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The Fleas (Insecta: Siphonaptera), Parasites of Sigmodontine Rodents (Cricetidae) from Northern Patagonia, Argentina

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ABSTRACT: The flea fauna of Patagonia in Argentina comprises about 50% of the total species and subspecies known for Argentina. Given the high diversity of environments and the rich assemblage of sigmodontine rodents of the Patagonian region, flea richness is probably underestimated. In the present study, 16 species and subspecies of fleas parasitizing sigmodontines from Northern Patagonia are reported. Fifteen new parasite–host associations and new records of geographical distribution are reported. The results suggest the coexistence of an endemic flea fauna (*Tetrapsyllus (Tetrapsyllus) tantillus*; *Tetrapsyllus (Tetrapsyllus) rhombus*; *Ectinorus (Ectinorus) spiculatus*; *Agastopsylla boxi boxi*; and *Sphinctopsylla ares*) with other species and genera that occur mainly at lower latitudes than those of Patagonia (*Tetrapsyllus (Phylliver) bleptus*; *Ectinorus (Ectinorus) hapalus* and *Polygenis (Polygenis) rimatus*). Considering that the same situation occurs with some species and genera of their sigmodontine hosts, future studies will allow us to determine the distributional limits of each flea taxon and analyze the influence of host geographical distribution.

KEY WORDS: Siphonaptera, Sigmodontinae, Stephanocircidae, Ctenophthalmidae, Rhopalopsyllidae, Ceratophyllidae, Hystrichopsyllidae, Tungidae, Patagonia, Argentina.

Patagonian Argentina, the southernmost region of South America, represents the largest area of the Argentinean territory (Rabassa, 2008). This area can be defined as a temperate or cool-temperate region. The climatic heterogeneity of the territory results from combined influences of the latitudinal temperature gradient and the west–east precipitation gradient. Also, a characteristic of the Patagonian climate is the predominance of winds from the west (Oesterheld et al., 1998; Paruelo et al., 1998). The region is one of the few territories that extends below 40°S and it supports complex biotic communities (Soriano et al., 1983). About 80 species of land mammals are known from this region. Cricetid rodents (Cricetidae, Sigmodontinae) are the most abundant and are represented by 16 genera and about 24 species; most of them are of the tribes Phyllotini and Abrotrichini and several are endemic (Pardiñas et al., 2011). Out of about 120 species and subspecies of fleas known from Argentina, 50% are reported parasitizing these rodents in Northern Patagonia (Autino and Lareschi, 1998; Beaucourmu and Castro, 2003) and 25% of them are endemic (Beaucourmu and Castro, 2003; Hastriter and Sage, 2009, 2011).

Considering the heterogeneity of environments and the fact that sigmodontines are highly diverse in Patagonia, it is supposed that the diversity of fleas in the area is underestimated due to lack of sampling; it is expected that fleas present a higher species richness in

the region than is actually known. Herein we report new host and geographical distributional records of fleas associated with sigmodontines in Northern Patagonia.

MATERIALS AND METHODS

Fleas were collected by U. Pardiñas (Centro Nacional Patagónico, Argentina) when studying the rodent hosts and were provided to the authors. Sites of collection were Neuquén Province: Nq1—Km 2 Sendero Pla. Quetruhue, PN Arrayanes (40°56'58.2"S, 71°39'35.1"W); Nq2—1 km aguas abajo puente RN 40 sobre Río Neuquén, Chos Malal (37°24'58.7"S, 70°13'31.6"W); Nq3—Calle América del Sur, 200 metros toma de agua, Neuquén (38°54'42"S, 68°03'57"W); Nq4—Establecimiento Sorzana, 3 km E RN 22, Zapala (38°55'51"S, 70°04'35"W); Nq5—Auca Mahuida, Riscos Altos (37°45'04.1"S, 68°54'11.8"W); Nq6—ANP Domuyo, Aguas Calientes (36°40'54.0"S, 70°3'44.2"W); Río Negro Province: RN1—Laguna Blanca, Antiplanicie del Somuncurá (41°25'36"S, 66°57'20"W); RN2—Cerro Corona, Antiplanicie del Somuncurá (41°27'11"S, 66°53'49"W).

