; MI = 3.5. *O. delticola*: N = 4; MI = 1.33. *Oligoryzomys* sp.: N = 1; MI = 1.00. *O. nasutus*: N = 80; MI = 3.33. *S. tumidus*: N = 82; MI = 5.86.
Remarks. *A. fahrenholzi* is a cosmopolitan species, which has been recorded infesting a great number of mammal

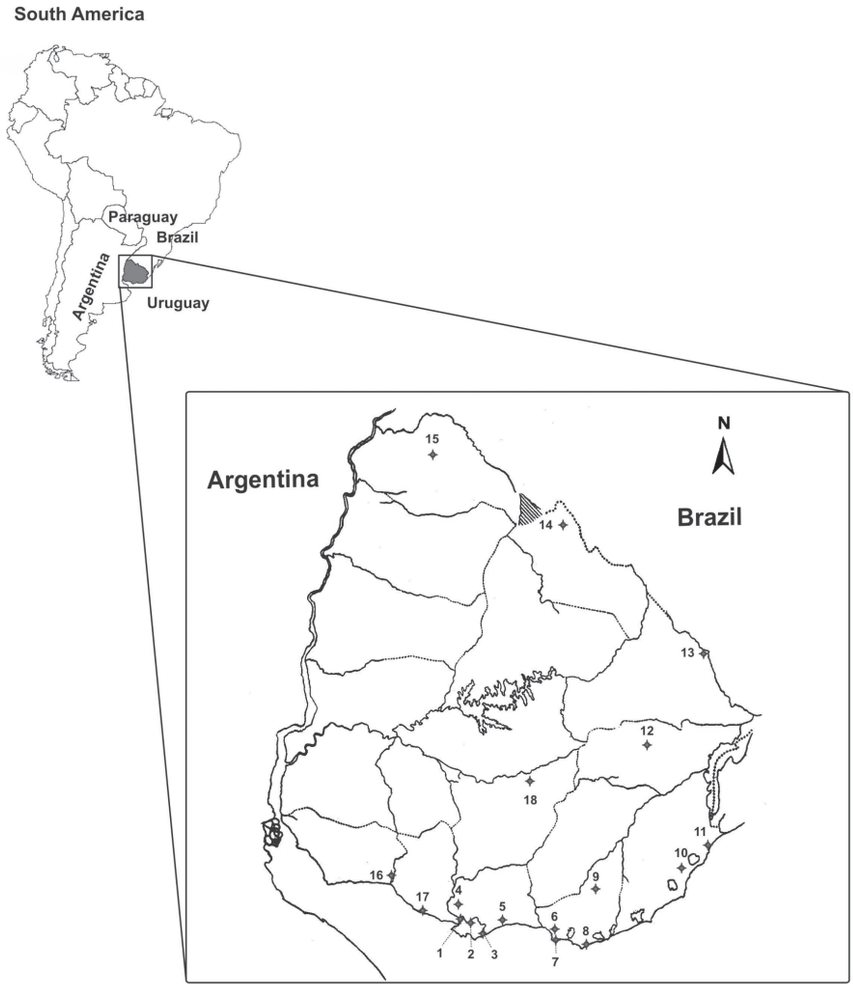

Fig. 1. Collection sites of mite species. Localities: 1 - Parque Lecocq, Montevideo County. 2 - Melilla, Montevideo County. 3 - Arroyo Carrasco, Montevideo County. 4 - Instituto Nacional de Investigación Agropecuaria (INIA) Las Brujas, Canelones County. 5 - Arroyo Tropa Vieja, Canelones County. 6 - Cerro Pan de Azúcar, Maldonado County. 7 - Piriápolis, Maldonado County. 8 - Barra del Arroyo Maldonado, Maldonado County. 9 - Posada La Laguna, Maldonado County. 10 - Castillos, Rocha County. 11 - La Coronilla, Rocha County. 12 - Quebrada de los Cuervos, Treinta y Tres County. 13 - Paso Centurión, Cerro Largo County. 14 - Establecimiento de Compañía Oriental Forestadora Uruguaya S.A. (COFUSA), Rivera County. 15 - Arroyo Pelado, Artigas County. 16 - Arroyo Cufré, Colonia County. 17 - Balneario Kiyú, San José County. 18 - Arroyo Illescas (Capilla del Sauce), Florida County.

species worldwide (Standtmann & Wharton 1958). In central and northern Argentina it was recorded on mammals of the orders Rodentia, Didelphimorphia, Microbiotheria, Xenarthra and Chiroptera (Lareschi & Mauri 1998). However, mites identified as *A. fahrenholzi* are often highly variable morphologically, and it is unclear whether this mite species is truly polyxenous, or is a composite of species with narrower host ranges. In this study *A. fahrenholzi* was collected on five rodent species, including new host records from *S. tumidus* and *O. nasutus*. These results are in accordance with previous findings in the Argentinean Buenos Aires province, where this mite has been reported in association with a variety of wild rodents, including *A. azarae*, *Oligoryzomys* species, *Scapteromys aquaticus* Thomas and *Oxymycterus rufus* (Fischer) (Lareschi 1996).

