

**A NEW SPECIES OF THE GENUS *NEOCUCULLANUS*
(NEMATODA: CUCULLANIDAE) IN *SALMINUS BRASILIENSIS*
(PISCES: CHARACIDAE) FROM ARGENTINA**

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ABSTRACT: During a parasitological survey of *Salminus brasiliensis* (Cuvier, 1816) from Juramento River, specimens of a new species of nematode were collected from the intestine, piloryc caeca and liver of fish and studied by light and scanning electron microscopy. *Neocucullanus marcelae* sp. nov. is described as the third species of the genus *Neocucullanus* by in both sexes the excretory pore is anterior to nerve ring, spicules in males very long, over 1.60-1.90 mm long, possess 32 caudal papillae; females with very prominent vulva. *Neocucullanus marcelae* n. sp. is the first species of the genus from Argentina.

KEY WORDS: *Neocucullanus* sp. nov., Nematodes parasites, freshwater fishes, Argentina.

The Argentinian continental ichthyofauna is very well represented, 450 species, with the absence of the families Osteoglossidae and Nandidae. This number represents less than 10% of the total fish species occurring in the Neotropical Region (López, 2001; López et al., 2002).

In Argentina, the Family Characidae is represented by 61 species distributed in 30 genera. Likewise, in the country, genus *Salminus* Agassiz, 1829 two valid species (*Salminus brasiliensis* (= *Salminus maxillosus*) (Cuvier, 1816) and *Salminus hilarii* Valenciennes, 1849) were recorded (López et al., 2003).

Salminus brasiliensis is distributed in South America: Paraná (Argentina), Paraguay, and Uruguay River basins; Laguna dos Patos drainage, upper Chaparé and Mamoré River basin in Bolivia, and Brazil. Occurrence in the remaining Amazon River highly doubtful (Froese & Pauly, 2011).

In Argentina, *S. brasiliensis* is recorded in the basin paranoplatensean ecoregion. This ecoregion combines elements of "yungas" (cloud forest irregularly distributed in the Provinces of Salta, Jujuy, Tucumán and Catamarca). Include the major part of course of Pilcomayo River in Argentina, Bermejo River, San Francisco, Salado del Norte or Juramento River, and in its southern portion rivers Tercero, Cuarto and Carcarañá. Except for Pilcomayo River, which merges with Paraguay River, the rest of these watercourses flow into Paraná River along different parts of it (López et al., 2002).

Salminus brasiliensis are fishes benthopelagic and potamodromous (Riede, 2004). Occurs in ponds (Cordiviola & Pignalberi, 1985); carnivorous, feeds on fish and crustaceans (Baensch & Riehl 1997; Zaniboni Filho et al., 2004).

A study to quantify the fish conservation state of the Family Characidae in an area of the Plata basin, taking into account the biological, ecological and distribution variables was performed. In this it was concluded that *S. brasiliensis* is a vulnerable species of maximum priority (Zayas & Cordiviola, 2007).

Many species of neotropical fish nematodes belong to Seuratoidea and Dracunculoidea. Out of five families of Seuratoidea superfamily, only the families Quimperidae and Cucullanidae involve species parasitic in Neotropical

freshwater fishes. Three genera (*Cucullanus*, *Dichelyne*, *Paraseuratium*) which are also found in other zoogeographical regions, but other three genera (*Neocucullanus*, *Neoparaseuratium*, *Procamallanus*) are restricted to South America (Moravec, 1998).

In the Neotropical freshwater fishes, Cucullanidae family encompasses three genus (*Dichelyne* Jägerskiöld, 1902, *Neocucullanus* Travassos, Artigas et Pereira, 1928, and *Cucullanus* Müller, 1777 (Moravec, 1998). *Neocucullanus* genus no occurs in Argentina.

Neocucullanus Travassos, Artigas et Pereira, 1928, is characterized by the caudal end in both sexes short and rounded, spicules short and thick and at least 9 pairs of preanal papillae in male (Moravec, 1998).

The aim of this paper was to describe the first species of the genus *Neocucullanus* in *Salminus brasiliensis* from Argentina and the third species of genus from South America.

MATERIAL AND METHODS

In September 2010 and May 2011, 14 specimens of *Salminus brasiliensis* (sex not specified; Lst = 25-43 cm) from Juramento River, (25°13'35,19"S; 64°28'30,82"W), Salta, Argentina were collected and examined for helminths. Fishes were 10% formalin fixed before preservation in 70% ethanol. Body cavity was opened by a mid-ventral incision and the digestive tract was removed. Nematodes were cleared in lactophenol and examined under light microscope. Drawings were made with the aid of LEICA microscope. Quantitative descriptors of parasite populations were estimated based on definitions of Bush et al. (1997). Measurements are given in millimeters unless otherwise stated. For SEM (scanning electronic microscopy) examination specimens were dehydrated throughout an ethanol series, acetone and ether, coated with gold and examined in a Jeol JSM-35CF SEM.

