Comp. Parasitol.
77(2), 2010, pp. 207–213

Fleas Associated with Mammals from Northwestern Argentina, with New Distributional Reports

Marcela Lareschi,[1,3,4] Juliana P. Sánchez,[1,3] M. Cecilia Ezquiaga,[1,3] Analía G. Autino,[2] M. Mónica Díaz,[2,3] and Rubén M. Barquez[2,3]

[1] Centro de Estudios Parasitológicos y de Vectores, CEPAVE (Centro Científico Tecnológico La Plata—Consejo Nacional de Investigaciones Científicas y Técnicas—Universidad Nacional de La Plata), calle 2 No. 584, 1900 La Plata, Argentina (e-mail: mlareschi@cepave.edu.ar),

[2] Facultad de Ciencias Naturales e Instituto Miguel Lillo—Universidad Nacional de Tucumán y PIDBA (Programa de Investigaciones de Biodiversidad Argentina), Miguel Lillo 205, San Miguel de Tucumán (4000), Tucumán, Argentina, and

[3] CONICET (Consejo Nacional de Investigaciones Científicas y Técnicas)

ABSTRACT: Northwestern Argentina is an area of a high biodiversity. However, few fleas have been recorded parasitizing mammals. In the present study we report the results of surveys carried out in the provinces of Salta, Jujuy, Tucumán, and Catamarca. The following 9 flea species and subspecies were collected from 17 species of mammals: *Craneopsylla minerva minerva* (Rothschild, 1903) (Stephanocircidae); *Neotyphloceras crassispina hemisus* Jordan, 1936 (Ctenophthalmidae); *Adoratopsylla* (*Tritopsylla*) *intermedia intermedia* (Wagner, 1901) (Ctenophthalmidae); *Tetrapsyllus* (*Phylliver*) *bleptus* (Jordan and Rothschild, 1923) (Rhopalopsyllidae); *Polygenis* (*Polygenis*) *acodontis* (Jordan and Rothschild, 1923) (Rhopalopsyllidae); *Phthiropsylla agenoris* (Rothschild, 1904) (Malacopsyllidae); *Malacopsylla grossiventris* (Weyenbergh, 1879) (Malacopsyllidae); *Pulex irritans* Linnaeus, 1758 (Pulicidae); and *Hectopsylla gracilis* Mahnert, 1982 (Tungidae). *Neotyphloceras crassispina hemisus*, *Ad.* (*T.*) *i. intermedia*, *Ph. agenoris*, and *H. gracilis* are reported for the first time from northwestern Argentina, from specimens collected in the provinces of Jujuy, Salta, and Catamarca. The mammals *Micoureus constantiae* (Thomas, 1904); *Thylamys* cf. *cinderella* (Thomas, 1902); *Thylamys sponsorius* (Thomas, 1921) (Didelphimorphia); *Akodon albiventer* Thomas, 1897; *Akodon caenosus* Thomas, 1918; *Calomys lepidus* (Thomas, 1884); *Eligmodontia hirtipes* Thomas, 1902; *Eligmodontia puerulus* (Philippi, 1896); *Phyllotis xanthopygus* (Waterhouse, 1837); *Tapecomys primus* Anderson and Yates, 2000 (Rodentia); and *Chaetophractus vellerosus* (Gray, 1865) (Cingulata) have an increased number of parasite species known to them. Eighteen new parasite–host associations are also reported.

KEY WORDS: fleas, Siphonaptera, Stephanocircidae, Ctenophthalmidae, Rhopalopsyllidae, Malacopsyllidae, Pulicidae, Tungidae, ectoparasite, mammals, Northwestern Argentina.

Northwestern Argentina has a high diversity of mammals and includes about 50% of the total number of species reported for the country (Wilson and Reeder, 2005; Barquez et al., 2006). Although 84 of these species are rodents and 13 are marsupials, only a few flea species were previously recorded associated with mammals in the area (Autino and Lareschi, 1998; Lareschi, Autino, et al., 2003).

