

EMENDED DESCRIPTION OF *LITOMOSOIDES MOLOSSI* (NEMATODA: ONCHOCERCIDAE) AND FIRST RECORDS OF *LITOMOSOIDES* SPECIES PARASITIZING ARGENTINEAN BATS

Mirna C. Oviedo*†, Juliana Notarnicola‡, M. Daniela Miotti§, and Lucía E. Claps*||

* Instituto Superior de Entomología Dr. Abraham Willink—INSUE and Cátedra de Invertebrados, Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad Nacional de Tucumán—UNT. Miguel Lillo 205 (4000) San Miguel de Tucumán, Tucumán, Argentina. Correspondence should be sent to: julinota@cepave.edu.ar

ABSTRACT: During a long-term study on biodiversity of bats in the Yungas and Entre Ríos provinces, 1,304 specimens of bats included in the families Noctilionidae, Phyllostomidae, Vespertilionidae, and Molossidae were collected and checked for filarioids. *Litomosoides molossi* Esslinger, 1973 was recovered from the thoracic and abdominal cavities of *Molossus molossus* (prevalence [P] = 6.4%); *Litomosoides chandleri* Esslinger, 1973 from *Artibeus planirostris* (P = 6.9%), *Sturnira oporaphilum* (P = 66.6%), *Sturnira erythromos* (P = 23.8%), *Sturnira lilium* (P = 7.2%), and *Eumops perotis* (P = 50%); and *Litomosoides saltensis* n. sp. was collected from *Eptesicus furinalis* (P = 1.7%). In this paper, we emend the description of *L. molossi*; describe a new species, *Litomosoides saltensis* n. sp., on the basis of 1 female specimen; and report for the first time *L. molossi* and *L. chandleri* parasitizing Argentinean bats, expanding the host and locality records. *Litomosoides molossi* exhibits a slender buccal capsule, with an anterior segment transparent, and the posterior chitinous portion displays 2 thickenings in the first third; possesses 1 dorsal prominent cephalic papilla and 4 labial papillae distributed around the mouth; cuticle with lateral punctuations all along the hypodermic chords in both sexes; and male with area rugosa and tail without cloacal papillae. In *L. chandleri*, the lateral punctuations are distributed on the posterior extremity of the body in both sexes. *Litomosoides saltensis* n. sp. displays a thick buccal capsule with a posterior segment well cuticularized, possessing 2 thickenings in the anterior half; 4 labial and 2 ventral cephalic papillae; a globular vulva located anterior to the esophagus–intestine junction; cuticle with lateral punctuations in the posterior extremity of the body; and tail with salient phasmids. We also provide a taxonomic key for the identification of the *Litomosoides* sp. of bat dwelling. Long-term studies and large sample sizes are needed to detect the presence of *Litomosoides* sp. in bats, in contrast to the findings in cricetid rodents, which seem to be more frequently collected.

North and Central Argentina exhibit high levels of biodiversity as results of the confluence of several biomes conjoining in the area, including the high-altitude Andes in the west, the Yungas in the northeastern foothills of the Andes, the tropical forest in the northeast, and a mixture of grassland and chaco thorn forest in the central lowlands (Cabrera and Willink, 1973). At the present time, 63 species of bats are known to occur in Argentina, and around 70% of them are distributed in North and Central Argentina. Four families of Chiroptera are represented in this area: Noctilionidae (2 species), Phyllostomidae (19 species), Vespertilionidae (25 species), and Molossidae (17 species) (Barquez, 2006; Díaz et al., 2011).

In Argentina, data on parasites from bats are scarce. Most of the records correspond to trematodes (Lunaschi, 2002, 2004, 2006; Lunaschi et al., 2003; Lunaschi and Notarnicola, 2010), and only 3 reported nematodes, including *Allintoshius baudii* Vaucher and Durette Desset, 1980 (Ornithostrongylidae) described from *Myotis aelleni* Baud from Patagonia, *Cheiropteronea striatum* Oviedo, Ramallo and Claps, 2010 (Molineidae) parasitizing *Artibeus planirostris* (Spix), and *Biacantha normaliae* Oviedo, Ramallo, Claps, and Miotti, 2012 in *Desmodus rotundus* (E.

Geoffroy) from the Yungas (Vaucher and Durette-Desset, 1980; Oviedo et al., 2010, 2012).

Sixteen of 42 species of *Litomosoides* Chandler, 1931 (Nematoda: Onchocercidae) were reported as parasites from the body cavities of bats (Caballero, 1939; Esslinger, 1973; Bain et al., 2003; Notarnicola et al., 2010; Guerrero and Bain, 2011). In Argentina, despite large sample sizes of bats, marsupials, and rodents, only 8 species of this genus were recorded in cricetids (Notarnicola et al., 2000, 2002, 2012; Notarnicola and Navone, 2002, 2011; Notarnicola, 2004, 2005; S. Mazza, unpubl. data). J. J. Boero and H. Delpietro (unpubl. data) mentioned the presence of specimens of *Litomosoides* sp. in *Sturnira lilium* (E. Geoffroy) from Misiones Province. However, the authors omitted any description, and the specimens were not deposited in any known collection.

In this paper, we emend the description of *Litomosoides molossi* Esslinger, 1973 and report for the first time *L. molossi* and *Litomosoides chandleri* Esslinger, 1973 parasitizing Argentinean bats, expanding the host and locality records. We also report the presence of a new species collected from *Eptesicus furinalis* (d'Orbigny). Finally, we include a taxonomic key for the identification of the *Litomosoides* sp. of bat dwelling.

MATERIALS AND METHODS

During a long-term study on biodiversity of bats in the Yungas and Entre Ríos provinces from 2002 through 2012, specimens of bats were collected using mist nets, killed with ether, and preserved in 10% formalin (Oviedo, 2013). We also dissected specimens deposited in the Mammal Collection of the Museo de Ciencias Naturales Dr. Bernardino Rivadavia (MACN), Buenos Aires, and in the Colección Mamíferos Lillo (CML), San Miguel de Tucumán, Tucumán, Argentina.

Filarioid nematodes were collected and placed directly in 70% ethanol. For study of morphological characters, specimens were cleared in lactophenol, placed on a slide, and studied with an Olympus BX51 microscope (Olympus Latin America Inc., Miami, Florida). To examine the oral papillae, an apical view of the head was prepared. The lateral cuticular internal ridge was used to identify lateral fields and the Y-shaped section of the lumen of the esophagus was used to identify the dorsal side. Microfilariae were dissected and examined from the uterus of fixed

Received 2 May 2015; revised 16 April 2016; accepted 18 April 2016.

† Instituto de Investigación Científica, Desarrollo y Transferencia Tecnológica, Universidad Técnica de Manabí. Av. José María Urbina, parroquia 12 de Marzo, cantón Portoviejo EC130105, Manabí, Ecuador.

‡ Centro de Estudios Parasitológicos y de Vectores CEPAVE–CCT La Plata–CONICET, Boulevard S/N entre Av. 60 y calle 64 (1900) La Plata, Argentina.

§ Programa de Investigaciones de Biodiversidad Argentina (PIDBA), Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad Nacional de Tucumán. Miguel Lillo 205 (4000) San Miguel de Tucumán, Tucumán, Argentina.

|| Facultad de Ciencias y Tecnología, Universidad Autónoma de Entre Ríos. Urquiza y Tratado del Pilar (3105) Diamante, Entre Ríos, Argentina.

DOI: 10.1645/15-776

females. Illustrations were made with the aid of a drawing tube. Measurements are presented as follows: data for 2 or 3 specimens are given separated by semicolons; if more than 3 specimens are measured, we give the mean values with the range in parentheses. Prevalence and mean intensity of infection are also provided for each species. Filarioid worms were deposited in the Colección Helmintológica Fundación Miguel Lillo (CH-FML) and Colección de Helmintos Museo de La Plata (MLP-he). Numbers from CH-FML correspond to lots of vials from different localities or host species. The hosts were deposited at CML (waiting for the number assignments). The acronyms used for field numbers from host specimens are: MDM, María Daniela Miotti; MO, Mirna Oviedo; RTS, Rita Tatiana Sánchez.