For identification, fleas were prepared following Lareschi et al. (2010). Whiting et al. (2008) are followed for names of higher taxa. The field number was retained for all fleas; voucher specimens will be deposited at the Colección de Entomología del Museo de la Plata, Argentina. All rodents are deposited at the Colección de Mamíferos del Centro Nacional Patagónico (CNP, Puerto Madryn, Chubut Province, Argentina). The acronyms of the field numbers for each specimen correspond to: PPA, proyecto Patagonia Agencia; UP, catálogo de campo de Ulyses Pardiñas; and LTU, proyecto Localidades Tipo. Wilson and Reeder (2005) are followed for synonymies of host names.

Flea specimens studied are listed below and the data include the number of each sex, field number, host species,

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and locality. A brief report with known host species and geographical distribution is also included.

RESULTS

Family Rhopalopsyllidae: Subfamily Parapsyllinae *Tetrapsyllus (Tetrapsyllus) tantillus* (Jordan and Rothschild, 1923)

Specimens examined: 1 male (LTU245), *Eligmodontia* sp., Nq2; 1 male (PPA138-1), 1 female (PPA138-2), *Eligmodontia* sp., Nq5; 1 female (UP879), *Euneomys* sp., RN1; 1 male, 1 female (UP862), *Abrothix longipilis* (Waterhouse, 1837) RN1; 1 male (UP869), *Ab. longipilis*, RN1; 3 females (UP860-1-3), *Ab. longipilis*, RN1; 2 males (UP861-1,2), *Ab. longipilis*, RN1; 1 female (UP863), *Ab. longipilis*, RN1.

Type host and locality: *Ctenomys (mendocinus) haigi* Thomas, 1919 (now *Ctenomys haigi*), Cholila, Chubut Province Argentina.

Geographic range: Argentina in Patagonian region and Chile from Coquimbo Province at Magallanes Province (Beaucournu and Castro, 2003).

Other hosts: Rodents and marsupials.

Remarks

Tetrapsyllus Jordan, 1931 is associated with a variety of rodents from Peru to Argentina and Chile in the Andean biogeographic region (sensu Morrone, 2001). The genus includes 3 subgenera: *Tetrapsyllus* Jordan, 1931; *Phylliver* Smit, 1987; and *Heteropsyllus* Beaucournu, 2002. In Argentina, one species of the subgenus *Heteropsylla* and 3 of *Tetrapsyllus* were reported, all distributed in Patagonia, and one species of *Phylliver* was reported in Northwest Argentina (Beaucournu and Castro, 2003). *Tetrapsyllus (T.) tantillus* was previously registered in the Argentinean provinces of Neuquén and Río Negro (Smit, 1987; Beaucournu and Alcover, 1989; Sanchez et al., 2009). Thus, the presence of this flea in the area was expected. In addition, this flea was found mostly parasitizing *A. longipilis* in accordance with previous studies (Hastriter et al., 2001). *Euneomys* sp. represents a new host record.

Tetrapsyllus (Tetrapsyllus) rhombus Smit, 1955

Specimens examined: 1 female (LTU291), *A. longipilis*, Nq1; 1 female (LTU295), *A. longipilis*, Nq1.

Type host and locality: *Oligoryzomys longicaudatus* (Bennett, 1832), Península de San Pedro, Río Negro Province, Argentina.

Geographic range: South of Argentina and Chile (Hastriter et al., 2001; Beaucournu and Castro, 2003).

Other hosts: Rodents.

Remarks

In Argentina, *Tetrapsyllus (T.) rhombus* is restricted to Northern and Central Patagonia and associated with rodents, mainly sigmodontines. Distributional records presented here are in agreement with the literature (Autino and Lareschi, 1998; Beaucournu and Castro, 2003).

Tetrapsyllus (Phylliver) bleptus (Jordan and Rothschild, 1923)

Specimens examined: 1 male (PPA225-2), 1 female (PPA225-3), *Phyllotis xanthopygus*, Nq6.