Fleas (Insecta: Siphonaptera) are highly specialized insects that in the adult stage are haematophagous ectoparasites, mostly of mammals, with 74% of the species recorded on rodents. Flea distribution extends to all continents, including Antarctica, and a wide range of hosts and their habitats (Linardi and Guimarães, 2000; Whiting et al., 2008). Of the approximately 2,575 species and subspecies of Siphonaptera (16 families) of the world (Whiting et al., 2008), 116 (9 families) have been recorded from Argentina (Autino and Lareschi, 1998; Beaucournu and Castro, 2003). However, the fauna of many areas of the country, such as the Northwest, is still understudied. This assertion is corroborated by the recent record of new species and genus additions to the known flea fauna of Argentina, based on specimens collected in the Northwest (Lareschi, Linardi, et al., 2003; Colombetti et al., 2008). Based on the known distributions of rodent and marsupial hosts, as well as species of Siphonaptera from neighboring countries (Johnson, 1957; Smit, 1987; Galliari and Pardiñas, 2000; Salazar-Bravo et al. 2002, 2003; Alarcón, 2003; D'Elía and Pardiñas, 2004), and taking into account that recently new species of marsupials (Díaz et al., 2002) and rodents (Díaz et al., 1999; Jayat et al., 2007, 2008; Ferro et al., 2009) have been described from individuals captured in Northwestern Argentina, the potential to find new species of fleas associated with mammals is reasonably high.

We present new records of fleas associated with mammals from Jujuy, Salta, Tucuman, and Catamarca Provinces, Argentina.

[4] Corresponding author.

MATERIALS AND METHODS

Northwestern Argentina includes the provinces of Jujuy, Salta, Tucumán, Catamarca, and Santiago del Estero. This area is unique because of the high diversity of biotic and abiotic factors that converge there. For many vertebrates and plants, the area can be considered an important center of biological diversity, speciation, endemism, and a biological corridor (Duellman and Fritts, 1972; Duellman, 1979; Fjeldsa and Krabbe, 1990; Vuilleumier, 1993). Also, the region has a huge orographic complexity and soil variations, and environmental heterogeneity is represented by the following ecoregions: High Andean, Puna, Yungas, Monte of Mountains and Isolated Valleys, and Dry Chaco (Burkart et al., 1999). The climate is cold and arid in the western part with semidesert vegetation formed by very low arbustive steppe. Eastward the climate is more moderate with increased frequency of rainfalls, which determine a more humid and exuberant vegetation that forms a zone of forests (Cabrera, 1976).

The collecting localities are shown in Figure 1, Jujuy Province: J1, Cuesta del Hurón, 29 km west of Cieneguillas, on Provincial Highway 64, 3835 m (Santa Catalina) (22°06′S, 66°03′W); J2, Cerro El Morado, 11 km northwest of San Antonio, on Río El Morado (San Antonio) (24°19′S, 65°24′W); J3, Cuesta de Lipán, 15 km west of Purmamarca, on Highway 52, 3156 m (Tumbaya) (23°40′S, 65°35′W); J4, on Highway 40, 29 km north of junction with Highway 52 (Tumbaya) (23°24′S, 65°46′W), J5, on Highway 83, on the way to Valle Grande, 9 km north of San Francisco, 1200 m (Valle Grande) (23°35′S, 64°58′W); J6, Curques, 24 km north of Susques, on Highway 74, 4100 m (Susques) (23°14′S, 66°23′W); J7, Salar Cauchari, 31 km north of Cauchari, on Provincial Highway 70, 3840 m (Susques) (23°50′S, 66°47′W); J8, Provincial Reserve Olaroz-Cauchari, 30 km west of Susques, on Provincial Highway 70 (Susques) (23°19′S, 66°37′W); J9, Sierra de Zenta, Porvincial Highway 13, between Chaupe Rodeo and Iruya, 12 km north of Chaupe Rodeo (Humahuaca) (22°53′S, 65°15′W); J10, La Quiaca, 17 km west and 3 km south, on Provincial Highway 5, 3711 m (Yavi) (22°09′S, 65°44′W); J11, Casa Colorada, 2 km north of Alfarcito, 3034 m (Tilcara) (23°35′S, 65°21′W); J12, Arroyo La Horqueta, 6 km southeastern of Lagunas de Yala, 2100 m (Dr. Manuel Belgrano) (24°07′S, 65°25′W); J13, Río Lavayén, 1 km north of Santa Rita (San Pedro) (24°28′S, 64°48′W). Salta Province: S14, 43.7 km northwest of the junction of Highways 50 and 18, on the way to Islas de Cañas (Orán) (23°00′S, 64°33′W); S15, Los Médanos (Cafayate) (26°04′S, 65°54′W). Tucumán Province: T16, Río Grande, 5 km south of El Siambón, 920 m (Tafi Viejo) (26°46.1′S, 65°28.1′W); T17, Dique San Ignacio (La Cocha) (27°44.32′S–65°40.25′W); T18, Los Chorrillos, 13 km north from the Northern limit of Estancia Los Chorrillos (Burruyacú) (26°15′S, 64°59′W); T19, Natural Reserve La Florida, 7 km west of Ibatín, on Río Pueblo Viejo (Monteros) (27°11′S, 65°40′W); T20, Yerba Buena (26°48′S, 65°19′W). Catamarca Province: C21, 28.1 km south of Casa de Piedra on El Quimilo Road (29°50.854′S, 65°25.787′W); C22, 7.9 km west of the junction of Highways 47 and 40 (Santa María) (26°59′S, 66°15′W).

