



First report of nematode parasites of *Physalaemus santafecinus* (Anura: Leiuperidae) from Corrientes, Argentina

Primer registro de nematodos parásitos de *Physalaemus santafecinus* (Anura: Leiuperidae) de Corrientes, Argentina

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Resumen. Ciento ochenta y tres nematodos fueron recolectados de 81 adultos del leiupérido *Physalaemus santafecinus* examinados en Corrientes, Argentina y capturados entre enero del 2002 y diciembre del 2003. Estos nematodos pertenecen a un total de 4 especies, 3 en estado adulto: *Cosmocerca podicipinus*, *Cosmocerca parva*, *Aplectana hylambatis*, y 1 especie en estado larval, *Physaloptera* sp. Se presentan características morfológicas, información métrica e intervalos de medidas de estas especies de nematodos, comparándolas con ejemplares recolectados de diferentes hospederos de la región neotropical. Éste es el primer registro de nematodos parásitos para *P. santafecinus* de Argentina.

Palabras clave: anfibios, *Cosmocerca*, *Aplectana*, *Physaloptera*, región neotropical.

Abstract. One hundred and eighty-three nematodes were recovered from 81 adults of leiuperid *Physalaemus santafecinus* examined from Corrientes, Argentina captured between January 2002 and December 2003. A total of 3 adults nematode species (*Cosmocerca podicipinus*, *Cosmocerca parva*, *Aplectana hylambatis*) and 1 larval species (*Physaloptera* sp.) were obtained. We present morphological characters, metric information and range for these nematode species and compared these with other specimens collected from different hosts of the Neotropical Realm. This is the first report of nematode parasites of *P. santafecinus* from Argentina.

Key words: amphibians, *Cosmocerca*, *Aplectana*, *Physaloptera*, Neotropical Realm.

Introduction

Many studies in nematode parasites of amphibians have been recently conducted in the Neotropical Realm, including a description of new species or genus (González and Hamann, 2004, 2006a, 2007a; Bursey and Goldberg, 2007; Martínez-Salazar and León-Règagnon, 2007; Ramallo et al., 2007, 2008; Martínez-Salazar, 2008) as well as, checklists that summarize the diversity of these parasites in these vertebrate hosts (Bursey et al., 2001; González and Hamann, 2006b, 2007b, 2009; Goldberg et al., 2007; Goldberg and Bursey, 2008a, 2008b; Hamann et al., 2009). Despite the fact that many species of parasites are cited in a wide variety of hosts, there are few studies that deal with the morphological and metrical aspects of these nematodes.

The genus *Physalaemus* Fitzinger, 1826 is distributed in northern and central Argentina, eastern Bolivia, Paraguay, Uruguay, Brazil and the Guianas, the lowlands of southern Venezuela and plains of southeastern Colombia and western Ecuador (Frost, 2009).

Physalaemus santafecinus Barrio, 1965 is found in Argentina in the provinces of Corrientes and Santa Fe. It can survive in both dry and moist substrata, for example near the shore of temporary, semipermanent and permanent ponds, and also in flooded grass. It has a diet with a marked tendency toward the specialization in termites using active foraging as a strategy for prey capturing. It is common in natural environments, but it can also be found in agricultural areas (Duré, 1998; Duré et al., 2008).

The purpose of our study is to report for the first time nematode species that are found in *Physalaemus santafecinus* from Corrientes, Argentina. Morphometric information and studies of the surface of some of these nematodes is presented using scanning electron microscopy.

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Materials and methods

Samples of *Physalaemus santafecinus* (n= 81) were collected near the city of Corrientes, Province of Corrientes in Argentina (27°28'S, 58°50'W). We examined 28 males and 53 females of this species between January 2002 and December 2003.

Amphibians were transported live to the laboratory and sacrificed in a chloroform (CHCl₃) solution. At necropsy, hosts were sexed and the alimentary canal, lungs, liver, kidneys, urinary bladder, musculature and integument were examined for parasites by dissection. Nematodes were observed *in vivo*, counted and killed in hot distilled water and preserved in 70% ethyl alcohol, cleared in glycerine or lactophenol and examined as temporary mounts. Some specimens were studied by scanning electron microscopy (SEM). These specimens were dehydrated in ethanol series, dried using the critical point technique, coated with gold, and examined with a JSM-5800 scanning electron microscope. Measurements are given in micrometers (µm) unless otherwise stated, and the mean ± SD followed by range is given in parentheses. Prevalence and mean intensity were calculated according to Bush et al. (1997). The specimens studied were deposited in the Helminthological Collection of the Centro de Ecología Aplicada del Litoral, Corrientes, Argentina (CECOAL).