Type host and locality: *Reithrodon caurinus* Thomas, 1920 (now *Reithrodon auritus* (G. Fischer, 1814)), Otro Cerro, Catamarca Province, Argentina.

Geographic range: Northwestern Argentina and Mendoza province, center and south of Peru and north of Chile (Smit, 1987; Beaucournu and Gallardo, 1989; Beaucournu and Castro, 2003).

Other hosts: Rodents.

Remarks

The species of subgenus *Phylliver* Smit, 1987 occur at lower altitudes than those of subgenus *Tetrapsyllus* Jordan, 1931 (Smit, 1987). In Argentina, the only species of the subgenus *Phylliver* reported is *T. (P.) bleptus*, distributed in the Northwest and Mendoza Province. Herein we include Neuquén Province in the distributional area of *T. (P.) bleptus*. This finding represents the first record of the subgenus in the Patagonian Argentina, which extends about 1,000 km from San Rafael (34°37'S; 68°20'W, Mendoza Province), the southern limit of its distribution. In addition, the genus *Phyllotis* Waterhouse, 1837 is mentioned for the first time as associated with this flea.

Ectinorus (Panallius) galeanus (Jordan, 1939)

Specimens examined: 1 male (LTU 213), *Akodon neocenus* Thomas, 1919, Nq3.

Type host and locality: *Galea musteloides* Meyen, 1832, Las Casuarinas, San Juan Province, Argentina.

Geographic range: Argentina (San Juan, Santiago del Estero, San Luis, Mendoza, and Río Negro provinces) (Beaucournu and Castro, 2003).

Other hosts: Rodents.

Remarks

Species of *Ectinorus* Jordan, 1942 parasitize rodents of the Andean–Patagonian region (Beaucournu and Castro, 2003). The genus includes 3 subgenera: *Ectinorus* Jordan, 1942 (with 34 species), *Ichyonus* Smit, 1987 (with 3), and *Panallius* Jordan, 1939 (with only one) (Hastriter and Sage, 2011). *Ectinorus* (*P.*) *galeanus* is the only species of the subgenus and was previously recorded only in Argentina (Beaucournu and Castro, 2003). The present finding represents the first record of the species for the Neuquén Province. Previously, *E.* (*P.*) *galeanus* was recorded associated with species of *Akodon* Meyen, 1833 (Smit, 1987); however, *A. neocenus* constitutes a new host record.

Ectinorus (*Ichyonus*) *onychius* (Jordan and Rothschild, 1923)

Specimens examined: 1 female (UP869), *A. longipilis*, RN1; 1 female (UP879), *Euneomys* sp., RN1.

Type host and locality: *Ctenomys haigi* Philippi, 1869; Cholila, Chubut Province, Argentina.

Geographic range: Argentina from Mendoza province to Patagonian region and center of Chile (Smit, 1987).

Other hosts: Rodents.

Remarks

This flea was originally described as a subspecies of *Ectinorus* (*Ichyonus*) *onychius* (which included 4 subspecies). Recently, Hastriter and Sage (2011) raised it to specific status and considered *Ectinorus* (*Ichyonus*) *onychius fueginus* Jordan, 1942 as a junior synonym. Geographical distribution of *E.* (*I.*) *onychius* in Argentina extends from northeastern Mendoza Province to the extreme southern province of Tierra del Fuego and from the Atlantic coast (Puerto Madryn, Chubut) to the steppe habitat at the Argentina–Chilean border (Hastriter and Sage, 2011). Therefore, the presence of this flea in the area was expected; *A. longipilis* and *Euneomys* sp. were previously mentioned as hosts (Hastriter and Sage, 2011).

Ectinorus (*Ectinorus*) *hapalus* (Jordan, 1942)

Specimens examined: 1 male (PPA201-1), 1 female (PPA201-2), *Abrothrix olivacea* Waterhouse, 1837, Nq6.

Type host and locality: *Graomys griseoflavus* (Waterhouse, 1837), Santa Rosa, Mendoza Province, Argentina.

Geographic range: Argentina (Mendoza, San Luis and Buenos Aires provinces) (Beaucournu and Castro, 2003).