Taxonomic arrangement of the mammals follows Wilson and Reeder (2005) and Barquez et al. (2006); the species were identified as *Akodon albiventer* Thomas, 1897; *Akodon caenosus* Thomas, 1918; *Calomys lepidus* (Thomas, 1884); *Eligmodontia hirtipes* Thomas, 1902; *Eligmodontia puerulus* (Philippi, 1896); *Oligoryzomys* sp.; *Phyllotis xanthopygus* (Waterhouse, 1837); *Phyllotis osilae* Allen, 1901; *Tapecomys primus* Anderson and Yates, 2000 (Rodentia: Cricetidae: Sigmodontinae); and *Lutreolina crassicaudata* (Desmarest, 1804); *Thylamys* cf. *cinderella* (Thomas, 1902); *Thylamys sponsorius* (Thomas, 1921); *Micoureus constantiae* (Thomas, 1904) (Didelphimorphia: Didelphidae); *Tolypeutes matacus* (Desmarest, 1804); *Chaetophractus vellerosus* (Gray, 1865) (Cingulata: Dasypodidae); *Cerdocyon thous* (Linnaeus, 1766); *Pseudalopex gymnocercus* (Fischer, 1814) (Carnivora: Canidae).

Fleas were collected by examining the pelage of the mammals then stored in 96% ethanol and mounted in Canada balsam for taxonomic identification. The classification given by Whiting et al. (2008) for the higher taxa is followed here. Specimens were deposited in the "Annexes" of the Colección Mamíferos Lillo (CML), Universidad Nacional de Tucumán, holding the same collection number as the hosts; some specimens still bear the field number (e.g., MMD).

The collected specimens are listed below, indicating the number of specimens by sex, collection number, host species, locality, and intensity (number of fleas/examined host). A brief report with comments on diagnostic characteristics, host species, and geographical distribution is also included for every species.

RESULTS

Family Stephanocircidae
Subfamily Craneopsyllinae
Craneopsylla minerva minerva
(Rothschild, 1903)

Specimens examined: 3 ♀ (MMD449), *Phi. xanthopygus*, J1; 3 ♀ (MMD452), *Phi. xanthopygus*, J1; 1 ♂ (MMD425), *Phi. xanthopygus*, J10; 1 ♀ (CML7556), *Ta. primus*, J5; 1 ♀ (MMD127), *Oligoryzomys* sp., J2; 1 ♀ (PIDBA 957), *L. crassicaudata*, S14; 1 ♀ (PIDBA1208), *Th.* cf. *cinderella*, T16; 1 ♂ (ARG5065), *Th*. cf. *sponsorius*, T17.

Intensity: 1.9

Type host and locality: Didelphis azarae (now *Didelphis aurita* (Wied-Neuwied, 1826)), Sapucay, Paraguay.

Geographic range: Argentina, Brazil, Chile, Paraguay, Peru, and Venezuela. Specimens from Ecuador identified as *Craneopsylla minerva wolffhuegeli* (Rothschild, 1909) may correspond to *Cr. m. minerva* (Linardi and Guimarães, 2000).

Remarks: Craneopsylla Rothschild, 1911, is recognized from the other 7 genera of Craneopsyllinae because of the cephalic helmet that is completely separate from the remainder of head and by the presence of 2 long genal bristles aligned with the cibarial pump. Only one species of the genus is

Figure 1. Flea study collection sites in northwestern Argentina. Inset map locates study area in South America.

recognized with 2 subspecies: *Cr. m. minerva* with 5 genal spines on each side and *Cr. m. wolffhuegeli* with 7 or 8 genal spines on each side (Hopkins and Rothschild, 1956; Johnson, 1957). In Argentina, *Cr. m. minerva* was recorded from Catamarca, Tucumán, Jujuy, Salta, Mendoza, Río Negro, and Buenos Aires, provinces mainly associated with a variety of rodents (Autino and Lareschi, 1998; Beaucournu and Castro, 2003; Lareschi, Autino, et al., 2003). In this article, *Cr. m. minerva* is mentioned for the first time parasitizing the rodents *Phi. xanthopygus* and *Ta. primus*, as well as the marsupials *Th.* cf. *cinderella* and *Th.* cf. *sponsorius*.