Androlaelaps rotundus (Fonseca)

Type-host. Small wild rat of an indeterminate species
Type-locality. São Paulo, Brazil
New records. Arroyo Illescas (Capilla del Sauce): 11F, *B. obscurus*, GF. INIA Las Brujas: 15F, *B. obscurus*, EMG, 7/iii/2003; 18F, *A. azarae*, EMG, 17/xi/2001. Balneario Kiyú: 42F, *A. azarae*, JMV and GS, 21/v/2000-03/ix/2000; 1F, *S. tumidus*, JMV and GS, 03/ix/2000. Arroyo Cufré: 4F, *D. kempi*, EMG, 11/ii/2001. Posada La Laguna: 15F, *A. azarae*, EMG, 28/i/2001. Piriápolis: 10F, *O. nasutus*, GF, 20/vii/1998. Arroyo Pelado, Ruta 30: 4F, *A. azarae*, JMV, 20/iv/2000. Parque. Lecocq: 9F, *A. azarae*, GF, 21/vi/1999.
Summary. *A. azarae*: N = 88; MI = 4.89 *B. obscurus*: N = 26; MI = 8.66. *D. kempi*: N = 4; MI = 4. *O. nasutus*: N =

10; MI = 10. *S. tumidus*: N = 1; MI = 1.
Remarks. *A. rotundus* is a composite species with a neotropical distribution and is associated with a number of different, but phylogenetically related, akodontine rodents (Gettinger & Owen 2000). In this study *A. rotundus* is reported on *A. azarae, B. obscurus D. kempi* and *O. rufus*. These results are in accordance with studies from Paraguay (Gettinger & Owen 2000) and Argentina (Mauri 1965, Lareschi 1996, Lareschi & Mauri 1998). In the last country, *A. rotundus* was recorded from the central and northern area (Lareschi & Mauri 1998), and is very abundant in the marshes of Rio de la Plata and Rio Paraná parasitizing *A. azarae* and *D. kempi* (Lareschi & Sánchez López 2000, Abba *et al.* 2001, Liljesthröm & Lareschi 2002, Lareschi *et al.* 2003a, Nava *et al.* 2003).

Gigantolaelaps wolffsohni (Oudemans)

Type-host. Small rodent
Type-locality. Valparaiso, Chile
New records. Arroyo Illescas (Capilla del Sauce): 2F, *B. obscurus*, GF. INIA Las Brujas: 10F, *B. obscurus,* EMG, 7/iii/2003; 6F, *O. flavescens*, EMG, 17/xi/2001. Cerro Pan de Azúcar: 4F, *A. azarae*, EMG, 7/ii/2003. Piriápolis: 1F, *O. flavescens*, GF, 20/vii/1998. Paso Centurión: 2F, *O. delticola*, EMG, -/iv/2002. Arroyo Carrasco: 6F, *O. flavescens*, JMV and O Castro, 27/vii/2000. Forestal COFUSA: 9F, *Oligoryzomys* sp., JMV, 8/i/2000-11/xii/2000. Arroyo Cufré, Ruta 1: 4F, *L. molitor*, EMG, -/iv/1999.
Summary. *A. azarae*: N = 4; MI = 4. *B. obscurus*: N = 12; MI = 6. *L. molitor*: N = 4; MI = 2. *O. delticola*: N = 2; MI = 2. *O. flavescens*: N = 13; MI = 2.60. *Oligoryzomys* sp.: N = 9; MI: 2.25.
Remarks. *Gigantolaelaps wolffshoni* is commonly associated with oryzomyine rodents, but in the collections from Uruguay it was also found on non-oryzomyine hosts, 12 females from 2 *B. obscurus* (MI = 6); four females from two *L. molitor* (MI = 2); four female from one *A. azarae*. However, most of the mites were associated with rodents of the genus *Oligoryzomys*; 13 females from *O. flavescens*; two females from *O. delticola*; nine females from *Oligoryzomys* sp.