Other hosts: *Akodon arenicola* (Waterhouse, 1837) (now *Akodon azarae* (J. Fischer, 1829)).

Remarks

The subgenus *Ectinorus* Jordan, 1942 is represented in Argentina by 16 species distributed mainly in the Andean biogeographic region (sensu Morrone, 2001; Beaucournu and Castro, 2003; Hastriter and Sage, 2009, 2011). This flea is distributed only in Argentina and *G. griseoflavus* appears to be its more-frequent host (Smit, 1987; Autino and Lareschi, 1998; Beaucournu and Castro, 2003). The finding of *E.* (*E.*) *hapalus* in Neuquén Province represents the first record of this species in Patagonia, extending about 1,000 km from the southern limit of its known geographic distribution. *Abrothrix olivacea* is a new host record.

Ectinorus (*Ectinorus*) *ixanus* (Jordan, 1942)

Specimens examined: 1 female (PPA184), *P. xanthopygus*, Nq6; 1 male (PPA197), *A. olivacea*, Nq6; 1 male (PPA201), *A. olivaceus*, Nq6; 1 male (LTU245), *Eligmodontia* sp., Nq2; 1 male (UP 863), *A. longipilis*, RN1.

Type host and locality: *Microcavia australis* (I. Geoffroy and d'Orbigny, 1883) San Rafael, Mendoza Province, Argentina.

Geographic range: Argentina (Mendoza and Chubut provinces) and Chile (Beaucournu and Castro, 2003; Beaucournu and Kelt, 1990).

Other hosts: *Abrothrix longipilis* and the carnivores *Pseudalopex griseus* (Gray, 1837) (Beaucournu and Kelt, 1990; Autino and Lareschi, 1998).

Remarks

Ectinorus (*E.*) *ixanus* was previously recorded in the Central Patagonian region (Chubut province). However, there are no records for Neuquén and Río Negro provinces. Thus, these findings extend its known geographical distribution. Moreover, *A. olivacea* and *P. xanthopygus* represent new host records.

***Ectinorus (Ectinorus) spiculatus*
Hastriter and Sage, 2011**

Specimens examined: 1 male (PPA188), *P. xanthopygus*, Nq6; 1 male (PPA201-1), 1 female (PPA201-2), *A. olivacea*, Nq6; 1 male (PPA205), *P. xanthopygus*, Nq6; 1 male (PPA199), 1 male (PPA227), *A. longipilis*, Nq6.

Type host and locality: *Phyllotis xanthopygus* (Waterhouse, 1837), 1 km SSW from Route 40 on dirt road to Estancia Llamuco, Neuquén Province, Argentina.

Geographic range: Argentina (Neuquén Province) (Hastriter and Sage, 2011).

Other hosts: *Akodon iniscatus* Thomas, 1919 (Hastriter and Sage, 2011).

Remarks

In this study *E. (E.) spiculatus* extends its known distribution about 200 km north from its type locality (38°44'10.2"S, 70°17'55.26"W, 1074 m) and represents the second record of the species. *Abrothrix longipilis* and *A. olivacea* are new host records.

***Polygenis (Polygenis) rimatus* (Jordan, 1932)**

Specimens examined: 1 female (LTU208), *A. neocenus*, Nq3; 1 male (LTU209), *A. neocenus*, Nq3; 1 male (LTU211-1), 1 female (LTU211-2), *A. neocenus*, Nq3.

Type host and locality: *Didelphis* sp., Sapucay, Paraguay.

Geographic range: Argentina (Buenos Aires, Formosa, San Juan, and La Rioja provinces), southeast of Paraguay, center of Peru and south of Brazil (Smit, 1987; Linardi and Guimarães, 2000; Beaucournu and Castro, 2003).

Other hosts: Rodents and marsupials.