Family Ctenophthalmidae
Subfamily Ctenophthalminae
Neotyphloceras crassispina hemisus Jordan, 1936

Specimens examined: 1 ♀ (CML4593), *Ak. albiventer*, J1; 1 ♀ (CML4578), *Ak. albiventer*, J1; 1 ♀, 1 ♂ (CML4580), *Ak. albiventer*, J1; 1 ♀, 1 ♂ (MMD292),

Phi. xanthopygus, J3; 1 ♀ (MMD293), *Phi. xanthopygus*, J3; 1 ♀ (MMD295), *Phi. xanthopygus*, J3; 1 ♀, 1 ♂ (MMD425), *Phi. xanthopygus*, J10; 1 ♂ (MMD312), *E. puerulus*, J7; 1 ♂ (MMD285), *E. puerulus*, J6; 1 ♀ (MMD364), *Ca. lepidus*, J9; 1 ♀, 3 ♂ (MMD320), *E. hirtipes*, J8; 1 ♀ (MMD317), *E. hirtipes*, J8; 1 ♀ (MMD249), *E. hirtipes*, J4.

Intensity: 1.5

Type host and locality: Andinomys edax Thomas, 1902, Otro Cerro, Catamarca Province, Argentina.

Geographic range: Argentina, Bolivia, Peru, and Chile.

Remarks: Neotyphloceras Rothschild, 1914, is distinguished from the remaining genera of the subfamily because of the presence of an oblique genal comb with 4 subequal large and dark spines, with the anterior spine overlapped by the second one. The genus includes 2 species distinguishable by the number of bristles in the frontal row. *Neotyphloceras crassispina* Rothschild, 1914, with 5 or 6 bristles in the frontal row includes 3 subspecies. Males of the subspecies are recognized because of the shape of the fixed process of the clasper and the situation of the last bristle, which in *N. c. hemisus* is farther away from the tip (Hopkins and Rothschild, 1966). Although there are no diagnostic characteristics to differentiate the females, we assume that studied specimens correspond to *N. c. hemisus*, since they were collected at the same localities and hosts as males identified as this species. In Argentina, only *N. c. hemisus* has been previously reported. This flea was recorded associated with cricetid rodents from Catamarca, Mendoza, Neuquén, Rio Negro, Tucumán, and La Rioja Provinces. In this study 5 new host species are reported, associated with *N. c. hemisus: Ak. albiventer*, *Ph. xanthopygus*, *E. hirtipes*, *E. puerulus*, and *Ca. lepidus*, and it is the first mention of the species in Jujuy Province.

Family Ctenophthalmidae
Subfamily Doratopsyllinae
Adoratopsylla (*Tritopsylla*) *intermedia intermedia* (Wagner, 1901)

Specimens examined: 1 ♂ (MMD384), *Ph. osilae*, J11; 2 ♀, 2 ♂ (CML 2895), *L. crassicaudata*, T17; 3 ♀, 6 ♂ (PIDBA957), *L. crassicaudata*, S14; 5 ♀, 2 ♂ (PIDBA790), *Mi. constantiae*, S14; 2 ♀, 1 ♂ (PIDBA1208), *Th.* cf. *cinderella*, T16; 1 ♂ (ARG4211), *Th. sponsorius*, T19; 4 ♀ (ARG5048), *Th.* cf. *sponsorius*, T17; 4 ♀, 1 ♂ (ARG5065), *Th.* cf. *sponsorius*, T17; 1 ♀ (ARG5066), 1 ♀ (CML6502), *Th. sponsorius*, S14; 1 ♀ (PIDBA781), *Th.* cf. *sponsorius*, S14; 4 ♀, 3 ♀ (PIDBA789), *Th. sponsorius*, S14; 2 ♀ (PIDBA791), *Th. sponsorius*, S14.

Intensity: 3.54

Type host and locality: "Unknown host," Paraguay; *Metachirus opossum* (now *Philander opossum* Linnaeus, 1758), Paracube, Ecuador.

Geographic range: Argentina, Brazil, Paraguay, Ecuador, Peru, and Venezuela.