Descriptions

A total of 183 nematodes were collected from 81 anurans examined. We found 4 species of nematodes from 2 different families: Cosmoceridae: *Cosmocerca podicipinus* Baker and Vaucher, 1984, *Cosmocerca parva* Travassos, 1925 and *Aplectana hylambatis* (Baylis, 1927) Travassos, 1931 and, Physalopteridae: *Physaloptera* sp.

***Cosmocerca podicipinus* Baker and Vaucher, 1984** (Fig. 1)

Taxonomic summary

Prevalence, number of parasites, mean intensity: 30.9 % (25 of 81 amphibians infected), 52, 2.07 ± 1.57.

Sites of infection: lung, large intestine and small intestine.

Accession number: CECOAL 02112906 (1 male); 02113219 (1 male, 1 female); 02113215 (1 male); 02123263 (1 male); 02123286 (1 male, 2 females).

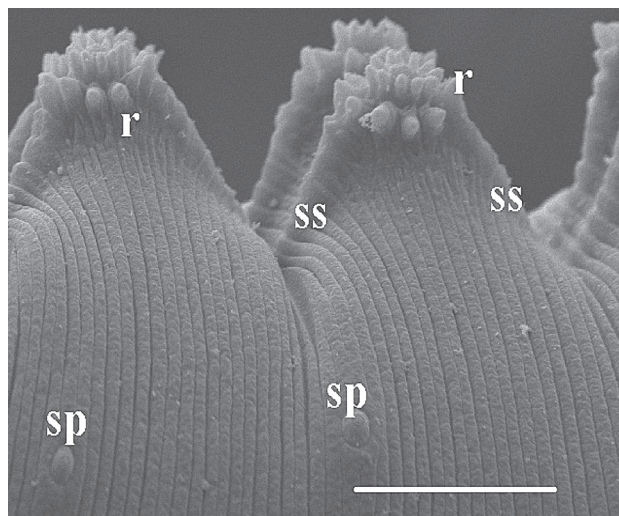


Figure 1. *Cosmocerca podicipinus*. Male, lateral view of plectanes; r: rosette punctations; ss: sclerotized supports; sp: somatic papillae. Scale bar: 50 µm.

The general morphology of these specimens is similar to that referred by González and Hamann (2006b, 2007b, 2008) from amphibian hosts from Corrientes, Argentina. The caudal region of the males of this species was extensively detailed for González and Hamann (2004). The metric characters of both sexes of this nematode species found parasitizing *P. santafecinus* are presented in Table 1.

Remarks

One of the most common characters used in the classification of species of the genus *Cosmocerca* is the number of pairs of plectanes in the caudal region of males (Baker and Vaucher, 1984) (see Table 2). It should be noted that in *C. podicipinus* the plectanes of each row are fused by sclerotized very marked. Within this study are presented details obtained with the scanning electron microscope of the mentioned structures. In lateral view, the plectanes and the sclerotized supports are presented like a row of crests, where the ends are occupied by the plectanes. Each plectane was formed by one interior complete rosette of 11-12 punctations and one exterior complete rosette of 12-15 punctations. Finally, adanal papillae are presented wider in the base and narrower in the upper limb.

The general metric characteristics of specimens of this species correspond to others specimens of the same species analyzed from others hosts of Corrientes, Argentina. Nevertheless, the body size of the females of this study is greater (4.27-7.8 mm) than the found ones in other

hosts; for example, the maximum body size of females of *C. podicipinus* from *Pseudopaludicola falcipes*: 6.0 mm (González and Hamann, 2004); from *Rhinella fernandezae*: 4.3 mm; from *R. bergi*: 6.9 mm (González and Hamann, 2007a) and from *R. schneideri*: 7.35 mm (González and Hamann, 2008). In males, the principal difference is the length of spicules; whereas in this study, the spicules of *C. podicipinus* are smaller than observed in other hosts: *P. falcipes*: 98-150; *R. fernandezae*: 71-94; *R. bergi*: 72-135; *R. schneideri*: 108-115 (González and Hamann, 2004, 2007a, 2008).