Type specimens were deposited in the Colección Helmintológica Fundación Miguel Lillo (CH-N-FML), Miguel Lillo 251, (4000) San Miguel de Tucumán, Argentina.

RESULTS

Cucullanidae Railliet & Henry, 1915

Neocucullanus marcelae sp. nov.

(Figures 1-19)

General: Large sized nematodes with transversally striated cuticle. Mouth dorsoventrally elongated, surrounded by membranous collarete with denticles. Four large double papillae, 2 small deirids and 6 small papillae present (Fig.3). Esophagus expanded at its anterior end to form well developed pseudobuccal capsule (oesophastome); posterior part of esophagus also somewhat expanded (Figs. 1,2). Intestinal caecum absent. Caudal end of adults very short and rounded, with a mucron. Precloacal sucker present. Preanal papillae numerous. Vulva postequatorial.

Diagnosis. In both sexes the excretory pore is anterior to nerve ring (Figs. 10, 11), spicules in males very long, over 1.60 mm long, 32 caudal papillae: 9 pairs

preanal and one ventral media, 1 pair adanal and 5 pairs postanal and one media ventral; females with prominent vulva.

Male (n=9) measurements of holotype in parentheses. Body 17.1-22.04 (19.08) long, 0.64-0.74 (0.70) wide. Esophagus 1.52-1.67 (1.60) long and 0.36-0.42 (0.40) wide. Distance from anterior end deirids, nerve ring and excretory pore 0.65-0.82 (0.74), 0.63-0.83 (0.80) and 0.40-0.48 (0.48), respectively. Caudal end short and blunt with hemicircular subventral alae. Caudal papillae: 9 pairs preanal and one media ventral, 1 pair adanal and 5 pairs postanal and one media ventral (Figs. 7,8,16,17,18,19). Precloacal sucker from posterior end 0.91-1.13 (0.92). Spicules well sclerotized, large, equally long 1.62-1.90 (1.62) (Fig.9). Gubernaculum absent. Phasmids not observed. Tail very short and rounded, 0.28-0.33 (0.32) long, with terminal mucron.

Female (n=9 gravid specimens) measurements of allotype in parentheses. Body 22.00-27.00 (27.00) long, 0.66-0.89 (0.72) wide. Esophagus 1.62-1.81 (1.80) long and 0.37-0.44 (0.40) wide. Distance from anterior end of deirids, nerve ring, and excretory pore 0.66-0.80 (0.78), 0.63-0.77 (0.68) and 0.36-0.49 (0.36), respectively. Vulva postequatorial, vulvar lips very elevated, 9.4-12.2 (12.0) from posterior end (Fig. 5, 12, 13). Uterus opposed, containing numerous eggs. Eggs thin-walled, size 0.063-0.086 (0.083) x 0.050-0.056 (0.050). (Fig. 6). Short tail bluntly, 0.20-0.28 (0.28), with cuticular spike 0.020-0.030 (0.022) long at tip. Two small phasmids observed (Figs. 4, 14, 15).

Type specimens: Holotype: male CH-N-FML # 07488; allotype: female CH-N-FML # 07489, and paratypes (10 males, and 14 females) CH-N-FML # 07490.

Type host: *Salminus brasiliensis* (Cuvier, 1816) (Pisces, Characidae), CI-FML # 5190, collected in 2010.

Type locality: El Chorro (25°13'35,19"S; 64°28'30,82"W), Juramento River, Department Metán, Province of Salta, Argentina.

Prevalence: 43% (6/14). *Salminus brasiliensis* harbored 42 specimens of *Neocucullanus marcelae* sp. nov.

Site of infection: Intestine, piloryc caeca and liver.

Mean intensity: 8.4 nematodes per fish.

Etymology: The specific name is given in honor to Marcela Peralta, colleague, friend, and godmother.

Remarks: Of the three species of *Neocucullanus* (*N. neocucullanus*, *N. multipapillatus* and *N. marcelae* n. sp.), *N. marcelae* sp. nov. is the only that presents the excretory pore anterior to nerve ring.

Neocucullanus marcelae is more similar to *N. neocucullanus* because both lack gubernaculum and possess hemicircular subventral caudal alae, observed with light microscope. It differs from *N. neocucullanus* by preanal papillae (9 pairs vs. 10 pairs), unpaired preanal papilla (present vs. absent), spicules (1.60-

1.90 mm vs. 0.38 mm), papillae adanal (present vs. absent), papillae postanal (5 pairs and unpaired media ventral vs. 3 pairs).

