



Observations on two *Procamallanus* (*Spirocamallanus*) species (Nematoda: Camallanidae) from freshwater fishes in Argentina, including description of *Procamallanus* (*Spirocamallanus*) *juana* sp.nov.

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Abstract

Helminthological examination of specimens of the freshwater fishes *Pimelodus albicans* Valenciennes (Pimelodidae), *Pimelodella gracilis* (Valenciennes) (Heptapteridae) and *Hyphessobrycon anisitsi* Eigenmann (Characidae), collected from the Salado River, province of Santiago del Estero, Argentina, revealed the presence of two species of parasitic nematodes, *Procamallanus* (*Spirocamallanus*) *juana* sp. nov. and *Procamallanus* (*Spirocamallanus*) *hilarii* (Camallanidae). *Procamallanus* (*Spirocamallanus*) *juana* sp. nov. was characterized by the presence of six visible pores located around the oral opening in both sexes, 14 cephalic papillae, buccal capsule with 5-7 spiral thickenings, three pairs of preanal papillae, and three pairs of postanal papillae, and conspicuous and pre-equatorial vulva in females. *Procamallanus* (*Spirocamallanus*) *hilarii* was recorded for the first time in *Hyphessobrycon anisitsi* from northern Argentina. Moreover, zoogeographical and host information for the genus *Procamallanus* (*Spirocamallanus*) is summarized.

Key words: *Procamallanus* (*Spirocamallanus*) *juana* sp. nov., Siluriformes, Salado River, Santiago del Estero

Introduction

The genus *Procamallanus* Baylis, 1923 includes parasitic species of marine and freshwater fishes. Based on the morphology of the buccal capsule, *Procamallanus* represents five subgenera: *Procamallanus* Baylis 1923, *Denticamallanus* Moravec & Thatcher 1997, *Spirocamallanus* Olsen 1952, *Punctocamallanus* Moravec & Scholz 1991, and *Spirocamallanoides* Moravec & Sey 1988 (Moravec & Thatcher 1997). Of these, the first three occur in Neotropical freshwater fishes (Moravec 1998). To date, there are 29 described species of *Procamallanus*, parasites of freshwater fishes from the Neotropical Realm (Ramallo 2008; Giese *et al.* 2009).

In Argentina, five species of *Procamallanus* (*Spirocamallanus*) have so far been recorded from freshwater fishes: *P. (S.) rarus* Travassos, Artigas & Pereira; *P. (S.) inopinatus* Travassos, Artigas & Pereira; *P. (S.) hilarii* Vaz & Pereira; *P.(S.) huacraensis* Ramallo and *P.(S.) pinto*i, Kohn & Fernandes (Chemes & Takemoto 2011; Ramallo 2008; Ailan *et al.* 2014). The first two species were recorded in siluriform (Pimelodidae and Heptapteridae) and characiform (Bryconidae, Characidae, Anostomidae and Serrasalminidae) fishes from the Middle Parana River (Corrientes province). *Procamallanus* (*S.*) *huacraensis*, *P. (S.) pinto*i and *P. (S.) hilarii* were registered only in northwestern Argentina. Both *P.(S.) huacraensis* and *P. (S.) pinto*i were recorded in specimens belonging to Trichomycteridae family (Siluriformes), the first one (*P. (S.) huacraensis*) was found in Huacra and Vis-Vis Rivers, and Agua Fresca Dike (Catamarca province) and *P. (S.) pinto*i in an irrigation ditch tributary of the Yacones River (Salta province). However, *Procamallanus* (*S.*) *hilarii* presented a broader host spectrum (Characiformes, Siluriformes and Cyprinodontiformes) with a more generalized geographical distribution, stretching from the Itaú River, located on the border between to Salta and Bolivia, to the Rio Hondo Dam (Santiago del Estero province) (Antelo *et al.* 2016).

During parasitological surveys performed on fishes from the River Salado, province of Santiago del Estero, we isolated specimens of *Procamallanus* (*Spirocamallanus*) *hilarii* for the first time in *H. anisitsi* (Characidae) and specimens of a new species of the genus *Procamallanus* Baylis, 1923; subgenus *Spirocamallanus* Olsen, 1952; which is described herein, from *P. albicans* and *P. gracilis*. The new species is described, and we expand the host and geographical spectrum of *P. (S.) hilarii*. The geographical implications and host information of the species belonging to the subgenus, *Spirocamallanus*, are also discussed.