In the Neotropical Realm this species was found in the following families of hosts and countries: Bufonidae, Aromobatidae, Strabomantidae and Leptodactylidae from Peru (Burseley et al., 2001); Leptodactylidae from Paraguay (Baker and Vaucher, 1984); Bufonidae and Dendrobatidae from Colombia (Goldberg and Bursey, 2003); Hylidae and Leptodactylidae from Brazil (Goldberg et al., 2007; 2009); Eleutherodactylidae, Leptodactylidae, Hylidae and Ranidae from Mexico (Goldberg and Bursey, 2002; Goldberg et al., 2002a; Cabrera-Guzmán et al., 2007); Ranidae, Craugastoridae, Strabomantidae and Hylidae from Costa Rica (Burseley and Goldberg, 2005, 2006, 2007; Goldberg and Bursey, 2008a, 2008b) and, Leiuperidae, Leptodactylidae, Bufonidae and Cycloramphidae from Argentina (González and Hamann, 2004, 2006a, 2006b,

2007a, 2007b, 2008, 2009; Hamann et al., 2006a, 2006b; Schaefer et al., 2006).

Cosmocerca parva Travassos, 1925 (Fig. 2)

Taxonomic summary

Prevalence, number of parasites, mean intensity: 17.3% (14 of 81 amphibians infected), 60, 4.28 ± 4.15 .

Sites of infection: large and small intestine.

Accession number: CECOAL 02032573 (1 male, 2 females); 02032576 (1 male, 5 females); 02032577 (2 males, 4 females); 02103059 (1 male, 1 female).

Table 1 shows the metric characters of the males and females of *C. parva*. In this study, the number of plectanes varied between 5 and 7 pairs, each one with 2 complete rosettes of punctations directly perpendicular to the body surface and a relatively inconspicuous underlying sclerotized support which is not fused to other plectanes.

Remarks

In males of *C. parva*, the number of pairs of plectanes varied considerably between hosts. In the original description, Travassos (1925) established a total of 5 pairs of plectanes. In Paraguayan leptodactylids and bufonids, Baker and Vaucher (1984) described males with 5-7 pairs of these structures, but in Argentinean amphibians, nematode specimens showed a different number of these structures (Mordeglia and Digiani, 1998; González and Hamann, 2006a, 2006b, 2007b, 2008, 2009). Thus, in bufonids have been registered with 4-7 pairs of plectanes (*Rhinella bergi* and *R. fernandezae*: 5 pairs, *R. granulosa*: 5-7 pairs, *R. schneideri* 4-5 pairs), in the cycloramphid *Odontophrynus americanus* 5 pairs, and in hylids (*Scinax acuminatus*) and leptodactylids (*Leptodactylus bufonius*), 6 pairs. Males analyzed in this study present a variable number of pairs of plectanes (5-7 pairs).

Observations with SEM on adanal region of male specimens collected of *R. granulosa* (Mordeglia and Digiani, 1998) show 2 to 4 pairs of papillae which are surrounded by 1 or 2 small rosettes of punctations and, plectanes with 2 complete rosettes of 12-16 punctations. González and Hamann (2008) observed that the plectanes were surrounded by 2 complete rosettes of 12-15 punctations. Males of *C. parva* analyzed in this study presented one interior complete rosette with 10-11 punctations and, one exterior complete rosette with 12-14

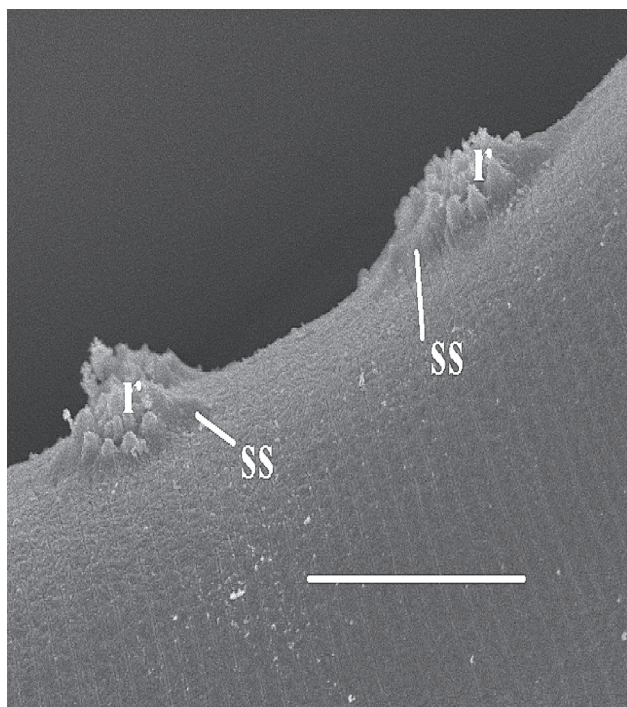


Figure 2. *Cosmocerca parva*. Male, lateral view of plectanes; r: rosette punctations; ss: sclerotized supports. Scale bar: 15 μ m.

punctations. The sclerotized supports between plectanes is practically nonexistent.