Neocucullanus marcelae n. sp. shares with *N. multipapillatus* 15 pairs of caudal papillae and unpaired preanal papilla. Differ by adanal papillae (present vs. absent), gubernaculum (absent vs. present), caudal alae (present vs. absent) and unpaired media ventral postanal papilla (present vs. absent).

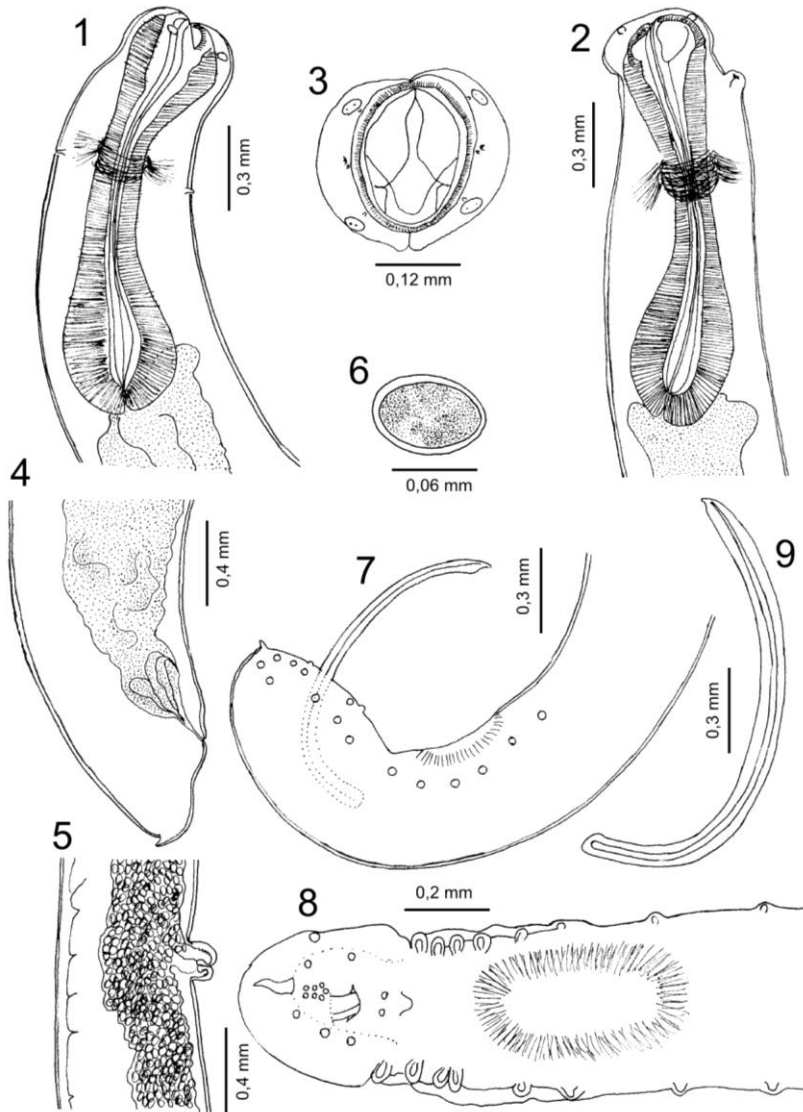
In this paper, we describe the first species of the genus *Neocucullanus* from Argentina and the third species of the same in South America.

