

First report of the genus *Neocosmocercella* Baker and Vaucher, 1983 (Nematoda: Cosmocercidae) parasitizing amphibians from Argentina Primer reporte del género *Neocosmocercella* Baker and Vaucher, 1983 (Nematoda: Cosmocercidae) parasitando anfibios de Argentina

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ABSTRACT: The cosmocercid, *Neocosmocercella paraguayensis* was recorded for the first time in Argentina parasitizing the hylid frog *Phyllomedusa azurea*. Morphometric and morphological data of this nematode species are provided, including the presence of bilobed cephalic lips, vesiculated rosette papillae in males and both uteri directed anteriorly in females. This finding constitutes the first record of this genus in Argentina.

Keywords: *Neocosmocercella paraguayensis*, Nematoda, *Phyllomedusa azurea*, Formosa, Argentina.

RESUMEN: *Neocosmocercella paraguayensis* (Cosmocercidae) es citado por primera vez en Argentina parasitando a *Phyllomedusa azurea* (Hylidae). Se describen sus características morfológicas y se indican sus datos morfométricos, que incluyen la presencia de labios cefálicos bilobados, papilas vesiculadas en los machos y ambos úteros dirigidos anteriormente en las hembras. Este hallazgo constituye el primer registro del género en Argentina.

Palabras clave: *Neocosmocercella paraguayensis*, Nematoda, *Phyllomedusa azurea*, Formosa, Argentina.

During a survey of helminth parasites of vertebrates, on August 30th 2013 one male specimen of *Phyllomedusa azurea* Cope, 1982 (Hylidae) was collected at La Marcela farm in Pirané, Formosa Province, Argentina (26° 17' 35" S, 59° 08' 38" W), with authorization of Ministerio de la Producción y Ambiente, Dirección de Fauna y Parques of Formosa Province. The frog was dissected after an overdose with 20% benzocaine and all organs were examined using a Stemi 2000-C Zeiss stereoscope. The collected helminths were counted, fixed in 5% formalin and cleared in Amann's lactophenol for light microscopic observation, using a Standard 25 Zeiss optical microscope. Taxonomic identification was done using specific literature (Anderson *et al.*, 1974; Baker and Vaucher, 1983). All measurements are given in micrometres (µm) unless otherwise is stated, with the mean followed by standard deviation and the range in parentheses. The specimens were deposited in the Helminthological Collection of the Museo de La Plata (MLP-He 7124), and the host in the Herpetological Collection of the Museo de La Plata (accession number: MLP A5788), Argentina.

Phyllomedusa azurea is a medium size leaf-frog (31-44 mm snout-vent length); with an arboreal habit and generalist diet (Freitas *et al.*, 2008). Its geographic

distribution covers Bolivia, Paraguay, northern Argentina (Salta, eastern Jujuy, Formosa, Chaco, northern Santiago del Estero, Santa Fe, and Corrientes provinces) and Pantanal and Cerrado regions of central and western Brazil (Frost, 2015). *Phyllomedusa azurea* was considered as synonymous of *Phyllomedusa hypochondrialis* (Daudin, 1800) or as a subspecies, *P. hypochondrialis azurea*. But later, Caramaschi (2006) redefined the *P. hypochondrialis* group, in which he included *P. azurea*, and therefore, revalidated this species.

The helminth fauna of *P. azurea* has been poorly studied, so far only two species of helminths has been recorded parasitizing this species in Argentina: *Cosmocercella minor* (Freitas and Dobbin, 1961) (Nematoda: Cosmocercidae) from Corrientes (González and Hamann, 2012) and *Catadiscus uruguayensis* Freitas and Lent, 1939 (Digenea: Diplodiscidae) from Chaco (Lunaschi and Drago, 2010). In the case of *C. minor*, the host was cited as *P. hypochondrialis* (C. González, personal communication 2015). Recently Campião *et al.* (2015) reported 13 helminth taxa parasitizing this amphibian species for Brazil, including larvae and adults of Nematoda, Digenea and Acanthocephala.

