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New species of *Parapharyngodon* (Nematoda: Pharyngodonidae) in *Phymaturus* spp. (Iguania: Liolaemidae) from Argentina

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Abstract

Parapharyngodon sanjuanensis sp. nov. (Nematoda: Pharyngodonidae) from the large intestines of *Phymaturus punae* and *Phymaturus williamsi* (Squamata: Liolaemidae) from province of San Juan, Argentina, is described and illustrated. *Parapharyngodon sanjuanensis* sp. nov. is the 54th species assigned to the genus and the 8th from the Neotropical region. It differs from other species in the genus in that males possess 8 caudal papillae, 6 of which are large and pedunculate, 2 are small, almost inconspicuous; anterior lip echinate, posterior lip bilobate; females possess prominent vulva and short stiff tail spike.

Keywords

Parapharyngodon sanjuanensis sp. nov., Nematode, Lizard, *Phymaturus* spp., Argentina

Introduction

Phymaturus Gravenhorst, 1838 comprises 38 species including two large clades, the *palluma* and the *patagonicus* groups. This latter group formed by a set of species inhabiting rocky formations situated along the western slopes of the Andes mountains in Argentina, and on the eastern slopes (Chile) of the same mountain range; between 26°30'S and 39°54'S (Lobo *et al.* 2013). Within this group, *Phymaturus punae* Cei, Etheridge and Videla, was described from specimens collected in the high plateau of the Cordillera of San Guillermo, Province of San Juan, Argentina, 3,500 m in elevation (Cei *et al.* 1983) and *Phymaturus williamsi* (Lobo, Laspiur and Acosta) was described from specimens collected at Quebrada vallecito, 40 km W of Calingasta town, Calingasta department, San Juan Province, Argentina, 3,000 m in elevation (Lobo *et al.* 2013). To our knowledge, there are no helminthological reports from either *P. punae* or *P. williamsi*. Helminths recorded from San Juan province are *Oochoristica travassosi* Rego and Ibanez, 1965 (Cestoda-Linstowiinae) found in the lizard *Liolaemus vallecurensis* Pereyra by Goldberg *et al.* (2004) and *Aplectana hylambatis* (Baylis 1927) (Nematoda,

Cosmocercidae) in the toad, *Rhinella arenarum* (Hensel) by González *et al.* (2013).

Currently, 53 species are assigned to the genus *Parapharyngodon*, 6 species are from the Afrotropical region, 3 from the Australian region, 2 from the Madagascan region, 4 from the Nearctic region, 7 from the Neotropical region, 8 from the Oriental region, 8 from the Palearctic region, 8 from the Panamanian region, 5 from the Saharo-Arabian region and 1 from the Sino-Japanese region (Bursey and Goldberg, 2015). With the exception of *Parapharyngodon anomalis* Hobbs, 1996 from a mammal host, *Parapharyngodon verrucosus* Freitas and Dobbin, 1959, *Parapharyngodon garciae* (Schmidt and Whittaker, 1975) Adamson, 1981, *Parapharyngodon duniae* Bursey and Brooks, 2004, *Parapharyngodon grenadaensis* Bursey, Drake, Cole, Sterner, Pinckney and Zieger, 2013 from anurans, and *Parapharyngodon japonicus* Bursey and Goldberg, 2000 from a salamander, all other species are intestinal parasites of lizards (Bursey and Golberg, 2014). The purpose of this paper is to describe a new species of *Parapharyngodon*, only the second species of genus to be described from Argentina.

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Materials and Methods

One adult male *Phymaturus punae* collected by hand at Agua del Godo-San Guillermo-Iglesia in 2004 and two adult male *Phymaturus williamsi* collected at Quebrada de La Puerta, Calingasta, Province of San Juan in 2009, fixed in neutral, buffered 10% formalin before preservation in 70% alcohol were examined for helminths. The body cavity was opened by a longitudinal incision from vent to throat, and the gastrointestinal tract was removed and opened longitudinally. Nematodes found in the large intestine were placed on a glass slide in lactophenol, allowed to clear, examined with a light microscope and found to represent an undescribed species of *Parapharyngodon*. Drawings were made using a camera lucida. Measurements are given in millimeters unless otherwise indicated and are presented as mean \pm SD followed by range in parentheses. For SEM (scanning electronic microscopy) specimens were dehydrated throughout an ethanol series, acetone and ether, coated with gold and examined in a Zeiss Supra 55VP SEM. Nematodes were deposited in the Colección Helminológica Fundación Miguel Lillo (CH-FML), Miguel Lillo 251, (4000). San Miguel de Tucumán, Argentina.