Some authors use different terms when referring to the same structure localized on the lateral sides of some species of *Litomosoides* from bat dwellings, i.e., “a row of minute papulae”; “lateral cuticular papulae” (Esslinger, 1973); “lateral modifications or embellishments” (Esslinger, 1973; Notarnicola et al., 2010); or “lateral row of tiny cuticular bosses” (Guerrero et al., 2002). Here, we coin the term “punctuations” for the row of small lateral cuticular points present at the level of the lateral hypodermic chords, generally all along the body length. This structure was commonly observed in both males and females of *L. molossi*, *L. chandleri*, *Litomosoides chitwoodi* Bain, Guerrero and Rodríguez, 2003 (= *Litomosoides* sp. from Chitwood, 1938), and in females of *Litomosoides yutajensis* Guerrero, Martin and Bain, 2003.

One of us (J.N.) had the opportunity to examine specimens collected by Esslinger during a trip to the United States. The material corresponded to *Litomosoides esslingeri* Bain, Petit and Diagne, 1989 (3 males and 3 females [U.S. National Museum {USNM} 72391] and a slide with microfilaria from blood [USNM 72392] deposited in the USNM Parasite Collection, Beltsville, Maryland), and J.N. observed that the descriptions, measurements, and drawings were exactly as Esslinger stated in his paper (Esslinger, 1973); thus we believe that Esslinger’s description of the lateral punctuations from *L. molossi* and *L. chandleri* are correct.

RESULTS

We examined 1,304 individual bats that included species from the families Noctilionidae, Phyllostomidae, Vespertilionidae, and Molossidae. All bats were collected from the provinces of Salta, Jujuy, Tucumán, Catamarca, Chaco, Formosa, Misiones, Corrientes, and Entre Ríos, Argentina. Table I summarizes the species of bats examined from the provinces of Salta, Jujuy, Tucumán, and Entre Ríos. Those from the remaining provinces are the following: 18 *Noctilio albiventris* Desmarest from Corrientes Province; 12 *Artibeus lituratus* (Olfers), 1 *Chrotopterus auritus* (Peters), and 1 *Myotis* sp. Kraup from Misiones; 7 *Molossops temminckii* (Burmeister) from Formosa; 6 *Molossus molossus* (Pallas), and 5 *Molossops temminckii* from Chaco; 1 *Myotis levis* (I. Geoffroy) and 8 *Tadarida brasiliensis* (I. Geoffroy) from Catamarca. Those bats positive for filarioids are presented in Table I. We recovered 2 previously known species: *L. molossi* and *L. chandleri*, and 1 new species of *Litomosoides* in *E. furinalis*.

REDESCRIPTIONS

***Litomosoides molossi* Esslinger, 1973**
(Figs. 1–7; Tables I, II)

Diagnosis: Adult worms small, males one-half length of females. Cephalic extremity rounded, with prominent dorsal papilla. In apical view, 4 labial papillae distributed in a square around the mouth; 1 dorsal cephalic papilla (Fig. 3). Buccal capsule slender; anterior segment transparent and posterior chitinous portion with 2 thickenings in the first third; buccal cavity thin (Figs. 1, 2). Tail slender, digitiform. Cuticle with punctuations all along the body length in both sexes (Figs. 2, 7). Esophagus differentiated in muscular and glandular portions. Vulva posterior to the esophagus–intestine junction. Vagina globular 40 × 40 mm. Male tail without cloacal papillae (Fig. 4); left spicule with handle longer than blade; blade consisting of 2 cuticularized rodlike structures in

TABLE I. List of species and number of bats trapped (and parasitized) in 4 provinces from northern Argentina. Superindex indicates the positive hosts for filarioid species as follow: ^c *Litomosoides chandleri*; ^m *L. molossi*; ^s *Litomosoides saltensis* n. sp.

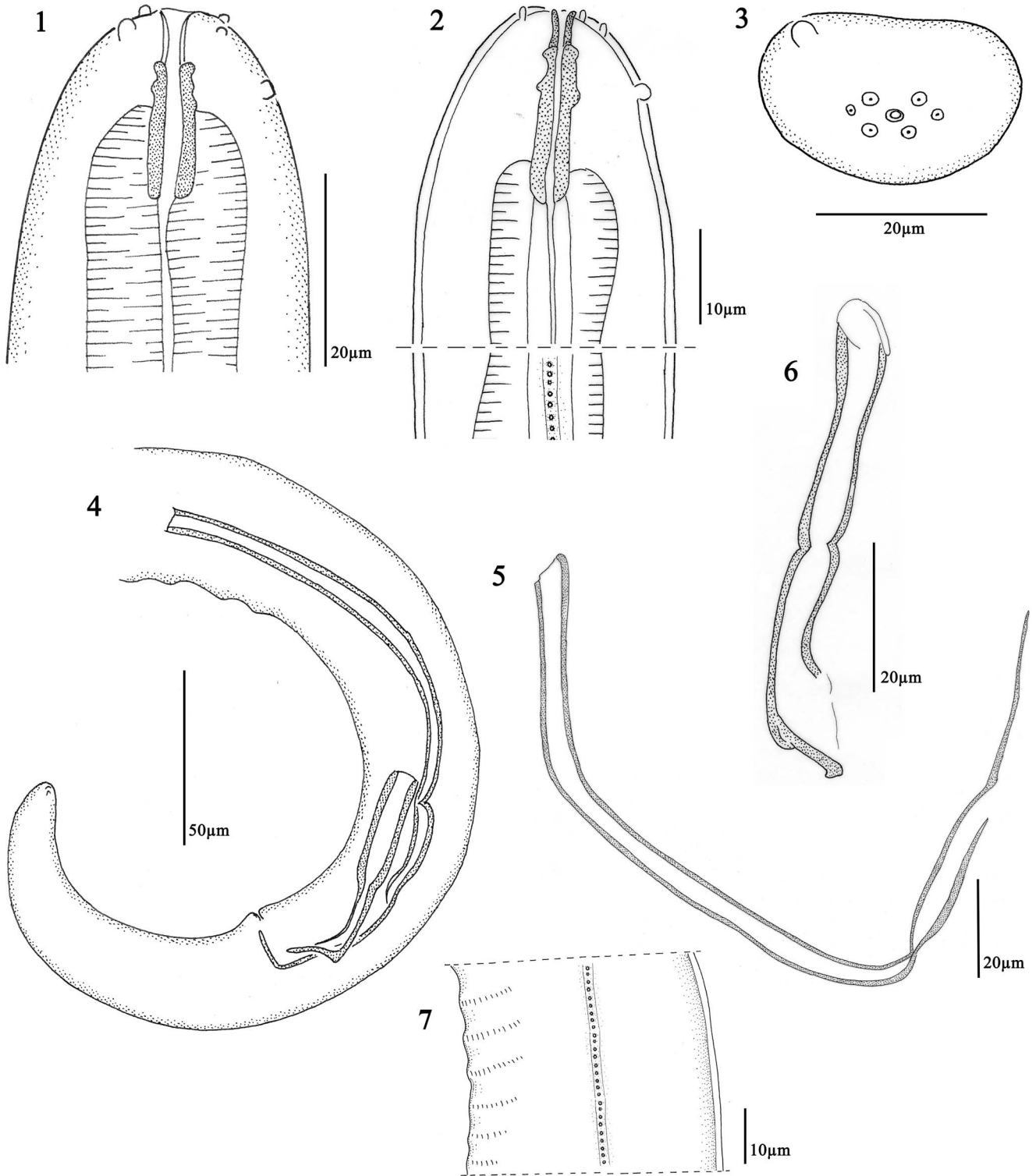
Family	Host species	Provinces				
		Salta	Jujuy	Tucumán	Entre Ríos	
Noctilionidae	<i>Noctilio leporinus</i>	3	—	—	—	
Phyllostomidae	<i>Anoura caudifer</i>	1	—	—	—	
	<i>Artibeus planirostris</i>	29 (1) ^c	71 (2) ^c	86 (10) ^c	—	
	<i>Chrotopterus auritus</i>	1	6	1	—	
	<i>Desmodus rotundus</i>	13	20	28	3	
	<i>Glossophaga soricina</i>	—	3	—	—	
	<i>Micronycteris microtis</i>	1	—	—	—	
	<i>Pygoderma bilabiatum</i>	1	1	—	—	
	<i>Sturnira erythromos</i>	6 (1) ^c	6 (1) ^c	93 (23) ^c	—	
	<i>Sturnira lilium</i>	170 (12) ^c	73 (13) ^c	114 (1) ^c	—	
	<i>Sturnira oporaphilum</i>	9 (6) ^c	—	—	—	
	Vespertilionidae	<i>Eptesicus diminutus</i>	5	—	—	3
		<i>Eptesicus furinalis</i>	18 (1) ^s	10	16	12
		<i>Histiotus</i> sp.	4	6	4	—
<i>Histiotus laeophotis</i>		1	—	2	—	
<i>Histiotus macrotus</i>		—	1	1	—	
<i>Lasiurus blossevillei</i>		4	12	3	4	
<i>Lasiurus cinereus</i>		5	6	1	—	
<i>Lasiurus ega</i>		—	—	—	22	
<i>Myotis</i> sp.		2	9	6	12	
<i>Myotis albescens</i>		1	2	2	1	
<i>Myotis dinelli</i>		3	3	6	—	
<i>Myotis keaysi</i>		—	1	2	—	
<i>Myotis levis</i>		—	—	—	7	
<i>Myotis nigricans</i>	23	2	6	—		
<i>Myotis riparius</i>	—	11	1	—		
Molossidae	<i>Cynomops planirostris</i>	5	6	—	—	
	<i>Eumops bonariensis</i>	—	—	—	9	
	<i>Eumops glaucinus</i>	—	1	—	—	
	<i>Eumops patagonicus</i>	1	1	—	5	
	<i>Eumops perotis</i>	—	—	2 (1) ^c	—	
	<i>Molossops temminckii</i>	—	7	—	9	
	<i>Molossus molossus</i>	22 (1) ^m	4	24	22 (4) ^m	
	<i>Nyctinomops laticaudatus</i>	1	1	—	—	
	<i>Promops nassutus</i>	2	—	—	—	
	<i>Tadarida brasiliensis</i>	17	100	25	—	