The metric characteristics of males and females of *C. parva* analyzed in this study correspond with others descriptions of hosts from Corrientes, Argentina (see González and Hamann, 2006a, 2007a, 2008). However, compared with the description of Travassos (1925), the length is smaller in both sexes (females: 6.8 mm; males: 3.5 mm); as well as, the length of gubernaculum is smaller than specimens analyzed by this author (120-140).

Similar to the previous one, this is a species with a widely distribution in the Neotropical Realm. In Brazil, it was found in families Leptodactylidae, Leiuperidae and Hylolidae (Travassos, 1925; Fabio, 1982), in Paraguay from Leptodactylidae, Bufonidae and Hylidae (Masi Pallares and Maciel, 1974; Baker and Vaucher, 1984), in Peru from Bufonidae, Aromobatidae, Hylidae, Leiuperidae, Leptodactylidae, Eleutherodactylidae and Microhylidae (Burse et al., 2001), in Trinidad and Tobago from Leptodactylidae and Eleutherodactylidae (Goldberg et al., 2002b), in Costa Rica from Craugastoridae (Goldberg and Bursey, 2008a), in Mexico from Ranidae (Paredes-

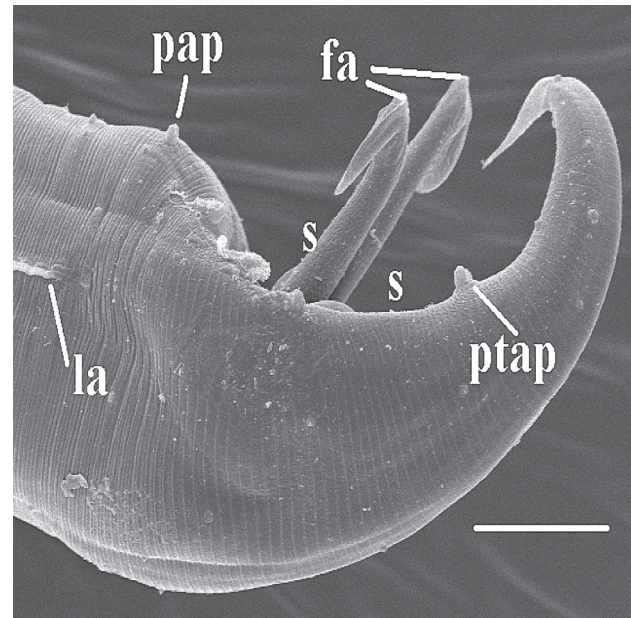


Figure 4. *Aplectana hylambatis*. Male, posterior end, pap: preanal papillae; ptap: postanal papillae; s: spicules; fa: fixed articulation; la: lateral alae. Scale bar: 40 μ m.

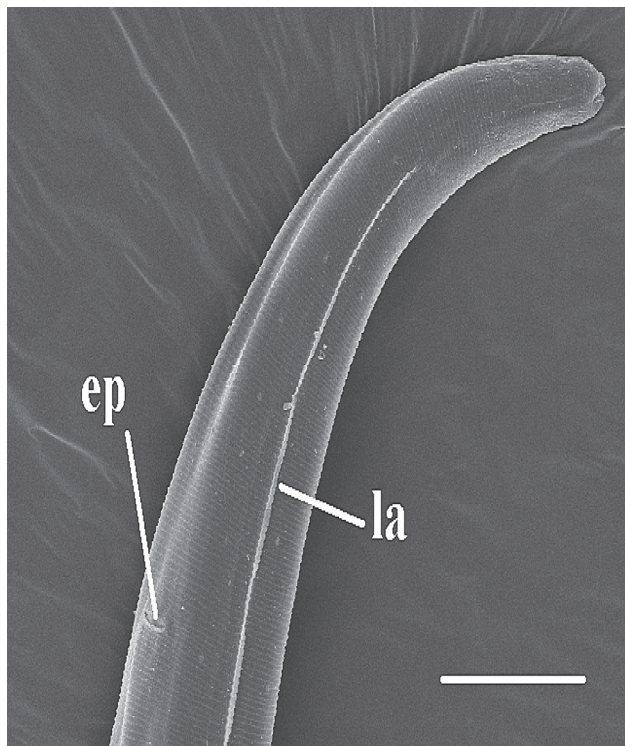


Figure 3. *Aplectana hylambatis*. Male, anterior end, lateral view; la: lateral alae; ep: excretory pore. Scale bar: 50 μ m.