Remarks: Adoratopsylla Ewing, 1925, is recognized because of the presence of a horizontal comb of 4 spines, none overlapping the others (Johnson, 1957). The genus includes 2 subgenera: *Tritopsylla* Cunha, 1929, is recognized from *Adoratopsylla* Ewing, 1925, because of the similarity in the length of the spines of genal comb (Linardi and Guimarães, 2000). *Adoratopsylla* (*T.*) *i. intermedia* is recognized from the remaining species and subspecies because of the distribution of setae on the head (Linardi and Guimarães, 2000), as well as characteristics of the posterodorsal lobe of the immovable process (Johnson, 1957). The genus is confined to the Neotropical region and its members infest marsupials of the subfamily Didelphinae. *Adoratopsylla* (*T.*) *i. intermedia* has been reported mainly in association with marsupials, and also with some rodents (Linardi and Guimarães, 2000). In Argentina, there are only 2 reports of the species and genus: one record in Tucuman Province (without locality and host identified) (Hopkins and Rothschild, 1966), and the second one in Calilegua (Jujuy Province) parasitizing *Thylamys* sp. (Lareschi et al., 2005). *Adoratopsylla* (*T.*) *i. intermedia* is recorded for the first time parasitizing *Mi. constantiae*, *Th.* cf. *cinderella*, and *Th.* cf. *sponsorius*. This flea is also recorded for the first time in Salta Province. The association with *Ph. osilae* may be accidental.

Family Rhopalopsyllidae
Subfamily Parapsyllinae
Tetrapsyllus (*Phylliver*) *bleptus* (Jordan and Rothschild, 1923)

Specimens examined: 1 ♀ (CML4578), *Ak. albiventer*, J8.

Intensity: 1

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

Geographic range: Argentina, Peru, and Chile.

Remarks: Tetrapsyllus Jordan, 1931, is distinguished from other genera in the Parapsyllinae because the metasternum bears a conspicuous antero-ventral projection, and labial palpus has 4 segments (Smit, 1987). In Argentina, species of the subgenus *Phylliver* Smit, 1987, were recorded in localities of Jujuy, Catamarca, and Mendoza, provinces associated with cricetid rodents (Smit, 1987; Beaucournu and Gallardo, 1989; Hastriter et al., 2002; Beaucournu and Castro, 2003). *Akodon albiventer* constitutes a new host record for *Te.* (*P.*) *bleptus*.

Family Rhopalopsyllidae
Subfamily Rhopalopsyllinae
Polygenis (*Polygenis*) *acodontis* (Jordan and Rothschild, 1923)

Specimens examined: 1 ♂ (ARG4467), *Th. sponsorius*, T18.

Intensity: 1

Type host and locality: Akodon simulator Thomas, 1916, Otro Cerro, Catamarca, Argentina.

Geographic range: Argentina, Brazil, and Venezuela.

Remarks: the genus *Polygenis* Jordan, 1939, is the most abundant of the subfamily because of the number of species and subspecies included. Linardi and Guimarães (2000) recognize 2 subgenera on the basis of the number of setae-bearing notches in the hind tibia. Males of *Po.* (*P.*) *acodontis* are distinguished from the remaining species because the distal arm of sternum IX has a dense fringe of setae along its ventral margin. In Argentina, this flea was recorded from the northwest provinces and Buenos Aires Province, associated with rodents and *L. crassicaudata*, from Tucumán. *Po.* (*P.*) *acodontis* was recorded associated with the last mentioned marsupial (Autino and Lareschi, 1998). *Thylamys sponsorius* constitutes a new host.

Family Malacopsyllidae
Phthiropsylla agenoris (Rothschild, 1904)

Specimens examined: 6 ♀, 1 ♂ (CML3067), *Chaetophractus* sp., S15; 4 ♀, 2 ♂ (CML7000), *Ch. vellerosus*, T20; 2 ♀, 6 ♂ (ARG4945), *Chaetophractus* sp., C22.

Intensity: 7

Type host and locality: Dasypus sp., Cruz del Eje, Argentina.

Geographic range: Argentina.

Remarks: Phthiropsylla and *Malacopsylla* are the only genera included in the family Malacopsyllidae. The genus *Phthiropsylla* Wagner, 1939, includes only one species, *Pht. agenoris*, which is recognized because of the presence of 3 (occasionally 2) short blunt widely spaced pseudospines on the pronotum, and the oblique break of the mesocoxa is complete (Smit, 1987). *Phthiropsylla agenoris* was recorded mainly on xenarthrans from central and southern Argentina, as well as from Tucumán and La Rioja Provinces (Smit, 1987; Autino and Lareschi, 1998). However, there are some records on carnivores and rodents (Smit, 1987). In this study, we mention a new host species for *Pht. agenoris* (*Ch. vellerosus*), and this flea is recorded for the first time in Catamarca province.