the proximal half and a filament in the distal half (Fig. 5); right spicule is a twisted conduit with a heel not strongly cuticularized (Fig. 6). Area rugosa begins anterior to cloaca, composed of transverse ridges of small longitudinal crests (Fig. 7). Microfilariae slender, with sheath closely applied to the body; nuclei extending to the tip of tail.

Taxonomic summary

Host: *Molossus molossus* (Pallas), CML 10757 from Salta; and MO812, MO819, MO830, MO836 from Entre Ríos.

Localities: Departamento General José de San Martín, Seco River, 20 km by road, approximately at WNW of Vespucio (22°32’S, 64°0’W; 536 m above sea level [asl]), Salta; Departamento Colón, Refugio La Aurora del Palmar, on the Los Loros River bank (31°50’S, 58°20’W), Entre Ríos, Argentina.



FIGURES 1–7. *Litomosoides molossi*. (1) Detail of female buccal capsule, lateral view. (2) Detail of buccal capsule from another female with lateral punctuations, lateral view. (3) Apical view showing the head papillae. (4) Male posterior region, lateral view. (5) Left spicule. (6) Right spicule. (7) Area rugosa at mid-length and lateral punctuations.

TABLE II. Compared measurements of *Litomosoides molossi* reported from *Molossus molossus* in the literature and the present study.

Reference	Esslinger (1973)	Rutkowska (1980)*		Present study
Locality, country	Valle, Colombia	Trinidad, Cuba	Salta, Argentina	Entre Ríos, Argentina
Localization	Thoracic cavity	Abdominal cavity	Thoracic cavity	Thoracic and abdominal cavities
Males	(n = 1)	(n = 1)	—	(n = 2)
Body length (mm)	4.5	—	—	6.51; 5.30
Body width	100	100	—	100; 100
Buccal capsule length	15	—	—	15; 14
Esophagus	342	—	—	360; 580
Tail	87	77	—	90; 100
Left spicule	159	156	—	190; 180
Handle	102	103	—	117; 115
Right spicule	67	64	—	68; 66
Spicular ratio	2.3	2.4	—	2.7; 2.7
Females	(n = 6)	(n = 1)	(n = 1)	(n = 4)
Body length (mm)	10.9 (7.5–13.2)	13	6.35	9.2 (6.3–13.9)
Body width	139 (121–155)	168	200	125 (100–150)
Buccal capsule length	17 (14–19)	14	20	18.5 (17–20)
Esophagus	337 (224–382)	264	492	423 (347–510)
Tail	113 (90–148)	96	160	202 (112–250)
Vulva to apex	617 (440–680)	600	540	623 (495–720)
Microfilaria length	92 (85–102)†	—	—	79.6 (66.1–94)‡

* Originally mentioned as *Molossus major tropidorhynchus* (= *M. molossus* [Simmons, 2005]).

† Microfilariae from blood smears.

‡ Uterine microfilariae.

Site of infection: Thoracic and abdominal cavities.

Vouchers: MLP-he 6824 from Salta; MLP-he 6825, MLP-he 6826, CH-FML 7552 from Entre Ríos.

Prevalence and mean intensity: Five of 78 hosts parasitized (6.4%); 3 filarioids per host (1–6).

Remarks

Table II provides the measurements from our specimens compared with those given by Esslinger (1973) and Rutkowska (1980). Filarioids were identified as *L. molossi* by the prominent dorsal papilla on the head; the thin buccal capsule with 2 thickenings in the first third; by the vulva located posterior to the esophagus–intestine junction; thin tail without cloacal papillae; presence of punctuations on the lateral line in both sexes; and by the shape of the spicules.

Our specimens were collected from both thoracic and abdominal cavities from the Pallas's mastiff bat *M. molossus*. The prevalence reported by Esslinger (1973) and Rutkowska (1980) was 27.9% (47/168) and 2.2% (2/90), respectively. The latter author found this filarioid in *Molossus major tropidorhynchus*; however, this is a synonym from *M. molossus* (Simmons, 2005). The Pallas's mastiff bat is distributed from Sinaloa and Coahuila (Mexico) to Peru, North Argentina, Paraguay, Uruguay, Brazil and Guianas, as well as the Caribbean Islands (Simmons, 2005). It seems that *L. molossi* could parasitize this host species along its distribution, as it can be found in faraway localities such as Colombia, Trinidad, and Argentina. This is a new locality record for *L. molossi*.

Litomosoides chandleri Esslinger, 1973

(Figs. 8–11; Tables I, III)

Diagnosis: Adult worms small, females twice as long as males. Cephalic extremity rounded. In apical view, 4 labial papillae forming a rectangle stretched dorsoventrally; 2 subventral cephalic papillae. Buccal capsule thick, with 1 conspicuous ring at mid-length; buccal cavity wide (Fig. 8). Cuticle with lateral punctuations distributed on the posterior extremity of the body in both sexes (Figs. 10, 11). Vulva generally located closely posterior to the level of the esophagus–intestine junction. Male tail with 2 to 3 asymmetrical cloacal papillae; left spicule with an anterior handle and a blade constituted by 2 cuticularized rodlike structures in the proximal half and a filament in the distal half; right spicule with a terminal cap and prominent heel not strongly cuticularized. Area rugosa begins anterior to

cloaca, composed of transverse ridges of small longitudinal crests. Microfilariae cylindrical, attenuated at extremity, with sheath closely applied to the body; nuclei extending to the tip of tail; terminal nucleus spheroid.

Taxonomic summary

Host: *A. planirostris* (Spix), *S. lilium* (E. Geoffroy), *Sturnira erythromos* (Tschudi), *Sturnira oporaphilum* (Tschudi), and *Eumops perotis* (Schinz).

Localities: See the Appendix for details on the localities.

Site of infection: Thoracic and abdominal cavities.