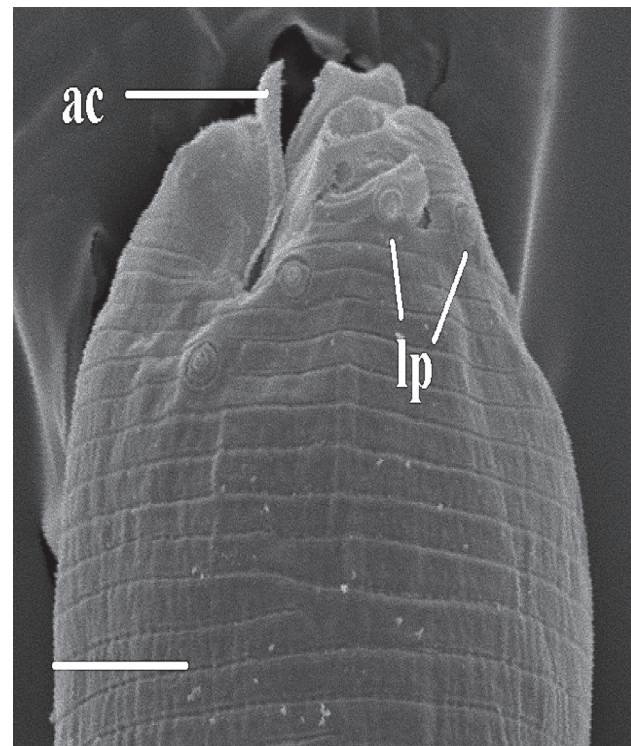


Figure 5. *Aplectana hylambatis*. Male, anterior end, lateral view; ac: armored chitin; lp: labial papillae. Scale bar: 10 μ m.

Calderón et al., 2004) and, in Argentina from Bufonidae, Hylidae, Leptodactylidae and Cycloramphidae (Mordeglia and Digiani, 1998; González and Hamann, 2006a, 2006b, 2007a, 2007b, 2008, 2009; Hamann et al., 2006a, 2006b, 2009; Schaefer et al., 2006).

***Aplectana hylambatis* (Baylis, 1927) Travassos, 1931** (Figs. 3, 4, 5)

Taxonomic summary

Prevalence, number of parasites: 1.2% (1 of 81 amphibians infected), 68.

Site of infection: large intestine.

Accession number: CECOAL 02103022 (10 males, 15 females).

Table 1 shows the metric characteristics of females and males of this species and, Table 3 shows the distribution of caudal papillae in the posterior end of males compared with specimens found in other hosts. In males of this species we observed that the distal portion of spicules presents an articulation that represents, approximately, 1/8 of its total length. This can be well seen when the spicules are everted.

Remarks

Baker (1980) emended the diagnosis of genus *Aplectana* and gave the following characteristics for this genus: tail of male lacking rosettes or plectanes; somatic papillae and lateral alae present; numerous thin-shelled, small eggs in uterus; both ovaries anterior to vulva.

The number of caudal papillae on posterior end of males is variable between hosts (see Table 3). The specimens analyzed from *P. santafecinus* have a higher number of preanals, adanals and postanals papillae compared with those studied from other hosts, although the number of adanals papillae match those found by Baker (1980) in *Rhinella achalensis* (= *B. achalensis*) from Córdoba province, Argentina.

In this species the morphology of spicules is controversial; for some authors (Gutierrez, 1945; Masi Pallares and Maciel, 1974) the last portion of these structures corresponded to a fixed articulation, hockey stick-shaped, when the spicules are everted. Lent and Freitas (1948) expressed that the body of the spicules ends in fixed articulation, and then there is a membranous portion that relates to sheath the spicules; Baker (1980)

wrote, “Distal end of spicules covered by a prominent hook-shaped membrane approximately 40-50 μm long and usually directed laterally”. We agree with the first authors; the spicules of this species are constituted of 2 parts, divided by an articulation. The proximal part representing 1/8 of the total length and the distal part that is bent perpendicularly when this structure is outside the body of the nematode; this can be seen clearly through the scanning electron microscope.

The metric characteristics of these nematodes, in general, were lower than those expressed in other studies (e.g., total length of females and males: Gutierrez, 1945: 4.4-6.2mm and 4-4.8mm; Masi-Pallares and Maciel, 1974: 4.98-5.84mm and 3-3.9mm; Baker, 1980: 4.8-6.3mm and 4.2-5mm; length of spicules: Gutierrez, 1945: 238-349; Masi-Pallares and Maciel, 1974: 295-349; Baker, 1980: 319-350; length of gubernaculum: Masi-Pallares and Maciel, 1974: 119-131; Baker, 1980: 109-116).