Description

Parapharyngodon sanjuanensis sp. nov. (Figs 1-13)

Diagnosis: Oxyuroidea Railliet, 1916: Pharyngodonidae Travassos, 1919, *Parapharyngodon* Chatterji, 1933. Robust nematodes with prominent annulations beginning just behind cephalic extremity and continuing to anus (Fig. 11, 12). Sexual dimorphism obvious, males approximately one-half length of females. Lateral alae present in males, absent in females. Esophagus cylindrical, ending in valved bulb (Fig. 1). Triangular oral opening bounded by 3 bilobed lips, each with 1 small papilla. Excretory system X-shaped with distinct sinus. Nerve ring in anterior region of esophagus, excretory pore posterior to esophageal bulb in both males and females. Males without caudal alae, caudal filament directed dorsally. Eggs oval with subterminal operculum and shell thick, punctated surface; morula stage of development. Vulva at mid-body. Females with conical tail terminating in short, stiff spike.

Male (holotype and 10 paratypes): Small, white, fusiform nematodes, distinctly truncate posteriorly. Length 3.00 ± 0.5 (2.52-4.26). Width at level of excretory pore, 0.36 ± 0.07 (0.24-0.51). Triangular oral opening surrounded by 3 small lips, amphids conspicuous, (Fig. 7). Lateral alae beginning near level of esophageal isthmus, width of alae constant throughout ending abruptly about 0.35 ± 0.04 (0.32-0.40) anterior to anus (Figs 6, 12). Annulations about 20 μ m apart. Esophagus 0.80 ± 0.16 (0.62-1.06), bulb length 0.10 ± 0.03 (0.09-0.18), bulb width 0.13 ± 0.02 (0.09-0.16). Nerve ring 0.18 ± 0.04 (0.14-0.26), excretory pore 1.30 ± 0.4 (1.00-2.20)

from anterior, respectively (Fig. 6). Tail 0.10 ± 0.01 (0.07-0.10), reduced to slim appendage inserted dorsally, directed obliquely to longitudinal axis of body. Spicule 0.17 ± 0.2 (0.08-0.18) long. Testis reflexed behind esophagus. Eight conspicuous, pedunculate caudal papillae: 2 pairs ventral, precloacal, 1 pair lateral and very large, 1 pair medial and somewhat inconspicuous; 1 pair sublateral, postcloacal; 1 pair on caudal appendage. Anterior anal lip echinate posterior anal lip with lateral digitiform extensions (Figs 8, 9, 13).

Female (allotype and 9 paratypes): Length including spike 5.46 ± 0.63 (4.72-7.08). Width at vulva 0.87 ± 0.11 (0.76-1.08). Triangular oral opening surrounded by six lips, each lip with 1 small papilla; amphids not seen (Figs. 2, 10). Annulations about 41 μ m apart. Esophagus 1.33 ± 0.05 (1.21-1.44), bulb length 0.17 ± 0.03 (0.10-0.21), bulb width 0.25 ± 0.03 (0.21-0.30). Nerve ring 0.20 ± 0.02 (0.17-0.22), excretory pore 1.63 ± 0.19 (1.40-2.08) (Fig. 1), vulva 2.51 ± 0.24 (2.30-3.14) from anterior, respectively (Fig. 3). Tail 0.21 ± 0.02 (0.20-0.23) long. Amphidelphic, uteri divergent; anterior uterus directed anteriorly, posterior uterus directed posteriorly; prebulbar ovaries reflexed, remaining below level of esophageal bulb; muscular ovjector, distinctly salient vulva. Eggs subovate, 0.12 ± 0.006 (0.11-0.13) long, 0.07 ± 0.006 (0.060-0.080) wide, thick-shelled, with subterminal operculum (Fig. 4). Eggshell thin, surface covered with tiny punctuations. Eggs in ovjector in early stages of cleavage. Short stiff tail spike 0.10 ± 0.01 (0.08-0.11) long (Fig.5).