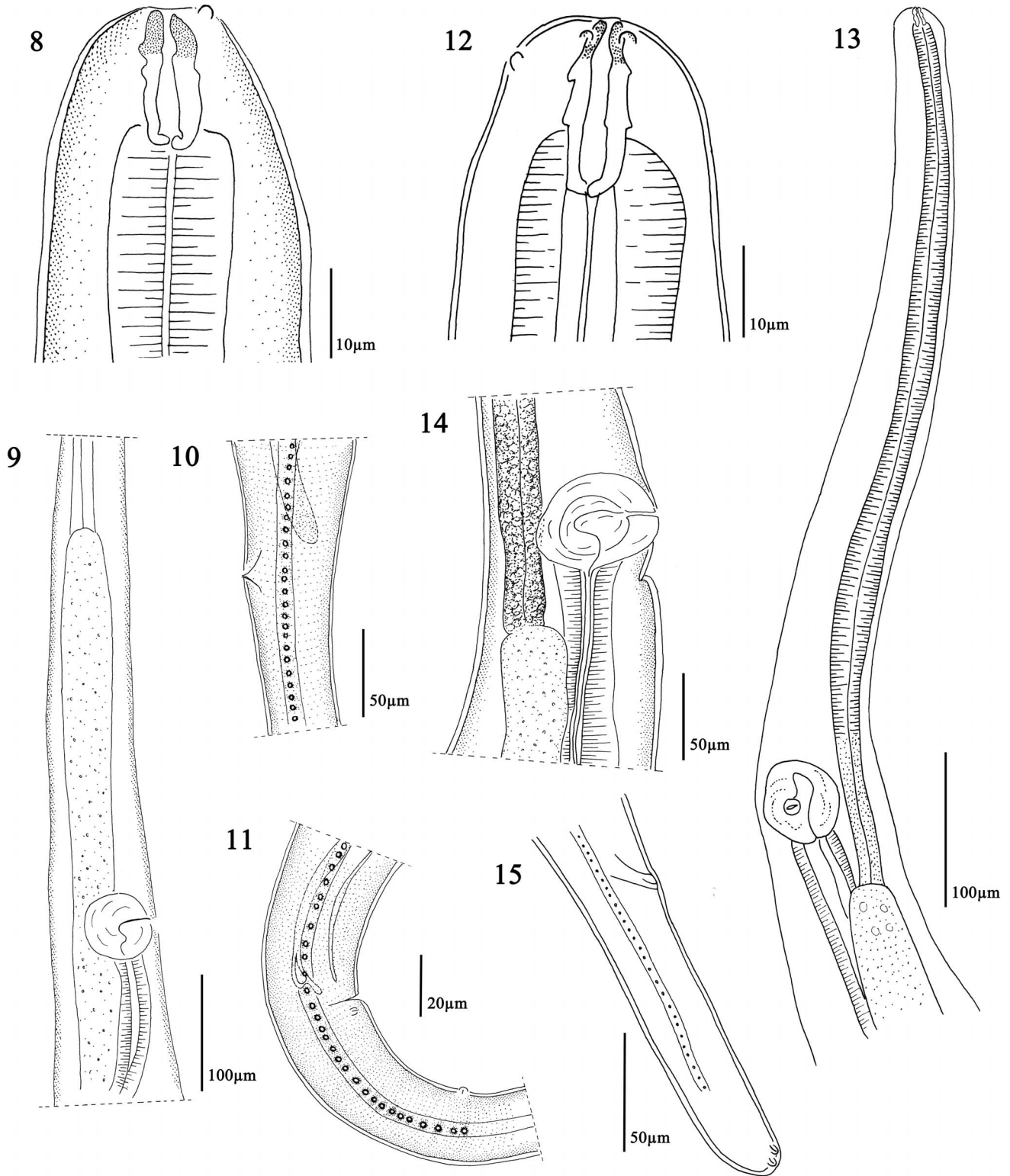
Vouchers: See the Appendix for details of collection numbers.

Prevalence and mean intensity: 13 of 186 *A. planirostris* (6.9%); 5.2 filarioids per host (1–15); 27 of 373 *S. lilium* (7.2%); 1.5 filarioids per host (1–6); 25 of 105 *S. erythromos* (23.8%); 1.7 filarioids per host (1–4); 6 of 9 *S. oporaphilum* (66.6%); 2.3 filarioids per host (1–6); and 1 of 2 *E. perotis*; 2 filarioids.

Remarks

Table III provides the measurements of the specimens harbored in the 5 species of bats. They were identified as *L. chandleri* by the thick buccal capsule with a conspicuous ring at mid-length; presence of 2 large subventral cephalic papillae (see Guerrero et al., 2002); vulva situated in the region of the esophagus–intestine junction; 2 pairs of asymmetric cloacal papillae; by the lateral punctuations of the cuticle in the posterior extremity in both males and females; by the shape of the spicules; and by the similar measurements (Esslinger, 1973; Guerrero et al., 2002).

We found that 1 specimen presented a longer esophagus (800 µm), whereas the others were around 500 µm long, in agreement with that stated by other authors (Esslinger, 1973; Guerrero et al., 2002; Notarnicola, et al., 2010). Esslinger (1973) mentioned that the position of the vulva is in the region of the esophagus–intestine junction, either anterior or posterior for *Artibeus jamaicensis*, whereas Rutkowska (1980) and Guerrero et al. (2002) stated that the vulva is closely posterior to the esophagus–intestine junction. Notarnicola et al. (2010) reported the position of the vulva posterior in *S. oporaphilum* specimens. Herein, female worms parasitizing *S. lilium*, *S. erythromos*, *S. oporaphilum*, and *E. perotis* exhibited a vulva posterior to the esophagus–intestine junction (see Fig. 9), whereas those parasitizing *A. planirostris* were anterior (n = 3), with the exception of 1 being at the same level of the esophagus–intestine junction.



FIGURES 8–15. *Litomosoides chandleri* and *Litomosoides saltensis* n. sp. (8–11) *Litomosoides chandleri*. (8) Detail of buccal capsule, lateral view from *Eumops perotis*. (9) Anterior region showing the position of the vulva posterior to the esophagus–intestine junction from *Eumops perotis*. (10) Lateral punctuation near anus in a female from *Artibeus planirostris*. (11) Lateral punctuation at the cloaca in a male from *Sturnira erythromos*. (12–15) *Litomosoides saltensis* n. sp. (12) Detail of buccal capsule, lateral view. (13) Anterior region showing the esophagus–intestine junction and the position of the vulva, ventral view. (14) Detailed vulva, lateral view. (15) Female tail with punctuations, lateral view.

TABLE III. Measurements of males and females of *Litomosoides chandleri* parasitizing 5 species of bats in northern Argentina.

Host species	<i>Sturnira oporaphilum</i>	<i>Sturnira erythromos</i>	<i>Sturnira lilium</i>	<i>Artibeus planirostris</i>	<i>Eumops perotis</i>
Males	(n = 4)	(n = 3)	(n = 6)	(n = 4)	—
Body length (mm)	11.47 (9.2–13.2)	10.2; 8.4; 8.1	9.08 (7.55–11.8)	10.27 (6.8–13.4)	—
Body width	104 (77–120)	105; 187; 129	107 (98–119)	122 (100–139)	—
Buccal capsule length	20 (19–21)	19; 15; 15	15.5 (14–17)	14.8 (13–17)	—
Esophagus	415 (370–460)	520; 792; 369	464 (372–752)	445 (312–552)	—
Tail	99 (86–120)	124 (108–140)*	101.5 (91–113)	106 (82–124)	—
Left spicule	229 (203–251)	221 (211–240)*	211.8 (187–261)	184 (144–237)	—
Handle	124 (110–150)	119 (105–131)*	117.8 (98–129)	86.2 (60–115)	—
Right spicule	60 (53–68)	56 (48–60)	58 (53–65)	51.2 (48–56)	—
Spicular ratio	3.8 (3.5–4.3)	3.9 (3.7–4.3)	3.6 (2.5–4.7)	3.6 (2.5–4.7)	—
Females	(n = 3)	(n = 6)	(n = 4)	(n = 4)	(n = 1)
Body length (mm)	28.4; 22; 27.3	15.4 (12.9–17.7)	21 (15.2–28.2)	21.3 (17.5–24.7)	16.44
Body width	265; 346; 244	167.5 (130–237)	225.3 (178–280)	181 (163–211)	163
Buccal capsule length	20; 17; 20	19 (17–24)	16.7 (15–20)	17.1 (16–19)	17
Esophagus	545; 456; 521	458.8 (420–480)	464.4 (430–482)	668.8 (570–800)	450
Tail	280; 235; 253	287.4 (257–379)	244 (237–250)	310.2 (198–403)	190
Vulva to apex	740; 744; 701	704.2 (648–758)	675.6 (560–740)	577.1 (543–602)†	815
Microfilaria length (n = 4)	59.4 (55–62.5)	62.2 (61–64)	56.2 (55–57.5)	56.5 (55–60)	—

* n = 4.