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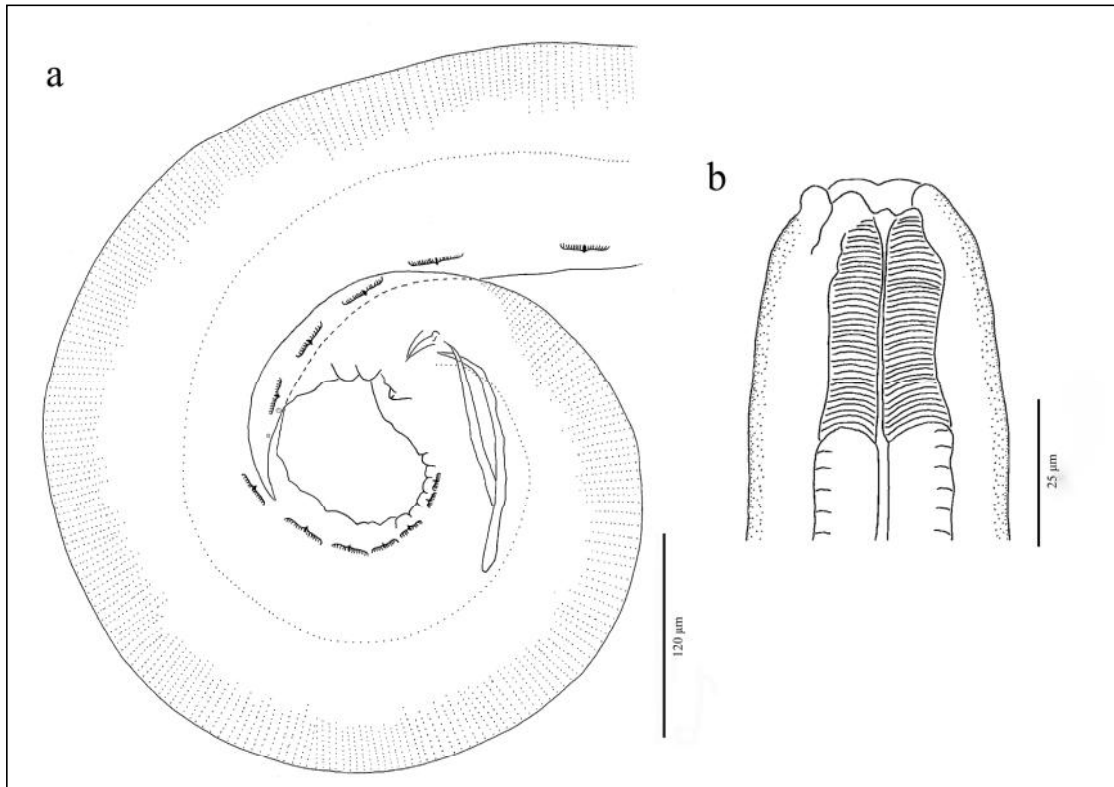


Figure 1. *Neocosmocercella paraguayensis* of *Phyllomedusa azurea* from Argentina. a) Male tail, lateral view. b) Detail of anterior end of body.

The aim of the present study is to report for the first time the occurrence of the genus *Neocosmocercella* Baker and Vaucher, 1983 in Argentinean amphibians. *Neocosmocercella paraguayensis* Baker and Vaucher, 1983 (Nematoda: Cosmocercidae) was described for the first time from the intestine of *P. hypochondrialis* collected in San Lorenzo, Asunción (Paraguay), and is the type and only species for the genus *Neocosmocercella*.

Ninety specimens of *N. paraguayensis* (51 females and 39 males) were found in the small and large intestine of the anuran host. The specimens (Figs. 1-2) possess a fine cuticle with conspicuous transverse striations, and lateral alae extending from the anterior third of oesophageal corpus near to anus in both sexes. The oral opening is hexagonal with three bilobed shallow lips (Fig. 1b). Cephalic extremity has four large papillae. Amphids were not observed with optic microscopy. The anterior end of the oesophagus bears three tooth-like projections covered with thick cuticle. The oesophagus comprises an anterior cylindrical corpus, narrow isthmus, and oesophageal bulb.

Males with 12-13 pairs of vesiculated rosette papillae in two ventral rows in the precloacal region (Figs. 1a, 2c). Presence of single unpaired papillae and three pairs of small papillae on anterior margin of anus. Five pairs of postcloacal papillae, three subventral and two lateral. Gubernaculum present. Posterior half of male body is coiled sinisterly (Fig. 2b).