Taxonomy summary

Type host: *Phymaturus williamsi* Lobo, Laspiur y Acosta, 2013 (Iguania, Liolaemidae), Herpetology Collection Universidad Nacional de San Juan (UNSJ-148, 159), collected in 2009.

Type locality: Quebrada de La Puerta (32°31.31'S; 69°42.02'W); Department Calingasta, Province of San Juan, altitude 2878 m.

Additional host: *Phymaturus punae* Cei, Etheridge and Videla, 1983 (Iguania, Liolaemidae), Herpetology Collection Universidad Nacional de San Juan (UNSJ-224), collected in 2004.

Additional locality: Agua del Godo, San Guillermo, Department Iglesia, Province of San Juan (29°14'48"S, 69°21'13.3"W), altitude 3390 m

Site of infection: Large intestine.

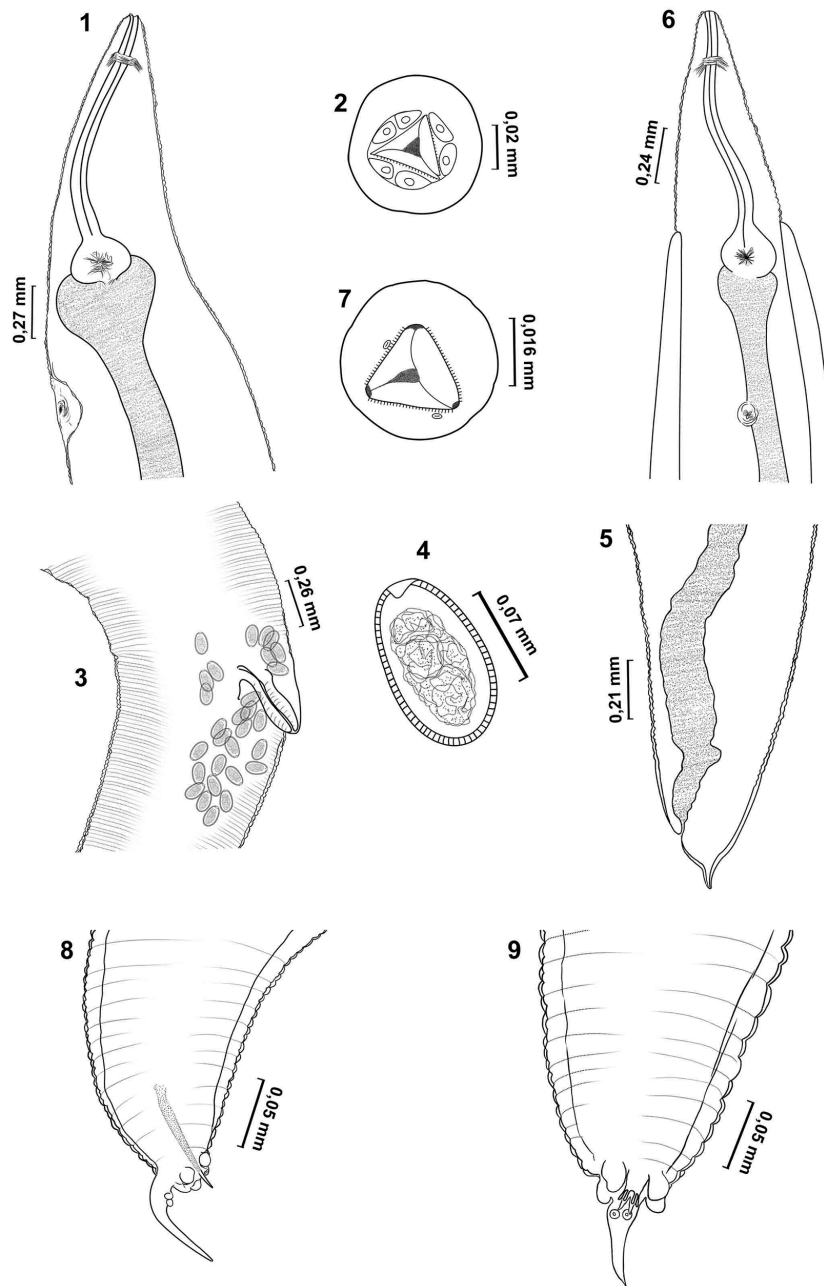
Type specimen: Holotype: female. CH-FML # 07542; allotype: male # 07543; paratypes: # 07544 (30 females, 30 males)

Additional material: CH-N-FML: #07545, #07546, and #07547.