ACKNOWLEDGEMENTS

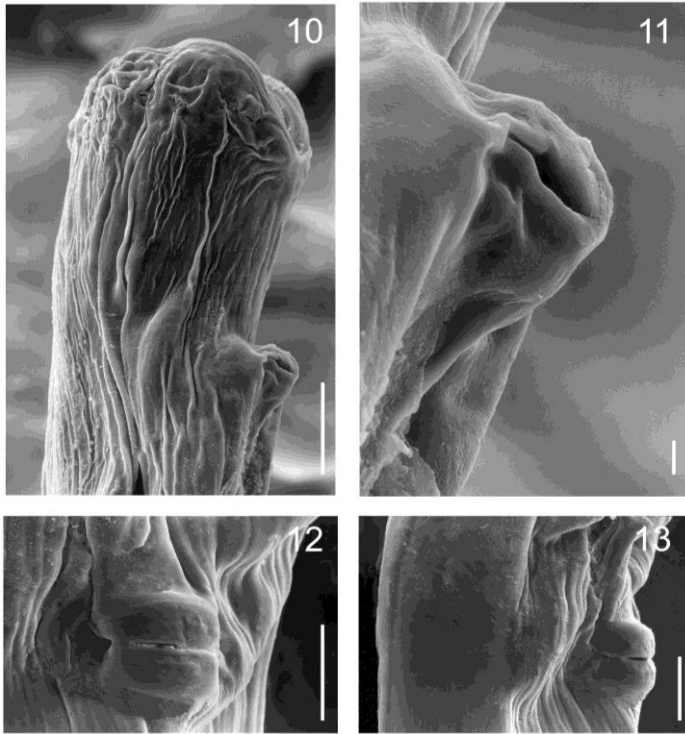
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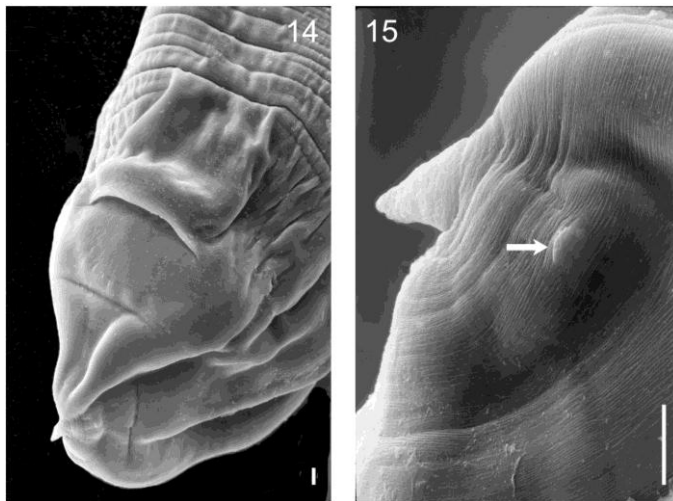
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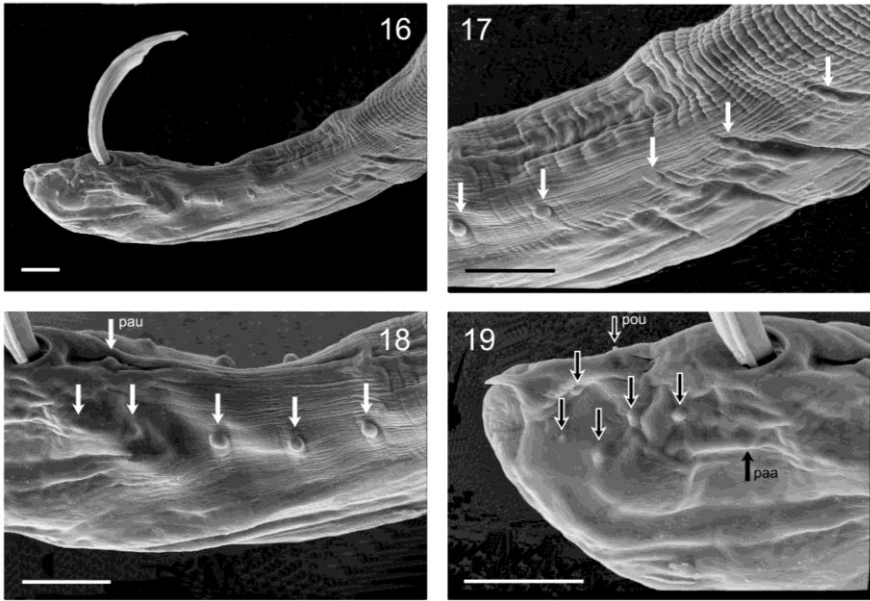
Figures 1-9. *Neocucullanus marcelae* n. sp. 1. Female, anterior end, ventral view, 2. Male, anterior end, lateral view, 3. Female, apical view, 4. Female, posterior end, lateral view, 5. Female, vulva, 6. Egg, 7. Male, posterior end, lateral view, 8. Male, posterior end, ventral view, 9. Spicules.



Figures 10-13. *Neocucullanus marcelae* n. sp. 10. Female, anterior end. Scale = 100 μ , 11. Detail of excretory pore. Scale= 10 μ , 12-13. Vulva. Scale=100 μ .



Figures 14-15. *Neocucullanus marcelae* n. sp. 14. Female, posterior end, 15. Female, phasmid (white arrow). Scales=10 μ .



Figures 16-19. *Neocucullanus marcelae* n. sp. 16. Male, posterior end, ventro-lateral view, 17-18. Preanal papillae (white arrows), 19. Adanal (black arrow) and postanal papillae (highlighted arrows). Scales=100 μ . pau: unpaired preanal papilla; pou: unpaired postanal papilla; paa: adanal papilla.