Females didelphic and prodelphic, with a markedly elongate vagina. Both uteri are directed anteriorly. Uterine sac present. Vulva opens anterior to mid-body,

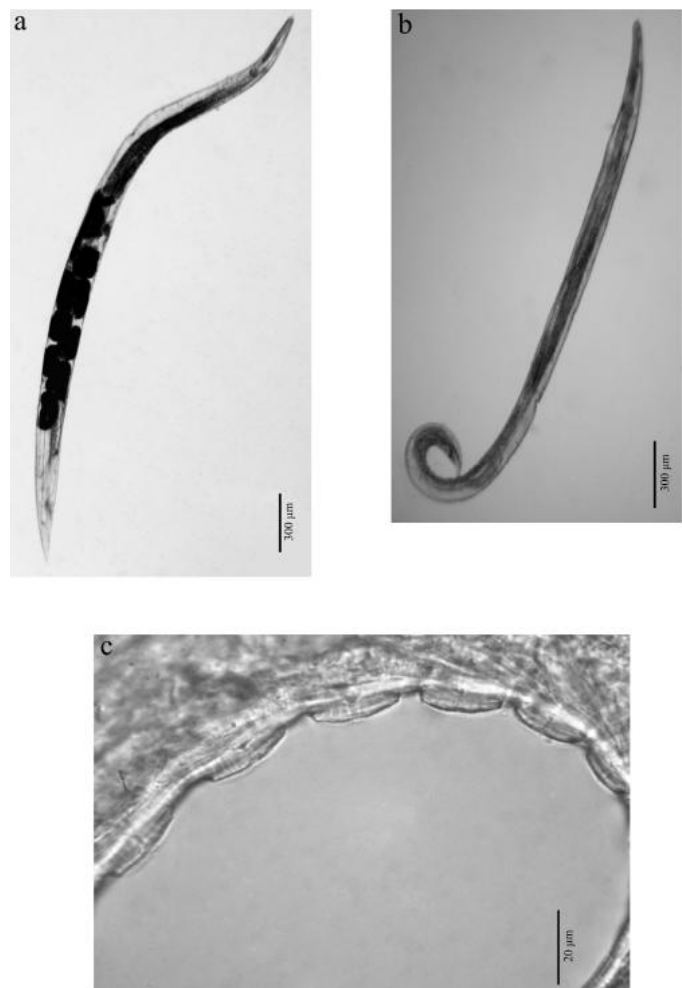


Figure 2. Microphotographies of *Neocosmocercella paraguayensis* of *Phyllomedusa azurea* from Argentina. a) Female, entire worm. b) Male, entire worm. c) Detail of vesiculated rosette papillae.

Table 1. Comparative data of *Neocosmocercella paraguayensis* from *Phyllomedusa hypochondrialis* and *P. azurea*

Hosts	<i>P. hypochondrialis</i>		<i>P. azurea</i>	
	San Lorenzo, Asunción, Paraguay		Pirané, Formosa, Argentina	
Localities	Baker and Vaucher (1983)		Present study	
Source	Males: Holotype (paratypes)	Female: Allotype (paratypes)	Males (n=10)	Females (n=10)
Total length (mm)	2.35 (1.8-3.2)	4.3 (3.2-4.1)	2.82±0.19 (2.5-3.08)	3.87±0.19 (3.59-4.12)
Width (mm)			0.13±0.03 (0.09-0.18)	0.19±0.012 (0.17-0.21)
Oesophagus total length	298 (388-444)	473 (416-460)	375.7±94 (226-421)	437.7±23.5 (396.5-483)
Pharynx	35	40	35±2.19 (31-38)	34.27±3.75 (23.8-35.7)
Corpus	271	328	267±47.16 (131-290)	305.06±27.45 (265.6-345.1)
Isthmus	30	37	31±4.12 (28.5-35.7)	37.22±4.54 (35.7-47.6)
Bulb	62	68	64.5±7.21 (54.7-78.5) x 54.5±8.8 (45.22-71.4)	64.97±7.23 (59.5-78.54) x 54.26±4.13 (47.6-59.5)
Nerve ring	172 (163-194)	207 (170-206)	185.6±8.6 (178.5-195.2)	184.30±13.71 (166.6-202.3)
Excretory pore	296 (252-333)	361 (302-348)	351.4±22.1 (328.4-376.7)	338.13±60.28 (217.3-386.4)
Tail length	124 (114-162)	297 (246-267)	135.6 ±16.3 (116.6-166.6)	254.3±40.27 (169.0-289.8)
Vulva from anterior extremity		1.9 (1.5-1.9)		1.85±0.10 (1.69-1.98)
Eggs		(190-225 x 110-130)		203.4±18.2 (178.5-228.9) x 123.0 ±13.33 (96.16-140.4)
Spicules	132 (123-153)		133.0±12 (104.7-147.6)	
Gubernaculum	43 (34-43)		33.1±7.12 (23.8-43.6)	

with reduced lips. Tail log, conical. Female's body not coiled (Fig. 2a).