† Three specimens with the vulva located anterior to the esophagus–intestine junction and 1 at the same level.

Litomosoides chandleri has been reported in phyllostomid bats from Colombia (Esslinger, 1973; Cuartas-Calle and Muñoz-Arango, 1999), Venezuela, French Guiana, Peru (Guerrero et al., 2002), and Bolivia (Notarnicola et al., 2010), and in the intestine of the molossid *Nyctinomops laticaudatus* (E. Geoffroy, 1805) from Cuba (Rutkowska, 1980). Herein, we increase the host record for the phyllostomids *S. lilium* and *S. erythromos*, and the molossid *E. perotis*. Argentina represents a new country for this filarioid.

***Litomosoides saltensis* Ovido and Notarnicola**
(Figs. 12–15; Table I)

Diagnosis and measurements: Body length 14.24 mm; maximum width 150; width at vulva 85; at level of the esophagus–intestine junction 90. Anterior extremity rounded, with 4 labial and 2 ventral cephalic papillae; visible amphids. Buccal capsule thick, with an anterior segment transparent, 19 long and 9 wide; posterior segment well cuticularized possessing 2 thickenings in the anterior half (Fig. 12). Nerve ring not visible. Esophagus 585 long with a glandular posterior part slightly differentiated from the muscular part. Vulva globular 60 × 60, located anterior to the esophagus–intestine junction (Figs. 13, 14); vagina 550 from the anterior extremity. In lateral view, cuticle with lateral punctuations in the posterior extremity of the body (Fig. 15). Tail 139 long, attenuated and rounded at tip, with salient phasmids (Fig. 15). No microfilariae were observed in the uterus.

Taxonomic summary

Host: *Eptesicus furinalis* (d’Orbigny), CML 10243.
Locality: Finca El Carmen (owner Daniel Lutaif), *Eucalyptus* forest (23°06’S, 64°15’W; 396 m asl), Departamento Orán, Salta, Argentina.
Site of infection: Thoracic cavity.
Voucher: MLP-he 6827.
Prevalence and intensity: One of 56 hosts (1.78%); 1 filarioid.
Etymology: The species is named after the province Salta.

Remarks

According to the morphological characters, this female can be separated from those of *Litomosoides hamletti*; *Litomosoides leonilavasquezae* Caballero, 1939; *Litomosoides fosteri* Caballero, 1947; *Litomosoides teshi* Esslinger, 1973; *Litomosoides brasiliensis* Lins de Almeida, 1936; *Litomosoides artibeus* Esslinger, 1973; *Litomosoides solarii* Guerrero, Martin, Gardner, and Bain, 2002; and *Litomosoides salazari* Notarnicola,

Jimenez, and Gardner, 2010 by the presence of lateral punctuations, absent in all these species (Caballero, 1939, 1947; Esslinger, 1973; Guerrero et al., 2002, 2003; Notarnicola et al., 2010).

The female of *L. saltensis* n. sp. most closely resembles *L. chandleri*, *L. molossi*, *L. chitwoodi*, and *L. yutajensis* by the presence of lateral punctuations and the body size. However, the new species differs from *L. chandleri* by the shape of the buccal capsule; by possessing a thinner buccal cavity; a shorter tail (139 µm vs. a mean of 215 µm); and the presence of conspicuous phasmids (Esslinger, 1973). *Litomosoides saltensis* n. sp. differs from *L. molossi* by the presence of 2 ventral cephalic papillae instead of a dorsal one; by a thicker buccal capsule (8 µm vs. a mean of 4.6); and a longer tail (139 µm vs. a mean of 113 µm) (Esslinger, 1973; present study); from *L. chitwoodi* differs by the size of the buccal capsule (19 µm vs. 12 µm); and the position of the vulva at the level of the esophagus instead of posterior to the esophagus–intestine junction (Chitwood, 1938; Bain et al., 2003); and from *L. yutajensis* differs by the absence of 2 median bosses on the head covered with tiny rugosities; and by the position of the vulva at the level of the esophagus instead of at the mid-length of the esophagus (Guerrero et al., 2003). The new species can also be differentiated from *Litomosoides guiterasi* (Pérez Viguera, 1934), a parasite from *Artibeus jamaicensis parvipes* Renn from Cuba, by possessing females with a shorter body (14.24 mm vs. 24 mm); a longer esophagus; and a longer buccal capsule (19 µm vs. 13 µm, as stated Bain et al., 2003).

Key to the species of *Litomosoides* from bats on the basis of female and uterine microfilaria characters

The present key includes 15 of 17 species of *Litomosoides*. *Litomosoides colombiensis* Esslinger, 1973 and *Litomosoides caliensis* Esslinger, 1973 were not included because they were described only by their blood microfilariae. Mean measurements were estimated on the basis of all data available.

- 1a. Buccal capsule less than 33 µm long 2
- 1b. Buccal capsule 34 µm long *L. artibeus*
- 2a. Mean body length more than 68 mm 3
- 2b. Mean body length less than 55 mm 5
- 3a. Cuticle with anastomosing of transverse striae at the level of the lateral hypodermic chords *L. teshi*
- 3b. Cuticle without the above character 4

- 4a. Cuticularized segment of the buccal capsule with 2 rings, 1 small anterior and 1 larger posterior..... *L. brasiliensis*
 4b. Cuticularized segment of the buccal capsule with 1 ring at the apex of the esophagus..... *L. serpicula*
 5a. Mean body length ranging from 40 to 55 mm..... 6
 5b. Mean body length less than 20 mm..... 10
 6a. Cuticular lateral punctuations present..... *L. yutajensis*
 6b. Cuticular lateral punctuations absent..... 7
 7a. Vulva located far posterior to the esophagus–intestine junction... 8
 7b. Vulva located anterior or in the region of the esophagus–intestine junction..... 9
 8a. Buccal capsule slender, 19 µm long by 4 µm wide..... *L. fosteri*
 8b. Buccal capsule thick, 16 µm long by 6 µm wide.....
 *L. leonilavasquezae*
 9a. Tail ratio 5.2. Uterine microfilaria with posterior extremity abruptly attenuated to a sharp point..... *L. solari*
 9b. Tail ratio from 2.3 to 2.7. Uterine microfilaria attenuated in both extremities..... *L. hamletti*
 10a. Lateral cuticular punctuations present..... 11
 10b. Lateral cuticular punctuations absent. Buccal capsule arrow shaped..... *L. salazari*
 11a. Vulva located well posterior to the esophagus–intestine junction..... 12
 11b. Vulva located in the region of the esophagus–intestine junction..... 13
 12a. Buccal capsule with thickenings in the anterior third and a mean of 18 µm long..... *L. molossi*
 12b. Buccal capsule thick with irregular external walls, 12 µm long..... *L. chitwoodi*
 13a. Buccal cavity thin. Tail 139 µm long with notorious phasmids..... *L. saltensis*
 13b. Buccal cavity thick. Tail with no salient phasmids, mean of 243 µm long..... *L. chandleri*; *L. guiterasi*

Key to the *Litomosoides* species from bats on the basis of male characters

The key includes 11 of 17 species. In the remaining 6 species, males were unknown.