Intensity: 191 (100 females, 91 males).

Prevalence and mean intensity: 100% (2 of 2 *P. williamsi*); 95.5 nematodes per lizard.

Etymology: The species is named for the site of collection of the hosts, Province of San Juan, Argentina.

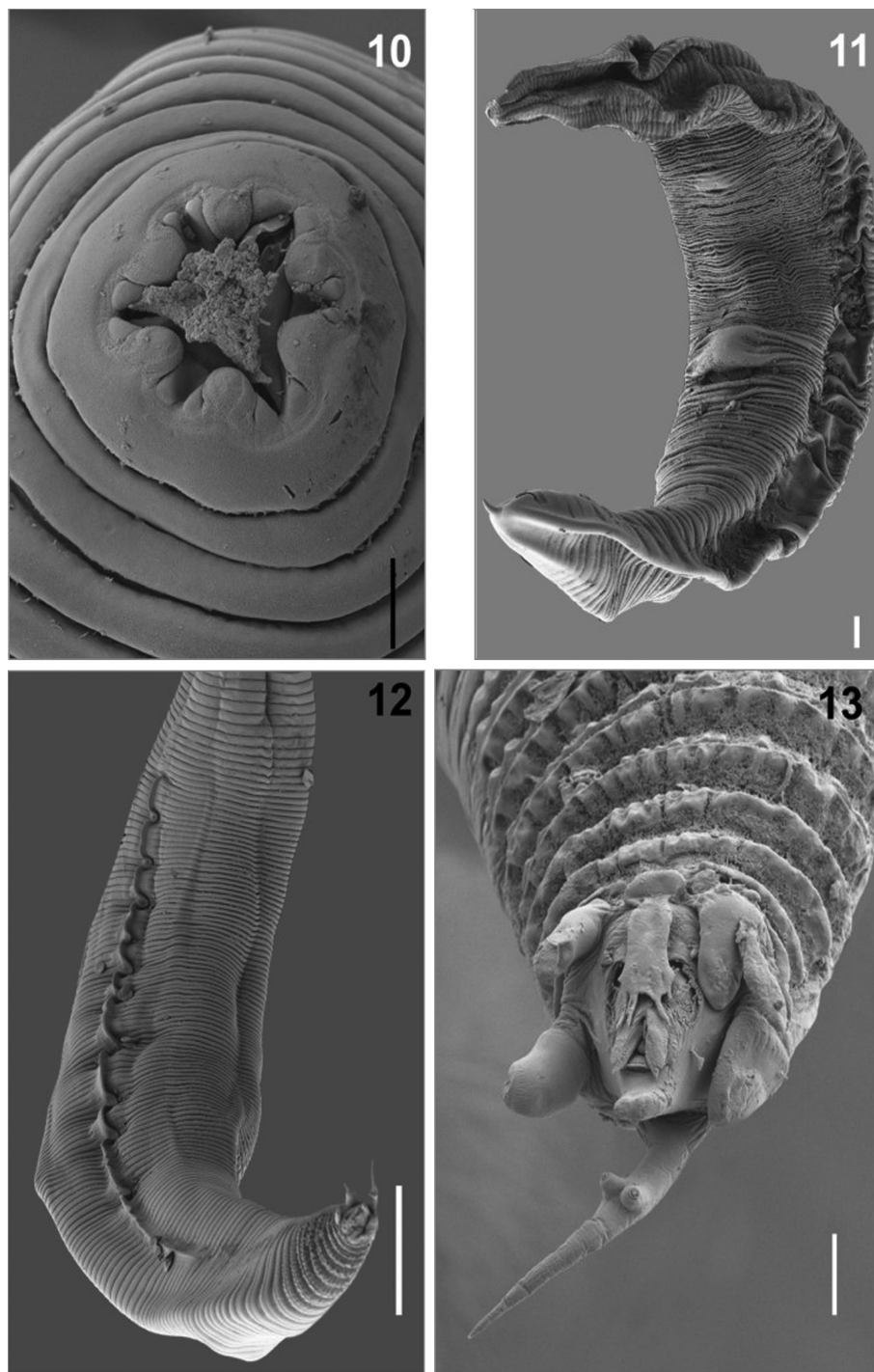


Figs 1-9. *Parapharyngodon sanjuanensis* sp. nov.. (1) Female, lateral view. (2) Female, anterior end, en face view. (3) Female, vulva. (4).Egg. (5) Female, posterior end, lateral view. (6) Male, anterior end, ventral view. (7) Male, anterior end, en face view. (8) Male, posterior end, lateral view. (9) Male, posterior end, ventral view