Materials and methods

During November 2012, March and May 2013; four specimens of *Pimelodus albicans*, standard length 5.1–7.3 cm and weight 2.3–8.2 g.; four of *Pimelodella gracilis*, standard length 2.4–7.7 cm and weight 2.3–7.8 g and seven specimens of *Hyphessobrycon anisitsi*, standard length 3.8–4.7 cm and weight 1.30–2.30 g., were collected from the Salado River (28° 48'42"S, 62°39'0.9"W), Añatuya, General Taboada Department, Province of Santiago del Estero, Argentina. The fishes were fixed in 4% formaldehyde for 24 hs. and stored in 70% ethanol for the posterior helminthological examination. All nematodes founded were cleared in lactophenol and examined with a light microscope. Drawings were made with the aid of a LEICA microscope. For examination by SEM (scanning electronic microscopy), some specimens from *P. albicans* and *P. gracilis* were dehydrated through an ethanol series, acetone, and ether. The specimens were coated with gold and examined with a Zeiss Supra 55VP SEM. Prevalence and mean intensity of infection were calculated based on the definitions of Bush *et al.* (1997). All measurements are given in millimeters unless otherwise stated.

Type specimens and specimens of *P. (S.) hilarii* have been deposited in the Colección Helmintológica Fundación Miguel Lillo (CH-N-FML), Miguel Lillo 251, (4000) San Miguel de Tucumán, Argentina. The fishes examined were deposited in the Colección Ictiológica Fundación Miguel Lillo (CI-FML), Miguel Lillo 251, (4000) San Miguel de Tucumán.

Order Spirurida Chitwood, 1933

Family Camallanidae Railliet & Henry, 1915

Genus *Procamallanus* Baylis, 1923

Subgenus *Spirocamallanus* Olsen, 1952

Procamallanus (*Spirocamallanus*) *juana* sp. nov.

(Figs 1–2)

Type material. Holotype: female CH-N-FML #07729; allotype: male CH-N-FML #07730; paratypes (four females, five males) CH-N-FML #07731.

Type host. *Pimelodus albicans* Valenciennes (Siluriformes, Pimelodidae), Ichthyology Collection CI-FML #6467, collected 30 May 2013.

Additional host: *Pimelodella gracilis* (Valenciennes) (Siluriformes, Heptateridae), Ichthyology Collection CI-FML #6519, collected 30 May 2013.

Type locality. Salado River, Añatuya, General Taboada Department, Province of Santiago del Estero (28° 48'42"S, 62°39'0.9"W), Northwest Argentina.

Etymology. The new species is named in honor of the memory of Juana Rosa Bennasar de Herrera ("Ms. Monona"), colleague, friend and for years Director of Zoology Area, FML.

Site of infection. Intestine.

Infection parameters. For *P. albicans*, prevalence: 75% (3/4); media intensity: 3.3 nematodes per fish and for *P. gracilis*, 75% (3/4); 4 nematodes per fish, respectively.

Measurements. Table 1.

TABLE 1. Measurements of *Procamallanus (Spirocamallanus) juana* sp. nov. Given in mm, mean \pm SD (minimum value–maximum value). (* Measurement of total length of tail, including the spike).

Character	Holotype	Allotype	Paratypes	
	♀ 1	♂1	♀4	♂5
Total body length	22,23	10.28	21.19 \pm 4.31 (15.46–24.25)	10.69 \pm 1.51 (8.35–12.00)
Body width	0.35	0.16	0.31 \pm 0.05 (0.27–0.37)	0.17 \pm 0.02(0.15–0.20)
Buccal capsule length	0.06	0.053	0.06 \pm 0.00 (0.06)	0.05 \pm 0.00 (0.05)
Buccal capsule width	0.06	0.05	0.06 \pm 0.00 (0.06)	0.05 \pm 0.00 (0.05–0.06)
Cephalic ring length	0.013	0.01	0.01 \pm 0.00 (0.01)	0.01 \pm 0.00 (0.01)
Cephalic ring width	0.033	0.033	0.03 \pm 0.00 (0.03–0.04)	0.03 \pm 0.00 (0.02–0.03)
Muscular esophagus total length	0.63	0.35	0.60 \pm 0.03 (0.56–0.63)	0.54 \pm 0.02 (0.51–0.56)
Muscular esophagus total width	0.07	0.06	0.07 \pm 0.00 (0.07)	0.06 \pm 0.00 (0.05–0.06)
Glandular esophagus total length	0.94	0.87	0.84 \pm 0.11 (0.70–0.93)	0.82 \pm 0.11 (0.70–0.93)
Glandular esophagus total width	0.06	0.05	0.06 \pm 0.00(0.06)	0.05 \pm 0.00 (0.04–0.05)
Nerve ring—anterior end	0.23	0.24	0.26 \pm 0.01 (0.25–0.26)	0.23 \pm 0.01 (0.22–0.23)
Excretory pore—anterior end	0.3	0.49	0.37 \pm 0.04 (0.32–0.40)	0.42 \pm 0.07 (0.35–0.49)
Deirids	-	0.1	-	0.12 \pm 0.03 (0.10–0.18)
Vulva—anterior end	15.00		14.79 \pm 2.86 (10.50–16.36)	-
Right spicule	-	0.75	-	0.79 \pm 0.02 (0.75–0.80)
Left spicule	-	0.27		0.27 \pm 0.01 (0.26–0.28)
Caudal alae length	-	0.32	-	0.34 \pm 0.04 (0.30–0.40)
Tail length*	0.12	0,14	0.12 \pm 0.01 (0.11–0.12)	0.14 \pm 0.03 (0.12–0.20)
Spike length	0.02	-	0.02 \pm 0.00 (0.02)	-
Larvae length	0.26	-	0.28 \pm 0.06 (0.20–0.32)	-