- 1a. Mean body length more than 40 mm (range 26–65 mm)..... 2
 1b. Mean body length less than 39 mm..... 3
 2a. Cuticularized segment of the buccal capsule with 2 rings, 1 small anterior and 1 larger posterior. Esophagus length more than a mean of 600 µm..... *L. brasiliensis*
 2b. Cuticularized segment of the buccal capsule with 1 ring at the apex of the esophagus. Length of the esophagus more than 566 µm..... *L. serpicula*
 3a. Mean body length less than 9.7 mm..... 4
 3b. Mean body length from 16 to 24 mm..... 6
 4a. Buccal capsule arrow shaped..... *L. salazari*
 4b. Buccal capsule without the above character..... 5
 5a. Presence of 1 dorsal cephalic papilla. Buccal capsule slender, posterior segment with 2 thickenings in the first third. Buccal cavity thin. Spicular ratio 2.7..... *L. molossi*
 5b. Presence of 2 ventral cephalic papillae. Buccal capsule thick, with 1 conspicuous ring at mid-length. Buccal cavity wide. Spicular ratio 3.3 to 3.6..... *L. chandleri*; *L. guiterasi*
 6a. Head with 2 median bosses covered with tiny rugosities..... *L. yutajensis*
 6b. Head without the above character..... 7
 7a. Cuticle with anastomosing of transverse striae at the level of the lateral hypodermic chords. Buccal capsule with irregular external walls and marked protuberance on dorsal wall..... *L. teshi*
 7b. Cuticle without the above character. Buccal capsule thin..... 8
 8a. Tail long with 8 pairs of cloacal papillae. Spicular ratio 4.8...
 *L. fosteri*
 8b. Tail short with 2 to 4 pairs of cloacal papillae. Spicular ratio 2.6 to 2.9..... 9
 9a. Buccal capsule thin, with a ring at midway. Generally 2 pairs of cloacal papillae..... *L. hamletti*
 9b. Buccal capsule with irregular external walls. Generally with 1 pair of ad-cloacal papillae and 3 pairs of postcloacal papillae..... *L. leonilavasquezae*

DISCUSSION

In this study we increased the known bat hosts for *L. chandleri*; enlarged the geographical distribution for both species, *L. chandleri* and *L. molossi*; and recorded for the first time a new species, *L. saltensis* n. sp., from the vespertilionid *Eptesicus furinalis*.

The key presented above shows that males and females from *L. guiterasi* and *L. chandleri* are indistinguishable. Specimens described by Pérez Viguera (1934) parasitizing *A. jamaicensis parvipes* Renn from Cuba are unique, corresponding to *L. guiterasi*. The specimens mentioned under *L. guiterasi* by Rego (1961), Esslinger (1973), and Guerrero et al. (2002) correspond to *L. hamletti* (Bain et al., 2003). Cuartas-Calle and Muñoz-Arango (1999) also reported *L. guiterasi* parasitizing *A. jamaicensis* Leach, *Glossophaga soricina* Pallas, and *Lonchophylla robusta* Miller from Colombia. However, according to the measurements given by these authors in table 3 and the figures H to L from their paper (Cuartas-Calle and Muñoz-Arango, 1999), the specimens correspond to *Litomosoides hamletti*. Similarly, the specimens mentioned by Rutkowska (1980) parasitizing *Eptesicus fuscus dutertrei* P. Gervais from Cuba also correspond to *L. hamletti*. Both authors, Cuartas-Calle and Muñoz-Arango (1999) and Rutkowska (1980), indicated the presence of *L. chandleri* parasitizing other bats as well, confirming that they could distinguish *L. chandleri* with a thick buccal capsule from *L. hamletti* (mentioned as *L. guiterasi*) with a slender buccal capsule.

As stated Bain et al. (2003), the description of *L. guiterasi* is insufficient and some characters were misinterpreted (i.e., anus subterminal in females). We agree with Bain et al. (2003) in that *L. chandleri*, *L. guiterasi*, and *L. chitwoodi* are related species since they are all parasites of *A. jamaicensis*. Moreover, measurements of the male and the female of *L. guiterasi* fit with the range measurements given for *L. chandleri* by Esslinger (1973), Guerrero et al. (2002), Notarnicola et al. (2010), and the present study, suggesting it could be a synonymous species; whereas the female of *L. chitwoodi* was revised by Esslinger (1973) and is considered different from *L. chandleri*. Until the original materials are revised, this dilemma will not be solved.

Long-term studies and large sample sizes are needed to detect the presence of filarioids in bats. As an example, Esslinger (1973) examined more than 500 specimens of bats belonging to 17 species included in 13 genera, and only 7 host species were parasitized by 8 *Litomosoides* species, with a prevalence ranging from 1.78% for *L. colombiensis* to 27.9% for *L. molossi*. Similarly, in extensive fieldwork conducted in Bolivia from 1984 to 2000, Notarnicola et al. (2010) examined more than 600 specimens of bats corresponding to 29 species, and reported 4 species of *Litomosoides* with low prevalence. In the present study, we have a larger sample size and a greater taxonomic coverage (1,304 specimens of bats corresponding to 35 different species), and the prevalence ranged from 1.78 to 66.6% (see also Oviedo, 2013). In contrast, *Litomosoides* species parasitizing cricetid rodents seem to be more frequently collected than those from bats and marsupials (Esslinger, 1973; Forrester and Kinsella, 1973; Moraes Neto and Lanfredi, 1998; Notarnicola, 2004).

Life cycles of *Litomosoides* have been elucidated for only 6 species, 3 from rodents (Scott et al., 1951; Bain et al., 1980; Diagne et al., 1989), 2 from bats (Bain et al., 2002; Guerrero et al., 2006), and 1 from marsupials (Bain et al., 1980). For all of them

the experimental vector used was the mite *Ornithonyssus bacoti* (Hirst, 1913) (Macronyssidae). In Argentina, the arthropod ectoparasites of bats, mainly bat flies, are relatively well known (Autino et al., 1999; Autino and Claps, 2000). In contrast, the acarine fauna—ticks and mites—in bats remain undocumented, with the exception of *Ornithodoros hasei* (Schulze, 1935) reported in *Molossops temminckii*, *Myotis albescens* (E. Geoffroy, 1806), and *Histiotus laephotis* Thomas, 1916 in the Yungas (Nava et al., 2007). More studies on bats are necessary to elucidate the biodiversity of their parasites, as well as to provide a better understanding of the host–parasite associations in Argentina, thus contributing to the knowledge of the biological diversity of Argentinean mammals.

ACKNOWLEDGMENTS

This study is part of M.C.O.'s Ph.D. thesis. The authors express their gratitude to Marcos Mollerach, Pablo Jayat, Jorge Martínez Crippa, Cristian Amún, Noelia Saracho Bottero, and Alejandro Osorez for their assistance in field trips; to the curators Rubén Báñez from CML and David Flores from MACN for the accessibility to the viscera from the material deposited; and to Maria Cristina Estivariz, from CEPAVE, for the scientific illustration. Special thanks to Scott L. Gardner for his critical comments on an early version of the manuscript, and to the anonymous reviewers. Funded provided from Consejo de Investigaciones de la Universidad Nacional de Tucumán and the Universidad Autónoma de Entre Ríos (Diamante) to M.C.O. and L.C. J.N. is member of CONICET.