Family Malacopsyllidae
Malacopsylla grossiventris (Weyenbergh, 1879)

Specimens examined: 4 ♀, 3 ♂ (ARG 5687), *To. matacus*, C21; 5 ♀, 4 ♂ (CML 5967), *Ce. thous*, J13; 2 ♀, 3 ♂ (CML7000), *Ch. vellerosus*, T20.

Intensity: 7

Type host and locality: Dasypus minutus (now *Zaedyus pichiy* Desmarest, 1804), Argentina.

Geographic range: Argentina.

Remarks: Malacopsylla Weyenbergh, 1881, is a monotypic genus. *Malacopsylla grossiventris* is recognized because of its angulated frons with a deciduous tubercle, heavy setae on posterior margin of fore tibia, darkly sclerotized and blunt, and oblique break of mesocoxa incomplete (Smit, 1987; Johnson, 1957). *Malacopsylla grossiventris* is mainly associated with xenarthrans; carnivores and some rodents were also mentioned as hosts (Smit, 1987; Autino and Lareschi, 1998). This flea was only reported from Argentina and has been recorded from provinces from central, northern, and southern regions of the country.

Family Pulicidae
Pulex irritans Linnaeus, 1758

Specimens examined: 56 ♀, 40 ♂ (CML 7125), *Ps. gymnocercus*, S14

Intensity: 96

Type host and locality: Homo sapiens Linnaeus, 1758, Uppsala, Sweden.

Geographic range: cosmopolitan.

Remarks: The genus *Pulex* Linnaeus, 1758 includes 7 species, but only *Pu. irritans* was reported for Argentina. This species is recognized because of the large dark eye without a ventral sinus, mesopleuron not divided, presence of a group of 10 or more bristles arranged abnormally in the internal face of the posterior coxa, and break of mesocoxa incomplete (Linardi and Guimarães, 2000). In Argentina, *Pu. irritans* parasitizes carnivores, rodents, marsupials, lagomorphs, and cervids. This flea was previously reported parasitizing *Ps. gymnocercus* in this country without more information about the locality. In addition, *Pu. irritans* was reported from Salta Province associated with *Puma concolor* (Linnaeus, 1771) in captivity (Autino and Lareschi, 1998).

Family Tungidae
Hectopsylla gracilis Mahnert, 1982

Specimens examined: 1 ♀ (MMD271), *Ak. albiventer*, J4; 1 ♀ (CML4617), *Ak. caenosus*, J12; 1 ♀ (MMD247), *E. hirtipes*, J4; 1 ♀ (MMD249), *E. hirtipes*, J4; 1 ♀ (MMD252), *E. hirtipes*, J4; 1 ♀ (MMD253), *E. hirtipes*, J4; 1 ♀ (MMD262), *E. hirtipes*, J4; 1 ♀ (MMD272), *E. hirtipes*, J4; 1 ♀ (MMD250), *E. puerulus*, J4; 2 ♀ (MMD257), *E. puerulus*, J4; 1 ♀ (MMD312), *E. puerulus*, J7.

Intensity: 1.1

Type host and locality: Eligmodontia typus F. Cuvier, 1837, Puerto Madryn, Chubut Province, Argentina.

Geographic range: Argentina.

Remarks: Hectopsylla gracilis is distinguishable from closely related species because of the number of lateral bristles on fifth tarsal segment, the number of setae on the metepimeron, the shape of the spermatheca and metatarsal claw (Hastriter and Méndez, 2000). This flea has been previously recorded from southern Argentina (Hastriter and Méndez, 2000). This is the first report of *H. gracilis* in northwestern Argentina. Since most of previous records are from *E. typus*, the association with species of *Eligmodontia* reported here was expected. *Akodon albiventer* and *Ak. caenosus* constitute new host records for *H. gracilis*.

DISCUSSION

Out of the 9 flea species reported parasitizing 17 species of mammals, *N. c. hemisus*, *Ad.* (*T.*) *i. intermedia*, *Pht. agenoris*, and *H. gracilis* are reported for the first time in the provinces of Jujuy, Salta, Catamarca, and in northwestern Argentina, respectively. The mammals *Mi. constantiae*, *Th.* cf. *cinderella*, *Th. sponsorius*, *Ak. albiventer*, *Ak. caenosus*, *Ca. lepidus*, *E. hirtipes*, *E. puerulus*, *Ph. xanthopygus*, *Ta. primus*, and *Ch. vellerosus* increase their range of parasites known. In addition, 18 parasite–host associations are reported for the first time. The results reported contribute to the knowledge of the biodiversity in northwestern Argentina.