Remarks

Within Rhopalopsyllidae, *Polygenis* Jordan, 1939 includes the largest number of species and subspecies (about 50; Linardi and Guimarães, 2000). Most of them are South American in distribution, but a few occur in Central America and two are known from the Nearctic region (Lewis, 1998). In Argentina, 14 species and subspecies were recorded, mainly distributed in Buenos Aires Province, and only 3 were denoted from the Patagonian region (Beaucournu and Castro, 2003). *Polygenis (P.) rimatus*

occurs mainly in Brazil and Argentina (Linardi and Guimarães, 2000; Lareschi and Linardi, 2005). The present record constitutes its first mention for the Patagonian region and represents the southernmost limit of its known distribution. *Akodon neocenus* represents a new host record.

**Family Ctenophthalmidae:
Subfamily Ctenophthalminae
Agastopsylla boxi boxi Jordan and
Rothschild, 1923**

Specimens examined: 3 males (LTU291-1-3), *A. longipilis*, Nq1; 1 male (LTU295), *A. longipilis*, Nq1; 1 male (UP862), *A. longipilis*, RN1; 2 males (UP872-1,2), *A. longipilis*, RN1.

Type host and locality: *Abrothrix longipilis*, Leleque, Chubut Province, Argentina.

Geographic range: South of Argentina and Chile (Beaucournu and Gallardo, 1989; Beaucournu and Castro, 2003).

Other hosts: Rodents.

Remarks

In Argentina, *Agastopsylla* Jordan and Rothschild, 1923 is represented by only one species with 2 subspecies and only defined for the males: *Agastopsylla boxi boxi* and *Agastopsylla boxi gibbosa* Beaucournu and Alcover, 1989, both distributed in northern and central Patagonia (Río Negro and Chubut provinces), mainly associated with species of *Abrothrix* Waterhouse, 1837 (Hopkins and Rothschild, 1966; Autino and Lareschi, 1998; Beaucournu and Castro, 2003). Herein we record *A. boxi boxi* for Neuquén Province for the first time. *Agastopsylla boxi boxi* was found mostly parasitizing *A. longipilis* in accordance with previous studies.

***Agastopsylla boxi* ssp.**

Specimens examined: 4 females (LTU291-4-7), *A. longipilis*, Nq1; 1 female (LTU298), *A. longipilis*, Nq1; 1 female (LTU219), *A. iniscatus*, Nq4; 2 females (LTU242-1,2), *G. griseoflavus*, Nq2; 1 female (PPA195), *P. xanthopygus*, Nq6; 1 female (UP873), *A. longipilis*, RN1; 2 females (UP881-1,2), *A. longipilis*, RN2.

Remarks

Females of the subspecies of *A. boxi* are unknown. Rodents *P. xanthopygus*, *A. iniscatus*, and *G.*

griseoflavus are mentioned for the first time associated with *Agastopsylla*.

**Family Stephanocircidae:
Subfamily Craneopsyllinae
Craneopsylla minerva wolffhuegeli
(Rothschild, 1909)**

Specimens examined: 1 male (LTU208-1), 1 female (LTU208-2), *A. neocenus*, Nq3; 1 female (LTU209), *A. neocenus*, Nq3; 1 female (LTU211), *A. neocenus*, Nq3; 1 female (LTU213), *A. neocenus*, Nq3.

Type host and locality: *Lutreolina crassicaudata* (Desmarest, 1804); Porvenir, Estancia La Daniela, Buenos Aires Province.

Geographic range: Argentina, Brazil, Peru, Chile (Johnson, 1957).

Other hosts: Rodents and marsupials.

Remarks

Argentina is the only country where the 7 genera of the subfamily Craneopsyllinae are reported, and Patagonia is the region where most of the species and genera coexist (Beaucournu and Castro, 2003; Colombetti et al., 2008; Lareschi et al., 2011). *Craneopsylla m. wolffhuegeli* has a wide geographic distribution, but this is its first record in Neuquén Province, and *A. neocenus* represents a new host record.

***Sphinctopsylla ares* (Rothschild, 1911)**

Specimens examined: 1 female (LTU291), *A. longipilis*, Nq1; 1 female (LTU295), *A. longipilis*, Nq1; 2 females (LTU304), *A. longipilis*, Nq1; 1 female (PPA225), *P. xanthopygus*, Nq6.