LITERATURE CITED

- AUTINO, A. G., AND G. L. CLAPS. 2000. Catalogue of the ectoparasitic insects of the bats of Argentina. *Insecta Mundi* **14**: 193–209.
- AUTINO, A. G., G. L. CLAPS, AND R. M. BARQUEZ. 1999. Insectos ectoparasitos de murciélagos de las yungas de la Argentina. *Acta Zoológica Mexicana* **78**: 119–169.
- BAIN, O., S. BABAYAN, J. GOMES, AND R. GUERRERO. 2002. First account of the larval biology of a *Litomosoides* filaria, from a bat. *Parassitologia* **44**: 89–92.
- BAIN, O., R. GUERRERO, B. RODRIGUEZ, S. BABAYAN, AND N. JOUENET. 2003. Examination of the type material of two species of *Litomosoides* (Filarioidea: Onchocercidae), parasites from bats; taxonomic consequences. *Parasite* **10**: 211–218.
- BAIN, O., G. PETIT, AND S. BERTEAUX. 1980. Description de deux nouvelles Filaires du genre *Litomosoides* et de leurs stades infestants. *Annales de Parasitologie Humaine et Comparée* **55**: 225–237.
- BARQUEZ, R. M. 2006. Chiroptera. *In* Los mamíferos de Argentina. Sistemática y distribución, R. Barquez, M. M. Díaz, and R. Ojeda (eds.). SAREM, Tucumán, Argentina, p. 57–86.
- CABALLERO, C. 1939. A new filariid from Mexican bats. *Transactions of the American Microscopical Society* **58**: 4–7.
- CABALLERO, C. 1947. Algunas filarias de mamíferos y de reptiles de las Repúblicas de Colombia y Panamá. *Anuales del Instituto de Biología de México* **18**: 169–188.
- CABRERA, A. L., AND A. WILLINK. 1973. Biogeografía de América Latina. Monografía 13. Serie de Biología. Secretaría General de la Organización de los Estados Americanos, Washington, D.C., 120 p.
- CHITWOOD, B. G. 1938. Some nematodes from the caves of Yucatan. *Carnegie Institution of Washington Publications* **491**: 51–66.
- CUARTAS-CALLE, C., AND J. MUÑOZ-ARANGO. 1999. Nematodos en la cavidad abdominal y tracto digestivo de algunos murciélagos colombianos. *Caldasia* **21**: 10–25.
- DIAGNE, M., G. PETIT, C. SEUREAU, AND O. BAIN. 1989. Développement de la filaire *Litomosoides galizai* chez l'acarien vecteur. *Annales de Parasitologie Humaine et Comparée* **64**: 478–488.
- DÍAZ, M. M., L. F. AGUIRRE, AND R. M. BARQUEZ. 2011. Clave de identificación de los murciélagos del cono sur de Sudamérica. *Centro de Estudios en Biología Teórica y Aplicada, Cochabamba, Bolivia*, 94 p.
- ESSLINGER, J. H. 1973. The genus *Litomosoides* Chandler, 1931 (Filarioidea: Onchocercidae) in Colombian bats and rats. *Journal of Parasitology* **59**: 225–246.
- FORRESTER, D. J., AND J. M. KINSELLA. 1973. Comparative morphology and ecology of two species of *Litomosoides* (Nematoda: Filarioidea) of rodents in Florida, with a key to the species of *Litomosoides* Chandler, 1931. *International Journal for Parasitology* **3**: 255–263.
- GUERRERO, R., AND O. BAIN. 2011. Study of types of some species of “*Filaria*” (Nematoda) parasites of small mammals described by von Linstow and Molin. *Parasite* **18**: 151–161.
- GUERRERO, R., O. BAIN, T. ATTOUT, AND C. MARTIN. 2006. Infective larva of *Litomosoides yutajensis* Guerrero et al., 2003 (Nematoda: Onchocercidae), a *Wolbachia*-free filaria from bat. *Parasite* **13**: 127–130.
- GUERRERO, R., C. MARTIN, AND O. BAIN. 2003. *Litomosoides yutajensis* n. sp., first record of this filarial genus in a mormoopid bat. *Parasite* **10**: 219–225.
- GUERRERO, R., C. MARTIN, S. L. GARDNER, AND O. BAIN. 2002. New and known species of *Litomosoides* (Nematoda: Filarioidea): Important adult and larval characters and taxonomic changes. *Comparative Parasitology* **69**: 177–195.
- LUNASCHI, L. I. 2002. Tremátodos Lecithodendriidae y Aeneterotrematidae de Argentina, México y Brasil. *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Serie Zoológica* **73**: 1–10.
- LUNASCHI, L. I. 2004. Redescrición de *Limatuloides limatulus* (Braun) Dubois, 1964 (Trematoda, Lecithodendriidae), un parásito de *Tadarida brasiliensis* (Geof.) (Chiroptera, Molossidae) de Argentina. *Gayana* **68**: 102–107.
- LUNASCHI, L. I. 2006. Redescrición y reubicación sistemática del trematodo *Topsiturvitrema verticalia* (Trematoda: Digenea) en una familia nueva. *Revista de Biología Tropical* **54**: 1041–1045.
- LUNASCHI, L. I., AND J. NOTARNICOLA. 2010. New host records for Aeneterotrematidae, Lecithodendriidae and Urotrematidae digenans in bats from Argentina, with the redescription of *Aeneterotrema liliputianum*. *Revista Mexicana de Biodiversidad* **81**: 281–287.
- LUNASCHI, L. I., M. URRIZA, AND V. H. MERLO ALVAREZ. 2003. *Limatum oklahomense* Macy, 1932 in *Myotis nigricans* (Chiroptera) from Argentina and a redescription of *L. umbilicatum* (Vélez et Thatcher, 1991) comb. nov. (Digenea, Lecithodendriidae). *Acta Parasitologica* **48**: 172–175.
- MORAES NETO, A. H. A., AND R. M. LANFREDI. 1998. Prevalence of two species of *Litomosoides* (Nematoda: Filarioidea) parasites of *Akodon cursor* (Rodentia: Muridae) from southeastern Brazil. *Revista Brasileira de Biología* **57**: 579–582.
- NAVA, S., J. M. VENZAL, M. M. DÍAZ, A. J. MANGOLD, AND A. A. GUGLIELMONE. 2007. The *Ornithodoros hasei* (Schulze, 1935) (Acari: Argasidae) species group in Argentina. *Systematic and Applied Acarology* **12**: 27–30.
- NOTARNICOLA, J. 2004. Taxonomía y biología de las filarias de animales silvestres y de importancia sanitaria en la República Argentina. Ph.D. Thesis. FCNyM-UNLP, La Plata, Buenos Aires, Argentina, 187 p. Available <http://sedici.unlp.edu.ar?id=arg-unlp-tpg-0000000080>.
- NOTARNICOLA, J. 2005. Description of adult and fourth-stage larva of *Litomosoides navonae* n. sp. (Nematoda: Onchocercidae), a parasite of five species of sigmodontine rodents from northeastern Argentina. *Systematic Parasitology* **62**: 171–183.
- NOTARNICOLA, J., O. BAIN, AND G. T. NAVONE. 2000. Two new species of *Litomosoides* (Nematoda: Filarioidea) in sigmodontines (Rodentia: Muridae) from Rio de La Plata marshland, Argentina. *Journal of Parasitology* **86**: 1318–1325.
- NOTARNICOLA, J., O. BAIN, AND G. T. NAVONE. 2002. *Litomosoides anguyai* n. sp. (Nematoda: Onchocercidae) from *Oxymycterus misionalis* (Rodentia: Muridae) in the rain forest of Misiones, Argentina. *Systematic Parasitology* **52**: 129–135.
- NOTARNICOLA, J., F. A. JIMÉNEZ-RUIZ, AND S. L. GARDNER. 2010. *Litomosoides* (Nematoda: Filarioidea) of bats from Bolivia with records for 3 known species and the description of a new species. *Journal of Parasitology* **96**: 775–782.
- NOTARNICOLA, J., F. A. JIMÉNEZ-RUIZ, AND S. L. GARDNER. 2012. Filarioids of rodents from Bolivia: A new species of *Molinema* and definition of *Litomosoides esslingeri* Bain, Petit and Diagni, 1989. *Journal of Parasitology* **98**: 1200–1208.
- NOTARNICOLA, J., AND G. T. NAVONE. 2002. A new species *Litomosoides odilae* n. sp. (Nematoda: Onchocercidae) from *Oligoryzomys nigripes* (Rodentia: Muridae) in the rain forest of Misiones, Argentina. *Journal of Parasitology* **88**: 967–971.