ACKNOWLEDGMENTS

Thanks to all members of PIDBA for their collaboration in the field work. The study was funded by National Science Foundation, U.S.A. (NSF DEB 9870184 awarded to M.A. Mares and J.K. Braun), CONICET, PID 4963, and CIUNT (Centro de Investigaciones de la Universidad Nacional de Tucumán), and partially by 11N541 (UNLP, Argentina).

LITERATURE CITED

Alarcón, M.E. 2003. Sifonapterofauna de tres especies de roedores de Concepción, VIII Región-Chile. Gayana 67:16–24.

Autino, A. G., and M. Lareschi. 1998. Capítulo 27: Siphonaptera. Pages 279–290 *in* J. J. Morrone and S. Coscarón, eds. Biodiversidad de artrópodos argentinos. Una perspectiva biotaxonómica. Ediciones Sur, La Plata.

Barquez, R. M., M. M. Díaz, and R. A. Ojeda. 2006. Mamíferos de Argentina: sistemática y distribución. Sociedad Argentina para el Estudio de los Mamíferos (SAREM), Mendoza.

Beaucournu, J. C., and D. Castro. 2003. Contribution á un Inventaire des Puces d'Argentina. Beiträge zur Entomologie 53:449–479.

Beaucournu, J. C., and M. H. Gallardo. 1989. Contribution à la faune du Chili. Puces nouvelles de la moitiè nord. Bulletin de la Sociètè Entomologique de France, 94:181–188.

Burkart, R., N. O. Bárbaro, R. O. Sanchez, and D. A. Gomez. 1999. Ecorregiones de la Argentina. Buenos Aires, Administración de Parques Nacionales.

Cabrera, A. L. 1976. Regiones fitogeográficas argentinas. Enciclopedia Argentina de Agricultura y Jardinería 2 (1), Ed. Acme, Buenos Aires.

Colombetti, P. L., A. G. Autino, G. L. Claps, M. I. Carma, and M. Lareschi. 2008. Primer registro de *Cleopsylla townsendi* (Siphonaptera: Stephanocircidae: Craneopsyllinae) en la Argentina. Revista de la Sociedad Entomológica Argentina 67:179–182.

D'Elía, G., and U. F. J. Pardiñas. 2004. Systematics of Argentinean, Paraguayan, and Uruguayan swamp rats of the genus *Scapteromys* (Rodentia, Cricetidae, Sigmodontinae). Journal of Mammalogy, 85:897–910.

Díaz, M. M., R. M. Barquez, J. K. Braun, and M. A. Mares. 1999. A new species of *Akodon* (Muridae:

Sigmodontinae) from Northwestern Argentina. Journal of Mammalogy 80(3):786–798.

Díaz, M. M., D. A. Flores, and R. M. Barquez. 2002. A new species of gracile mouse opossums, genus *Gracilinanus* (Didelphimorphia: Didelphidae), from Jujuy Province, Argentina. Journal of Mammalogy 83:824–833.

Duellman, W. E. (ed.) 1979. The South American Herpetofauna: Its origin, evolution, and dispersal. Monograph of the Museum of Natural History, the University of Kansas, 7:1–485.

Duellman, W. E., and T. H. Fritts. 1972. The taxonomic review of the Southern Andean marsupial frogs (Hylidae: Gastrotheca). Occasional Papers, Museum of Natural History, The University of Kansas, 9:1–37.

Ferro, L. I., J. J. Martínez, and R. M. Barquez. 2009. A new species of *Phyllotis* (Rodentia, Cricetidae, Sigmodontinae) from Tucuman Province, Argentina. Mammalian Biology (2009), doi:10.1016/j.mambio. 2009.09.005.

Fjeldsa, J., and N. Krabbe. 1990. Birds of the High Andes. Zoological Museum, University of Copenhagen, Copenhagen, Denmark. 876 pp.

Galliari, C. A., and U. F. J. Pardiñas. 2000. Taxonomy and distribution of the sigmodontine rodents of genus *Necromys* in central Argentina and Uruguay. Acta Theriologica 45:211–232.

Hastriter, M. W., and E. Méndez. 2000. A review of the flea genera *Hectopsylla* Frauenfeld and *Rhynchopsyllus* Haller (Siphonaptera: Pulicidae). Proceedings of the Entomological Society of Washington 102(3):613–624.