Remarks

Species of *Parapharyngodon* are distinguished on the basis of the pattern of caudal papillae, morphology of the anterior cloacal lip, the location of the ovary, and geographical distribution (Bursey and Goldberg, 2014). Seven species have been previously described from the Neotropical Realm, i.e., *Parapharyngodon alvarengai* Freitas, 1957, *Parapharyngodon binae* Pereira, Sousa and Lima, 2011, *Parapharyngodon largitor* Alho and Rodrigues, 1963, *Parapharyngodon riojensis* Ramallo, Bursey and Goldberg, 2002, *Parapharyngodon scleratus* (Travassos, 1923) Freitas, 1957, *Parapharyngodon senisfaciecaudus* Freitas, 1957, and *Parapharyngodon verrucosus* Freitas and Dobbin, 1959 (Bursey and Goldberg, 2014). Of these, only *P. scleratus* has 4 pair caudal papillae; however the anterior cloacal lip is smooth. Thus, *P. sanjuanensis* is the only Neotropical species in which males are characterized by 8 caudal papillae and echinate anterior cloacal lip.

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Figs 10-13. *Parapharyngodon sanjuanensis* sp. nov. (10) Female, anterior end, en face view. Scale= 10 μ m. (11) Female, entire, lateral view. Scale=100 μ m. (12) Male, entire, lateral view. Scale 200 μ m. (13) Male, posterior end, ventral view. Scale= 20 μ m

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References

- Burseley C.R., Goldberg S.R. 2014. Description of a new species of *Parapharyngodon* (Nematoda: Pharyngodonidae) from Mexico with a list of current species and key to species from the Panamanian Region. *Journal of Parasitology*, 101, 374–381. DOI: 10.1645/13-460.1

- Cei J.C., Etheridge R., Videla F. 1983. A new species of Iguana on the northwest Province of San Juan (San Guillermo Provincial Reserve), Argentina. *Deserta*, 7, 316–323 (In Spanish)
- Goldberg S.R., Bursey C.R., Morando M. 2004. Metazoan endoparasites of 12 species of lizards from Argentina. *Comparative Parasitology*, 71, 208–214. DOI: [10.1654/4089](https://doi.org/10.1654/4089)
- González C.E., Quiroga L.B., Moreno D., Sanabria E.A. 2013. First record of *Aplectana hylambatis* (Nematoda: Cosmocercidae) in amphibians on the province of San Juan. *Cuadernos de herpetología*, 27, 155–159 (In Spanish)
- Holt B. G., Lessard J.P., Borregaard M. K., Fritz S. A., Araújo M. B., Dimitrov D. Fabre P.H., Graham C. H., Gaves G. R., Jonsson K. A. 2013. An update of Wallace's zoogeographic regions of the world. *Science*, 339, 74–78. DOI: [10.126/science.1228282](https://doi.org/10.126/science.1228282)
- Lobo F., Laspiur A., Acosta J.C.. 2013. Description of new Andean species of the genus *Phymaturus* (Iguania: Liolaemidae) from Northwestern Argentina. *Zootaxa*, 3683, 117–132. DOI: [10.11646/zootaxa.3683.3.3](https://doi.org/10.11646/zootaxa.3683.3.3)
- Ramallo G., Bursey C. R., Goldberg S. R.. 2002. *Parapharyngodon riojensis* n. sp.(Nematoda: Pharyngodonidae) from the lizard *Phymaturus punae* (Squamata: Iguania:Liolaemidae) from northwestern Argentina. *Journal of Parasitology*, 88, 979–982. DOI: [10.2307/3285541](https://doi.org/10.2307/3285541)

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