- NOTARNICOLA, J., AND G. T. NAVONE. 2011. *Litomosoides pardinasi* n. sp. (Nematoda: Onchocercidae) from two species of cricetid rodents in Northern Patagonia, Argentina. *Parasitology Research* **108**: 187–194.
- OVIEDO, M. C. 2013. Biología y sistemática de nematodos parásitos de quirópteros de las Yungas de la Argentina. Ph.D. Thesis. Universidad Nacional de Tucumán, Tucumán, Argentina, 408 p.
- OVIEDO, M. C., G. RAMALLO, AND L. E. CLAPS. 2010. Una especie nueva de *Cheiropteronea* (Nematoda: Molineidae) en *Artibeus planirostris* (Chiroptera: Phyllostomidae) en la Argentina. *Iheringia* **100**: 242–246.
- OVIEDO, M. C., G. RAMALLO, L. E. CLAPS, AND M. D. MIOTTI. 2012. A new species of *Biacantha* (Nematoda: Molineidae), a parasite of the common vampire bat from the Yungas, Argentina. *Journal of Parasitology* **98**: 1209–1215.
- PÉREZ VIGUERAS, I. 1934. Notas sobre las especies de Filarioidea (Nematoda) encontradas en Cuba. *Memorias de la Sociedad Cubana de Historia Natural Felipe Poy* **8**: 55–60.
- REGO, A. A. 1961. Sobre algunas especies do genero *Litomosoides* Chandler, 1931 (Nematoda: Filarioidea). *Memorias do Instituto Oswaldo Cruz* **59**: 1–9.
- RUTKOWSKA, M. A. 1980. The helminthofauna of bats (Chiroptera) from Cuba. I. A review of nematodes and acanthocephalans. *Acta Parasitologica Polonica* **26**: 153–186.
- SCOTT, J. A., E. M. McDONALD, AND B. A. TERMAN. 1951. Description of the stages in the life cycle of the filarial worm *Litomosoides carinii*. *Journal of Parasitology* **37**: 425–432.
- SIMMONS, N. B. 2005. Order Chiroptera. In *Mammal species of the world: A taxonomic and geographic reference*, 3rd ed., Vol. 1, D. E. Wilson and D. M. Reeder (eds.). Johns Hopkins University Press, Baltimore, Maryland, p. 312–529.
- VACHER, C., AND M. C. DURETTE-DESSET. 1980. *Allintoshius baudi* n. sp. (Nematoda: Trichostrongyloidea) parasite du Murin *Myotis aelleni* Baud, 1979 et redescription de *A. tadaridae* (Caballero, 1942). *Revue Suisse Zoologie* **86**: 267–278.

APPENDIX 1. Detailed data of *Litomosoides chandleri*. We give the host species, collection number of filaroid specimens, host collection numbers, and locality data. Colección Helminológica Fundación Miguel Lillo (CH-FML); Colección de Helminos Museo de La Plata (MLP-He); Mammal Collection of the Museo de Ciencias Naturales Dr. Bernardino Rivadavia (MACN); Colección Mamíferos Lillo (CML), San Miguel de Tucumán, Tucumán, Argentina. The acronyms used for field numbers from host specimens are MDM, María Daniela Miotto; MO, Mirna Ovidio; RTS, Rita Tatiana Sánchez.

Host species	Helminthological collection no.	Mammal collection no.	Locality	Department	Province	Coordinates and altitude
<i>Artibeus planirostris</i>	CH-FML 7568	CML 10248	Finca El Carmen (owner Daniel Lutai), in the Eucalyptus forest	Orán	Salta	23°06'S, 64°15'W; m above sea level (asl) 396
	CH-FML 7573	CML 4216	Las Capillas River	General Manuel Belgrano	Jujuy	24°05'S, 65°10'W; m asl 1,166
	CH-FML 7571	CML 8643	Zapla, Parque Provincial Serranías del Zapla, over Zapla River	Palpalá	Tucumán	24°15'S, 65°7'W; m asl 1,000
	CH-FML 7569	CML 8573, 8625, 8717, 8559, 8618, 8620, 8694	El Siambón, over Grande River	Tafi Viejo	Tucumán	26°46'S, 65°28'W; m asl 909
	CH-FML 7572	CML 8737				
	MLP- He 7110	CML 8660				
	MLP- He 7106	CML 8733				
	CH-FML 7567	CML 10177, 10184, 10185	Campo Largo, route 54, km 74.5	General José de San Martín	Salta	22°1'S, 63°55'W; m asl 684
	CH-FML 7566	CML 10503, 10504	Finca Río Seco, 37 km to the NNE of Embarcación			22°52'S, 64°2'W; m asl 454
	MO 356	CML 10432	On Seco River approximately 20 km by road, WNW of Vespuccio			22°32'S, 64°0'W; m asl 536
<i>Sturnira oporophillum</i>	MLP- He 7104	MACN 16404	Aguas Blancas, Ayaxardal ford	Orán		
	CH-FML 7564	CML 10516, 10522, 10529, 10537, 10539	Finca Alto Verde			22°13'S, 64°32'W; m asl 670
	MLP- He 7108	CML 10519				
	CH-FML 7565	CML 10402, 10408, 10410	Finca El Carmen (owner Daniel Lutai), in the Eucalyptus forest	Ledesma	Jujuy	23°6'S, 64°15'W; m asl 396
	CH-FML 7562	CML 10341, 10354, 10355, 10357, 10358, 10360	Finca Sauzalito, approximately 1 km to the E of the crossing between route 34 and Yuto Creek			23°39'S, 64°32'W; m asl 413
	CH-FML 7563	CML 10268, 10381, 10383, 10386	On the crossing of route 34 and Yuto Creek			23°38'S, 64°32'W; m asl 410
	CH-FML 7561	CML 8726	El Siambón on Grande River	Tafi Viejo	Tucumán	26°46'S, 65°28'W; m asl 909
	CH-FML 7551	CML 10646	Campo Largo, route 54, km 12.5	General José de San Martín	Salta	22°19'S, 63°49'W; m asl 837
	CH-FML 7550	CML, 10648, 10650, 10652	Finca Alto Verde	Orán		22°13'S, 64°32'W; m asl 670
	MLP- He 7109	10647				
MLP- He 7105	10653					

APPENDIX 1. Continued.

Host species	Helminthological collection no.	Mammal collection no.	Locality	Department	Province	Coordinates and altitude
<i>Sturnira erythronos</i>	CH-FML 7554	CML 10273	Finca Falcón, near Seco River	General José de San Martín	Salta	22°18'S, 63°58'W; m asl 704
	MO 663	CML 10268	Between the crossing of route 34 and Yuto Creek	Ledesma	Jujuy	23°38'S, 64°32'W; m asl 410
	CH-FML 7557	CML 10296	Parque Provincial de Flora y Fauna La Florida,	Monteros	Tucumán	27°13'S, 65°37'W; m asl 441
	MLP- He 7111	CML 10295	camping near the dam			
	CH-FML 7556	CML 10300	Water taking Los Reales, approximately 8 km from Pueblo Viejo			27°6'S, 65°46'W; m asl 1065
	CH-FML 7555	CML 10278, 10279, 10280, 10284, 10286, 10287, 10293	Approximately 10 km to the NNW of Potrero de las Tablas	Lules		26°50'S, 65°27'W; m asl 900
	CH-FML 7559	CML 8557, 8558, 8584	El Siambón, over Grande River	Tafi Viejo		26°46'S, 65°28'W; m asl 909
	CH-FML 7558	CML 10330, 10332	Approximately 5 km of El Siambón, over Grande River			26°45'S, 65°28'W; m asl 967
	MLP- He 7107	CML 6615				
	CH-FML 7560	CML 10322, 10323, 10326	Horco Molle, Parque Biológico San Javier, over the Cañas River	Yerba Buena		26°46'S, 65°19'W; m asl 760
	CH-FML 7560	CML 10310, 10313, 10319, 10320	Over Las Piedras River			26°45'S, 65°19'W; m asl 750
<i>Eumops perotis</i>	CH-FML 7553	RTS 001	San Martín and Boulevard 9 de Julio streets	Yerba Buena	Tucumán	26°49'S, 65°17'W; m asl 476