Laelaps manguinhosi Fonseca

Type host. *Holochilus vulpinus* Brants
Type-locality. Porto Jofre, Mato Grosso, Brazil
New records. Arroyo Illescas (Capilla del Sauce): 2F, *B. obscurus*, GF. Barra del Aº Maldonado: 3F, 1M, *O. nasutus*, JMV, GF and GS, 7/iii/1999-28/v/2000. 43F, *S. tumidus*, JMV, GF, OCa and GS, 6/i/1999-19/I/2000. Arroyo Tropa Vieja: 8F, *S. tumidus*, JMV, GF, OCa and Oco, 19/i/2000.
Summary. *B. obscurus* N = 2; MI = 2. *O. nasutus*: N = 4; MI = 1. *S. tumidus*: N = 40; MI = 5.
Remarks. *L. manguinhosi* parasitizes mainly sigmodontine species of the genera *Holochilus* and *Nectomys*, but this mite has also been reported in association with a wide variety of other species of rodents, marsupials, bats and birds (Furman 1972). In the present study *L. manguinhosi* was collected mainly on *S. tumidus*. This association with *Scapteromys* species was also reported in the marshes of Buenos Aires Province, where this mite showed preference towards *S. aquaticus*, although it was also collected on *O. rufus* (Lareschi 1996). It is unclear whether *L. manguinhosi* is polyxenous, or whether the specimens that have been identified as belonging to that species correspond to a composite of several more host specific mite species.

Laelaps paulistanensis Fonseca

Type-host. Wild rat of undetermined species
Type-locality. São Paulo, Brazil
New records. Arroyo Illescas: 8F, *B. obscurus*, GF. Cerro Pan de Azúcar: 7F, *A. azarae*, EMG, 7/ii/2003. Piriápolis: 6F, *O. flavescens*, GF, 20/vii/1998. Arroyo Cufré: 4F, 10M, *O. delticola*, EMG, 11/ii/2001. La Coronilla: 1F, *O. delticola*, AO and FA. Paso Centurión: 1F, *O. delticola*, EMG, -/iv/2002. Melilla: 1F, *O. flavescens*, A. Mignone, 04/iv/1998. Forestal COFUSA: 1F, *Oligoryzomys* sp., JMV, 10/xi/2000.
Summary. *A. azarae*: N = 7; MI = 7. *B. obscurus* N = 8; MI = 2.67. *O. flavescens*: N = 7; MI = 3.5. *O. delticola*: N = 16; MI = 5.33. *Oligoryzomys* sp.: N = 1; MI = 1.
Remarks. *L. paulistanensis* has a neotropical distribution, associated primarily with oryzomyine rodents. In Uruguay, this species also found on the non-oryzomyines *B. obscurus* and *A. azarae*, but strong associations were also observed with rodents of the genus *Oligoryzomys.*

Mysolaelaps microspinosus Fonseca

Type-host. Undetermined rat
Type-locality. São Paulo, Brazil.
New records. Melilla: 1F, *O. flavescens,* A. Mignone, 04/iv/1998. Forestal COFUSA: 1F, 2F, *Oligoryzomys* sp., JMV, 8/i/2000-11/xii/2000.
Summary. *O. flavescens*: N = 1; MI = 1. *Oligoryzomys* sp : N = 3; MI = 3.
Remarks. *M. microspinosus* is known only from the southern neotropics. In northwestern and central Argentina, it has been recorded in humid environments from *Oligoryzomys* and *Oryzomys* species (Mauri 1965, Lareschi & Mauri 1998, Lareschi *et al.* 2003b). In the marshes of Buenos Aires and Entre Ríos Provinces, *M. microspinosus* was recorded mainly on *O. flavescens* and *O. delticola* (Lareschi 1996, Abba *et al.* 2001, Lareschi *et al.* 2003a, Nava *et al.* 2003).

Subfamily Haemogamasinae

Eulaelaps stabularis (Koch)

New records. Balneario Kiyú: 1F, *S. tumidus*, JMV and GS, 3/ix/2000. La Coronilla: 2F, *O. nasutus*, AO and FA.
Summary. *S. tumidus*: N = 1; MI = 1. *O. nasutus*: N = 2; MI = 2.

Remarks. *E. stabularis* is a cosmopolitan ectoparasite, and a common associate of vertebrate nests in both Old and New World (Strandtmann & Wharton 1958). In Buenos Aires Province, this mite has been reported associated with sigmodontine rodents, included *S. aquaticus* (Lareschi & Mauri 1998).

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