In the Neotropical Realm, *A. hylambatis* was found in Peru in amphibians of families Bufonidae, Leptodactylidae,

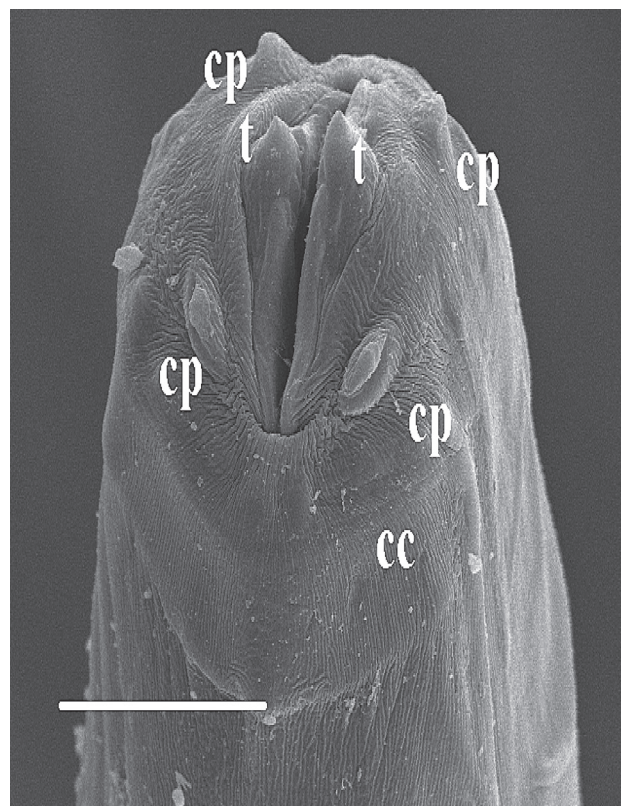


Figure 6. *Physaloptera* sp. Anterior end: cp: cephalic papillae; t: terminal tooth; cc: cephalic collar. Scale bar: 50 μm .

Table 1. Morphometric characteristics of cosmoceroids nematodes from *Physalaemus santafecinus* from Corrientes, Argentina

	<i>Cosmoerca podicipinus</i>		<i>Cosmoerca parva</i>		<i>Aplectana hylambatis</i>	
	Males (n= 10)	Females (n= 10)	Males (n= 10)	Females (n= 10)	Males (n= 10)	Females (n= 10)
Total length	1.83±0.29mm (1.3–2.3)	5.87±1.34mm (4.27–7.8)	1.86±0.32mm (1.53–2.57)	4.2±0.68mm (3.43–5.92)	2.30±0.26mm (1.96–2.76)	2.77±0.18mm (2.52–3.09)
Width	138.6±20.0 (100–170)	299.5±64.4 (190–390)	184.5±15.7 (165–210)	259.5±30.9 (230–320)	138.8±39.9 (120–205)	231.6±51.0 (183–324).
Pharynx	24.3±5.0 (18–32) x	39.2±4.6 (34–46) x	25.7±4.6 (16–30) x	37.2±4.4 (28–44) x	31.5±3.1 (28–37) x	34.0±4.3 (28–41) x
	16.5±3.4 (11–22)	42.3±6.5 (30–51)	18.7±4.2 (12–23)	38.7±5.7 (30–48)	19.1±1.7 (17–22)	23.4±2.1(21–28)
Muscular esophagus	188.3±23.6 (147–220) x	297.7±15.9 (270–324) x	218.1±30.8 (180–290) x	279.8±22.7 (252–318) x	342.6±25.7 (306–390) x	376.0±29.4 (306–402) x
	20.1±3.6 (13–25)	42.6±7.6 (30–55)	25.3±5.2 (15–35)	39.8±6.3 (27–48)	30.5±2.8 (25–34),	40.7±4.6 (34–46)
Bulb	47.8±6.6 (39–60) x	92.4±5.8 (85–103) x	64.5±9.6 (50–80) x	93.6±12.6 (80–124) x	76.8±3.9 (71–80) x	98.2±6.1 (85–103) x
	46.1±6.6 (34–59)	99.4±10.0 (83–115)	64.4±11.4 (42–75)	94.5±11.6 (73–115)	77.3±4.1 (67–82).	98.4±5.7 (90–108)
Nerve ring from anterior end	148.3±19.8 (120–180)	200.6±29.6 (161–260)	155.1±15.1 (130–180)	198.0±31.3 (161–260)	195.6±17.7 (174–222)	224.4±21.6 (204–270)
Excretory pore from anterior end	225.5±28.9 (180–270)	421.6±96.3 (306–610)	212.7±23.6 (177–260)	331.3±45.5 (258–390)	374.5±33.2 (306–420)	427.5±80.5 (342–620)
Anus from posterior end	-	522.5±137.0 (350–740)	-	434.5±105.5 (315–675)	-	195.8±12.2 (177–218)