Type host and locality: *Akodon olivaceus* (Waterhouse, 1837) (now *Abrothrix olivacea*); Province of Cautín, Temuco, Chile.

Geographic range: Patagonian Argentina and in Chile from Elqui to Magallanes Province (Hastriter et al., 2001; Beaucournu and Castro, 2003).

Other hosts: Rodents and marsupials.

Remarks

In Argentina *Sphinctopsylla* is represented by two species, both of them occurring in the Patagonian region (Beaucournu and Castro, 2003). *Sphinctopsylla ares* parasitizes most of the species of sigmodontines in the area (Hastriter et al., 2001).

***Plocopsylla wilesi* Beaucournu and Kelt,
1990**

Specimens examined: 1 male (PPA147-1), 8 females (PPA147-2-9), *Euneomys* sp., Nq5; 1 male (UP869-1), 1 female (UP869-2), *A. longipilis*, RN1; 1 male (UP872-1), 2 females (UP872-2-3), *A. longipilis*, RN1; 1 female (UP866), *P. xanthopygus*, RN1; 1 male (UP873-1), 1 female (UP873-2), *A. longipilis*, RN1; 2 females (UP875-1,2), *Euneomys* sp., RN1.

Type host and locality: *Abrothrix xanthorinus* (Waterhouse, 1837) (now *A. olivacea*); Aysén, Chile.

Geographic range: Chile (Aysén region) (Beaucournu and Kelt, 1990).

Other hosts: *Phyllotis xanthopygus* (Beaucournu and Kelt, 1990).

Remarks

Plocopsylla Jordan, 1931 has the largest number of species within the Craneopsyllinae, including 31 species distributed in the sub-Andean region, from Colombia to Argentina and Chile. On the basis of its morphology, *P. wilesi* is close to *Plocopsylla lewisi* Beaucournu and Gallardo, 1988, *Plocopsylla angusticeps* Manhert, 1982, and *Plocopsylla silewi* Beaucournu and Kelt, 1990 (Beaucournu and Kelt, 1990). These species are distributed in Argentinean and Chilean Patagonia parasitizing species of *Abrothrix*, *Phyllotis* Waterhouse, 1837 and *Euneomys* Coues, 1874 (Schramm and Lewis, 1988; Beaucournu and Kelt, 1990). The present finding of *P. wilesi* represents the first report of the species in Argentina, and *Euneomys* sp. and *A. longipilis* are new hosts. However, these rodents are frequently parasitized by the other above-mentioned species of *Plocopsylla* that are close to *P. wilesi*.

**Family Hystrichopsyllidae:
Subfamily Hystrichopsyllinae
Ctenoparia inopinata Rothschild, 1909**

Specimens examined: 2 females (LTU 291, LTU298), *A. longipilis*, Nq1.

Type host and locality: *Abrothrix olivacea*; Valparaíso, Chile.

Geographic range: In Argentina, Buenos Aires and the Patagonian region and in Chile from Valparaíso province to Aysén province (Hastriter et al., 2001; Beaucournu and Castro, 2003).

Other hosts: Rodents.

Remarks

The genus *Ctenoparia* Rothschild, 1909 includes 5 species distributed in Argentina and Chile, parasitizing mainly sigmodontines (Hopkins and Rothschild, 1962; Beaucournu and Castro, 2003). In Argentina *C. inopinata* was registered from Neuquén, Buenos Aires, Río Negro, and Tierra del Fuego provinces, mainly associated with species of *Abrothrix*, and more frequently *A. longipilis* (Hastriter et al., 2001; Alarcón, 2003; Beaucournu and Castro, 2003; Sanchez et al., 2009). Thus, the present record was expected.

Family Ceratophyllidae

Nosopsyllus (Nosopsyllus) fasciatus (Bosc, 1800)

Specimens examined: 2 females (LTU 208-209), *A. neocenus*, Nq3.

Type host and locality: *Myoxus nitela* Zimmermann, 1780, locality unknown.

Geographic range: Cosmopolitan.

Other hosts: Rodents.