Hastriter, M. W., M. D. Zyzak, R. Soto, R. Fernandez, N. Solorzano, and M. F. Whiting. 2002. Fleas (Siphonaptera) from Ancash Department, Peru with the description of a new species, *Ectinorus alejoi* (Rhopalopsyllidae), and the description of the male of *Plocopsylla pallas* (Rothschild, 1914) (Stephanocircidae). Annals of Carnegie Museum, 71:87–106.

Hopkins, G. H., and M. Rothschild. 1956. An illustrated catalogue of the Rothschild Collection of fleas (Siphonaptera) in the British Museum (Natural History). Volume II. Cotopsyllidae, Vermipsyllidae, Stephanocircidae, Ischnopsyllidae, Hypsophthalmidae and Xiphiopsyllidae. British Museum (NH), London.

Hopkins, G. H., and M. Rothschild. 1966. An illustrated catalogue of the Rothschild Collection of fleas (Siphonaptera) in the British Museum (Natural History). Volume IV. Hystricopsyllidae. British Museum (NH), London.

Jayat, J. P., G. D'Elía, U. F. J. Pardiñas, M. D. Miotti, and P. E. Ortiz. 2008. A new species of the genus *Oxymycterus* (Mammalia: Rodentia: Cricetidae) from the vanishing Yungas of Argentina. Zootaxa 1911: 31–51.

Jayat, J. P., G. D'Elía, U. F. J. Pardiñas, and J. G. Namen. 2007. A new species of *Phyllotis* (Rodentia, Cricetidae, Sigmodontinae) from the upper montane forest of the Yungas of northwestern Argentina. Pages 391–416 *in* D. A. Kelt, E. P. Lessa, J. Salazar-Bravo, and J. L. Patton, eds. The Quintessential Naturalist: Honoring the Life and Legacy of Oliver P. Pearson. University of California Publications in Zoology, Berkeley, California.

Johnson, P. T. 1957. A classification of Siphonaptera of South America. Memoirs of the Entomological Society of Washington, Washington, D.C.

Lareschi, M., A. Autino, M. M. Díaz, and R. M. Barquez. 2003. New host and locality records for mites and fleas associated with wild rodents from northwestern Argentina. Revista de la Sociedad Entomológica Argentina 62:60–64.

Lareschi, M., P. M. Linardi, A. G. Autino, R. M. Barquez, and M. M. Díaz. 2003. First report of *Polygenis* (*Polygenis*) *roberti beebei* (Fox, 1947) (Siphonaptera: Rhopalopsyllidae) in Argentina, with a new host record and morphological data. Systematic Parasitology 56:183–187.

Lareschi, M. F. Ortiz, and M. Arce de Hamity. 2005. Nuevo registro de *Adoratopsylla* (*Tritopsylla*) *intermedia intermedia* (Wagner) (Siphonaptera: Ctenophtalmidae) en la Provincia de Jujuy, Argentina. VI Congreso Argentino de Entomología. San Miguel de Tucumán. P054, pág. 97.

Linardi, P. M., and L. R. Guimarães. 2000. Sifonápteros do Brasil. Ed. MZUSP, FAPESP. São Paulo, Brazil. 291 pp.

Salazar-Bravo, J., T. Tarifa, L. F. Aguirre, E. Yensen, and T. L. Yates. 2003. Revised checklist of Bolivian mammals. Museum of Texas Tech University Occasional Papers 220:1–26.

Salazar-Bravo, J., E. Yensen, T. Tarifa, and T. L. Yates. 2002. Distributional records of Bolivian mammals. Mastozoología Neotropical 9:70–78.

Smit, F. G. A. M. 1987. An Illustrated Catalogue of the Rothschild Collection of Fleas (Siphonaptera) in the British Museum (Natural History). Volume VII. Malacopsylloidea. British Museum (NH), London.

Vuilleumier, F. 1993. Biogeografía de aves en el neotrópico: jerarquías conceptuales y perspectivas para futuras investigaciones. Revista Chilena de Historia Natural, 66:11–51.

Whiting, M. F., A. S. Whiting, M. W. Hastriter, and K. Dittmar. 2008. A molecular phylogeny of fleas (Insecta: Siphonaptera): origins and host associations. Cladistics 24:1–31.

Wilson, D. E., and D. M. Reeder (editors). 2005. Mammal Species of the World. A Taxonomic and Geographic Reference (3rd ed.). Johns Hopkins University Press, Baltimore, Maryland.