Tail	113.8±16.0 (90-138)	-	134.4±28.0 (92-190)	-	136.7±15.5 (115-160)	-
Gubernaculum	84.6±5.9 (75-92)	-	81.9±19.3 (56-109)	-	76.8±7.8 (67-89)	-
Spicules	79.6±7.0 (69-89)	-	75.1±12.8 (57-98)	-	275.6±13.5 (255-298)	-
Plectanes	5 pairs	-	5-7 pairs	-	-	-
Adanal papillae	3 pairs	-	3 pairs + 1 unpaired papilla anteriorly to anus	-	See Table 2	-
Vulva from anterior end	-	2.89±0.75mm (1.95-3.96)	-	1.95±0.29mm (1.5-2.62)	-	1.87±0.13mm (1.6-2.1)
Eggs	-	99.1±4.6 (88-103) x 65.6±3.5 (60-69)	-	101.1±4.1 (93-108) x 67.4±2.7 (62-70)	-	88.2±7.0 (78-100) x 57.3±2.1 (53-60)

Table 2. Number of pairs of plectanes (#) in species of *Cosmocerca* of Neotropical anurans

#	<i>Cosmocerca</i> spp.
8-11	<i>C. brasiliensis</i> Travassos, 1925
6	<i>C. chilensis</i> Lent and Freitas, 1948; <i>C. rara</i> Freitas and Vicente, 1966
5	<i>C. cruzi</i> Rodrigues and Fabio, 1970; <i>C. travassosi</i> Rodrigues and Fabio, 1970; <i>C. podicipinus</i> Baker and Vaucher, 1984
7	<i>C. longispicula</i> Moravec and Kaiser, 1994; <i>C. uruguayensis</i> Lent and Freitas, 1948; <i>C. vrcibradici</i> Bursey and Goldberg, 1998
4-5	<i>C. paraguayensis</i> Moravec and Kaiser, 1994
5-7	<i>C. parva</i> Travassos, 1925

Table 3. Distribution of caudal papillae in males of *Aplectana hylambatis* in different hosts from Neotropical Realm

Gutierrez, 1945	Masi-Pallares and Maciel, 1974	Baker, 1980	Present study
From: <i>Rhinella arenarum</i>	From: <i>Rhinella schneideri</i> , <i>Leptodactylus ocellatus</i> , <i>Hypsiboas raniceps</i> , <i>H. punctatus</i>	From: <i>Rhinella achalensis</i>	From: <i>Physalaemus santafecinus</i>
Preanals: 3-4 medium pairs 1 lateral pair	Preanals: 2 lateral pairs 5 ventrolateral pairs	Preanals: 5 subventral pairs	Preanals: 6 ventral pairs
Adanals: 1 lateral pair	Adanals: 3 pairs on anterior lip 1 unpaired on anterior lip	Adanals: 1 sublateral pair 3 pairs on anterior lip 1 unpaired on anterior lip	Adanals: 1 large unpaired 3 pairs on anterior lip 1 sublateral pair immediately posterior to anus
Postanals: 1 pair	Postanals: 2 ventrolateral pairs 2 dorsolateral pairs 1 ventrolateral pair 2 ventrolateral apical pairs	Postanals: 2 subventral pairs 1 subdorsal pair 2 lateral pairs 1 subventral pair	Postanals: 1 large subventral pair located close together in midregion of tail 3 lateral subventral pairs 3 lateral subdorsal pairs 2 unpaired ventral papillae in the last third of the tail.

Ceratophryidae and Microhylidae (Burse et al., 2001; Iannaccone 2003a, 2003b); in Bufonidae, Myrohylidae, Leiuperidae, Leptodactylidae and Hylidae from Paraguay (Masi Pallares and Maciel, 1974; Baker and Vaucher, 1986) and in Bufonidae from Uruguay (Lent and Freitas, 1948). In Argentina, this species was found in amphibians of family Bufonidae (Gutierrez, 1945; Sueldo and Ramírez, 1976; Ramírez et al., 1979; Baker, 1980) and Leptodactylidae (González and Hamann, 2006b; Hamann et al., 2006a, 2006b).

Physaloptera sp. (Larvae) (Fig. 6)

Taxonomic summary

Prevalence, number of parasites: 1.2% (1 of 81 amphibian infected), 3.

Site of infection: gastric mucosa.

Accession number: CECOAL 03074252 (3 larvae).