Remarks

Nosopsyllus (N.) fasciatus has a Palearctic origin and it has colonized all regions following its hosts, synanthropic rats (Johnson, 1957). This flea has epidemiological importance because of its role in the transmission of pathogens (Linardi and Guimarães, 2000). In Argentina *N. (N.) fasciatus* was found associated with a variety of rodents across the territory (Autino and Lareschi, 1998; Beaucournu and Castro, 2003). The finding of *N. (N.) fasciatus* associated with *A. neocenus* increases the host range of this flea. This new association is important from an epidemiological point of view because it increases the possibility of transmission of pathogens to new hosts.

Family Tungidae: Subfamily Tunginae

Hectopsylla (Hectopsylla) gracilis Mahnert, 1982

Specimens examined: 2 females (LTU245-2, 3), *Eligmodontia* sp., Nq2; 1 females (LTU242), *G. griseoflavus*, Nq2; 1 female (PPA138), *Eligmodontia* sp., Nq5; 1 female (PPA141), *Eligmodontia* sp., Nq5; 2 females (PPA146-1, 2), *Eligmodontia* sp., Nq5.

Type host and locality: *Eligmodontia morgani* J. A. Allen, 1901 Puerto Madryn, Chubut Province, Argentina.

Geographic range: Argentina (Patagonian region, Northwest, and Mendoza Province) (Beaucournu and Castro, 2003).

Other hosts: Species of *Eligmodontia*, *Akodon*, and *Graomys* Thomas, 1916 (Hastriter and Méndez, 2000; Lareschi et al., 2010).

Remarks

The type host is erroneous; it must have been confused with *Eligmodontia typus* Cuvier, 1837 because, according to Mares et al. (2008), *E. morgani* does not occur in Puerto Madryn. Tungidae comprises fleas with an unusual morphology related with their biology (Linardi and Guimarães, 2000). Species of *Hectopsylla* Frauenfeld, 1860 are distributed mainly in the Andean region (Hastriter and Méndez, 2000). Ten species are reported for Argentina and five of them have Patagonian distribution (Beaucournu and Castro, 2003). The finding of *H. (H.) gracilis* associated with *Eligmodontia* sp. is in accordance with the literature (Hastriter and Méndez, 2000; Lareschi et al., 2010).

DISCUSSION

Considering the geographical distribution of the fleas studied here, the occurrence of *T. (T.) tantillus*, *T. (T.) rhombus*, *E. (E.) spiculatus*, *A. boxi*, and *S. ares* exclusively in the Patagonian region corroborate data from the literature (Smit, 1987; Hastriter et al., 2001; Beaucournu and Castro, 2003). On the contrary, the present finding of *P. (P.) rimatus* (38°54'42"S, 68°03'57"W) represents the southernmost limit of the known distribution for the species; it also supports the recent record of the genus *Polygenis* for Patagonia (Lareschi and Linardi, 2009), which was previously known only for north and central regions of Argentina (Autino and Lareschi, 1998; Beaucournu and Castro, 2003). Also, the present finding of *T. (P.) bleptus*, known mainly from the Northwest (Smit, 1987), supports its presence in higher latitudes (Beaucournu and Castro, 2003) and represents the first records of the subgenus *Phylliver* for Patagonia. Furthermore, *H. (H.) gracilis* occurs throughout the Andean–Patagonian region (Beaucournu and Castro, 2003; Lareschi et al., 2010) with a high occurrence on rodents of the genus *Eligmodontia*. This suggests that this species of flea accompanies the hosts throughout their geographical range.

The results presented here suggest that in Northern Patagonian Argentina there coexists an endemic flea fauna (mostly represented by species of Parapsyllinae)

with other species and genera that occur mainly at lower latitudes than those of Patagonia. In this region, the species and genera of their sigmodontine hosts are also included into two main ecogeographical assemblages (Pardiñas et al., 2011). Moreover, considering that the endemic flea fauna is mainly associated with sigmodontines most representative of Patagonia (tribes: abrothichines and phyllotines), future studies will allow us to determine the distributional limits of each flea taxon and to analyze the influence of host geographical distribution.

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