General description. Medium-sized nematodes with finely, transversely striated cuticle. Mouth aperture rounded, provided and surrounded by six visible pores, fourteen submedian cephalic papillae arranged in three circles, two circlets (medium and external) with four papillae each; and the inner circlet with six larger papillae. Pair of medium amphids present (Fig. 1D, 2A). Buccal capsule orange-brown, thick-walled, barrel-shaped, slightly longer than wide, with simple well developed basal cephalic ring; wall of middle part of capsule strengthened by conspicuous thickenings appearing in lateral view as drop-shaped, extending anteriorly to anterior margin of capsule. In both sexes, inner surface of capsule provided with several spiral ridges, which may be complete and incomplete (not extending from one lateral margin of capsule to other) (Figs. 1A, B, C). Muscular esophagus somewhat shorter than glandular esophagus; both parts of esophagus slightly expanded near their posterior ends (Figs. 1A, C). Intestine narrow. Deirids, observed only in males; small, simple, with rounded end situated at about mid-way between posterior end of buccal capsule and nerve ring (Figs. 2B, C). Excretory pore located approximately in the middle of the muscular esophagus(Figs. 1A, C). Tail of females pointed and of males conical (Figs. 1F, G).

Adult female (five gravid specimens): Buccal capsule with 5–7 inner spiral ridges (Figs. 1C). Deirids absent. Vulva pre-equatorial with conspicuous lips (Fig. 1E, 2E). Vagina muscular, directed posteriorly from vulva. Uterus containing larvae (Figs. 1E). Tail pointed with terminal spike (Figs. 1F, 2F).

Adult Male (six specimens): Buccal capsule with 5–7 inner spiral ridges (Fig. 1B). Deirids present (Figs. 2B, C). Spicules of similar shape, but very unequal in length, right spicule larger than left, both with pointed distal ends (Fig 1G). Six pairs of sessile caudal papillae: three pairs preanal and three pairs postanal (Figs. 1G, 2D). Gubernaculum absent. Posterior end of body ventrally bent, provided with narrow caudal alae. (Figs. 1G, 2D). Tail conical (Fig 1G).

Remarks. The new species belongs to the genus *Procamallanus* Baylis, 1923, which is characterized by the presence of a solid buccal capsule continuous with the inner surface smooth or with spiral ridges, spicules usually unequal, and caudal alae and gubernaculum present or absent in males. Three subgenera occur in Neotropical

freshwater fishes. The new species herein described belongs to the subgenus *Spirocamallanus* Olsen, 1952, because both males and females present spiral thickenings (ridges) in the buccal capsule and the base of the male capsule without teeth (Moravec 1998). Between the species of *Procamallanus* (*Spirocamallanus*) recorded for the Neotropical Region, it is possibly distinguished as a morphological group that present caudal alae and unequal spicules, represented by *P. (S.) rarus*, *P. (S.) solani* Pinto, Fabio, Noronha & Rolas, *P. (S.) paraguayensis* (Petter), *P. (S.) freitasi* (Moreira, Oliveira & Costas), *P. (S.) pimelodus* Pinto, Fábio, Noronha & Rolas, *P. (S.) dessetae* (Petter, Golvan & Tchepakoff), *P. (S.) rebecae* (Andrade-Salas, Pineda-Lopez & Garcias-Magaña) and the new species herein described.