Based on 3 specimens. Body whitish, 3.42 ± 0.28 mm (3.13 - 3.7) x 162.0 ± 10.4 (150 - 168), with transversely annulated cuticle. Terminus of head with 2 lateral lips and cephalic collar formed by inflated cuticle. On either lip, a sclerotized support and one terminal tooth at upper margin is present. Each lip bearing 2 cephalic papillae and one amphid. Muscular esophagus 211.6 ± 14.0 (195 - 221) x 26.1 ± 2.7 (23 - 28); glandular esophagus 1.06 ± 0.02 mm (1.04 - 1.08) x 61.7 ± 2.4 (60 - 64). Nerve ring, 171.7 ± 10.4 (161 - 182) from anterior end. Excretory pore near anterior end of glandular esophagus, 188.4 ± 18.5 (168 - 204) from anterior end of body. Tail conical, 89.7 ± 6.9 (83 - 97) long.

Remarks

Compared with larvae that were found in others hosts of the same area, specimens analyzed in this study showed the same morphological characteristics, but in terms of size, were smaller than those found in bufonids (*R. granulosa*: 4.6-5.6mm; *R. fernandezae*: 4.17mm; *R. schneideri*: 5.9mm) (González and Hamann, 2006b, 2007b, 2008).

Larvae of *Physaloptera* were found in the following families of amphibians from the Neotropical Realm: Hylidae, Bufonidae, Leptodactylidae, Leiuperidae and Cycloramphidae from Brazil (Vicente et al., 1990; Boquimpani-Freitas et al., 2001; Goldberg et al., 2009); Bufonidae, Aromobatidae, Hylidae, Leiuperidae, Eleutherodactylidae, Leptodactylidae and Microhylidae

from Peru (Burse et al., 2001); Leptodactylidae from Trinidad and Tobago (Goldberg et al., 2002b); Bufonidae, Hylidae and Ranidae from Mexico (Galicia-Guerrero et al., 2000; Bursey and Goldberg, 2001; Goldberg and Bursey, 2002; Goldberg et al., 2002a; Cabrera-Guzmán et al., 2007); Craugastoridae and Hylidae from Costa Rica (Goldberg and Bursey, 2008a, 2008b) and, in Argentina from Leiuperidae, Leptodactylidae, Hylidae and Bufonidae (Gutierrez et al., 2005; González and Hamann, 2006a, 2006b, 2007a, 2008).

Discussion

Four nematode species belonging to genus *Cosmocerca* have been recorded from different families of Argentinean amphibians. *Cosmocerca podicipinus* and *C. parva* were found in leptodactylids, leiuperids, bufonids, hylids and cycloramphids, all of them from Corrientes province (see González and Hamann, 2008, 2009); *C. cruzi* and *C. rara* were only found in Corrientes province from *L. latinasus* (Hamann et al., 2006a).

Also, 5 species of genus *Aplectana*: *A. tarija* Ramallo, Bursey and Goldberg, 2007 in *Rhinella arenarum*; *A. adaechevarriae* Ramallo, Bursey and Goldberg, 2008 in *R. granulosa* and *R. schneideri* from Salta Province (Ramallo et al., 2007; 2008); *A. meridionalis* Lent and Freitas, 1948 in *Pleurodema borellii* (Peracca, 1895) from Jujuy Province (Baker, 1980); *A. delirae* (Fabio, 1971) in *R. granulosa* from Corrientes Province, and, *A. hylambatis* in bufonids from Salta, Córdoba, Buenos Aires and Corrientes Provinces and, in leptodactylids from Corrientes Province (Gutierrez, 1945; Sueldo and Ramírez, 1976; Ramírez et al., 1979; González and Hamann, 2006b; Hamann et al., 2006a, 2006b) have been found. In this study, *P. santafecinus* represents new host record for *C. podicipinus*, *C. parva* and *A. hylambatis*.

Adults of *Physaloptera* have been found parasitizing the stomach of mammals, snakes, and a few species of lizards which acquire infections from ingesting insects containing infective larvae (Anderson, 2000). In amphibians, only 2 species are known, represented by adults: *P. amphibia* Linstow, 1899 found in the esophagus and the stomach of *Limnectes macrodon* (Duméril and Bibron, 1841) from Philippines Islands and *P. tigrinae* Ali and Farooqui, 1969 from *Hoplobatrachus tigerinus* (Daudin, 1802) from India (Baker, 1987). This study adds *P. santafecinus* to the list of hosts parasitized by larvae of this genus.

This study is the first report of nematodes of *P. santafecinus* from Argentina and some new morphological data are presented for all the species recorded.

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