There are nine genera assigned to the subfamily Cosmocercinae Railliet, 1916: *Aplectana* Railliet and Henry, 1916; *Cosmocerca* Diesig, 1861; *Cosmocercella* Steiner, 1924; *Cosmocercoides* Wilkie, 1930; *Neocosmocercella*; *Oxyascaris* Travassos, 1929; *Oxyomatium* Railliet and Henry, 1916; *Paradollfusnema* Baker, 1982 and *Raillietnema* Travassos, 1927 (Burse et al., 2011). The genus *Neocosmocercella* shares with the genus *Cosmocercella* the presence of vesiculated rosette caudal papillae in the male body (absent in other genera). In addition, *Neocosmocercella* cephalic end has three bilobed lips and the mouth is hexagonal (lips not bilobed forming triangular mouth in *Cosmocercella*), also, both uteri are anterior to the vulva in the females, having largest eggs (>150 µm). The comparative analysis of the specimens here studied with those of *N. paraguayensis* originally described in Paraguay (Table 1) revealed that the specimens are similar morphometrical and morphologically. According to the authors, the number of precloacal vesiculated rosette papillae varied from 19-27, the specimens from *P. azurea* showed a constant number of 24-27 (12-13 pairs).

In Argentina, 34 species of anuran amphibians (belonging to the families Leptodactylidae, Hylidae, Bufonidae, Odontophrynidae, Ceratophryidae and Ranidae) were examined for nematodes (González and Hamann, 2015) and none were parasitized by *Neocosmocercella*.

In the present study, we provide the first record of the genus *Neocosmocercella* in *P. azurea* from Argentina, as well as morphological and morphometric data of *N. paraguayensis*. This study extends the geographical distribution of *N. paraguayensis* and provides morphological details from specimens collected in Formosa (Argentina) from *P. azurea*. This anuran amphibian represents a new host record for this nematode species.

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LITERATURE CITED

- Anderson RC, Chabaud AG, Willmon S. 1974. CIH keys to the nematode parasites of vertebrates. Numbers 6, 7, 8, 9 and 10. Farnham Royal, Commonwealth Agricultural Bureaux. Wallingford, United Kingdom.
- Baker MR, Vaucher C. 1983. Parasitic helminths from Paraguay 4: Cosmocercoid nematodes from *Phyllomedusa hypochondrialis* (Daudin) (Amphibia: Hylidae). *Revue Suisse De Zoologie* 90: 325-334.
- Burse CR, Goldberg SR, Kraus F. 2011. New species of *Aplectana* (Nematoda: Cosmocercidae) in *Sphenomorphus pratti* from Papua New Guinea. *Journal of Parasitology* 97: 654-60.

Campiã KM, Ribas A, Tavares LER. 2015. Diversity and patterns of interaction of an anuran-parasite network in a neotropical wetland. *Parasitology* 142: 1751-1757.

Caramaschi U. 2006. Redefinição do grupo de *Phyllomedusa hypochondrialis*, com redescritção de *P. megacephala* (Miranda-Ribeiro, 1926), revalidação de *P. azurea* Cope, 1862 e descrição de uma nova espécie (Amphibia, Anura, Hylidae). *Arquivos do Museu Nacional* 64: 159-179.

Freitas EB, De-Carvalho CB, Faria RG, Batista RC, Coelho WA, Bocchiglieri A. 2008. Nicho ecológico e aspectos da história natural de *Phyllomedusa azurea* (Anura: Hylidae, Phyllomedusinae) no Cerrado do Brasil Central. *Biota Neotropica* 8: 101-110.

Frost DR. 2015. Amphibian Species of the World: an Online Reference. Version 6.0. American Museum of Natural History, New York, USA. <http://research.amnh.org/herpetology/amphibia/index.html>. Last access: febrero-2015.

González CE, Hamann MI. 2012. First Report of Genus *Cosmocercella* Steiner, 1924 (Nematoda: Cosmocercidae) in Amphibians from Argentina. *Comparative Parasitology* 79: 155-159.

González CE, Hamann MI. 2015. Checklist of nematode parasites of amphibians from Argentina. *Zootaxa* 3980: 451-476.

Lunaschi LI, Drago FB. 2010. Platyhelminthes, Trematoda, Digenea Carus, 1863: Distribution extension in Argentina and new Anura and Ophidia hosts. *Check List* 6: 447- 450.

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