The general morphology of the new species is very similar to *P. (S.) pimelodus*; both species are characterized by possessing three pairs of preanal papillae and caudal alae in males, the right spicule exceeds 0.70 mm and the vulva is pre-equatorial. However, both species differ in the number of cephalic papillae (14 vs. 8); the presence or absence of pores around the mouth aperture; the number of pairs of postanal papillae (3 vs. 8) and the shape of the female tail (pointed with a spike vs. conical without spike). By the presence of caudal alae in males, the new species also resembles *P. (S.) rarus*. Moreover both species were found in freshwater catfishes from Argentina. However, these species differ in that, *P. (S.) juana* **sp. nov.** has sessile caudal papillae, while those of *P. (S.) rarus* are pedunculated; the vulva in the new species is pre-equatorial while in *P. (S.) rarus* it is equatorial, and the spicules are simple in *P. (S.) juana* **sp. nov.** While *P. (S.) rarus* has unequal and dissimilar spicules, the large spicule with a small ventral outgrowth and the small spicule simple.

The presence of a digit-like projection provided with one or more small terminal cuticular spikes on the female tail, is a feature that the new species shares with some species of *Procamallanus* (*Spirocamallanus*), parasites of freshwater and marine fishes (Moravec *et al.* 2000). In the Neotropical Realm some species have this character. These include *P. (S.) rebecae*; *P. (S.) solani*; *P. (S.) penneri* (Fusco & Brooks); *P. (S.) gobiomori* Moravec, Salgado-Maldonado & Caspeta-Mandujano, 2000; and *P. (S.) jaliscensis* Moravec, Salgado-Maldonado & Caspeta-Mandujano, 2000; all of them are parasites of freshwater fishes (Moravec 1998; Moravec *et al.* 2000). These species can be distinguished from *P. (S.) juana* **sp. nov.** by a series of morphological features (such as the number of spiral thickenings in the buccal capsule and the length of right spicule) and the geographical distribution.

Most of the species of *Procamallanus* (*Spirocamallanus*) have eight cephalic papillae arranged in two circlets. Nevertheless, the new species is the first in presenting fourteen cephalic papillae organized in three circlets, the external and median circlet formed by four papillae and the inner by six papillae, the papillae of the inner circlet distinctly large. *Procamallanus* (*Spirocamallanus*) *halitrophus* (Fusco & Overstreet), *P. (S.) rebecae*, *P. (S.) rigbyi* Yooyen, Moravec & Wongsawad and *P. (S.) similis* Yooyen, Moravec & Wongsawad also have numerous cephalic papillae, all present 12 papillae organized in three circlets formed by four papillae each and the papillae of the external circlet are distinctly large (Cardenas & Lanfredi, 2005; Yooyen *et al.* 2011). Nevertheless these species differ mainly in the host range and the geographical distribution. The first two species were recorded in the Neotropical Realm. *Procamallanus* (*Spirocamallanus*) *halitrophus* was recorded in marine fishes from the northern Gulf of Mexico and the coasts of Rio de Janeiro, Brasil; while *P. (S.) rebecae* was found in cichlid freshwater fishes from southern Mexico (Moravec, 1998). In contrast to *P. (S.) rigbyi* and *P. (S.) similis* that were recorded in marine perciform fishes from the Gulf of Thailand (Yooyen *et al.* 2011).

By the presence of pores surrounding the margin of the oral opening, *P. (S.) juana* **sp. nov.** resemble *P. (S.) daleneae* (Boomker), *P. (S.) spiralis* Baylis and *P. (S.) serranochromis* Moravec & Van As. The first two present six pores, which coincides with the new species; while *P. (S.) serranochromis* has four pores in the cephalic end. Nevertheless, these species can be distinguished mainly from *P. (S.) juana* **sp. nov.** by the geographical distribution. *Procamallanus* (*S.*) *daleneae* and *P. (S.) serranochromis* were only recorded in African freshwater fishes. While, *Procamallanus* (*S.*) *spiralis* was also found in Africa and in different species of marine fishes in the Gulf of Suez, off the Atlantic and Pacific coasts of Mexico, in Philippine and Indonesian waters (off the Celebes), and in the Indian Ocean off the coast of Pakistan and India (Moravec & Van As 2015).

Procamallanus (*S.*) *juana* **sp. nov.** can be distinguished from all congeners, by possessing 14 cephalic papillae arranged in three circlets (one of six papillae and two remaining with four papillae); six pores distinctly surrounding the mouth aperture; a buccal capsule with 5–7 spiral ridges; three pairs of preanal and three pairs of postanal papillae in males and a terminal cuticular spike on the female tail. Thus in this paper, we propose the erection of the new species of *Procamallanus* (*Spirocamallanus*), which is the 30th species of this genus for Neotropical Realm and the sixth for Argentina.

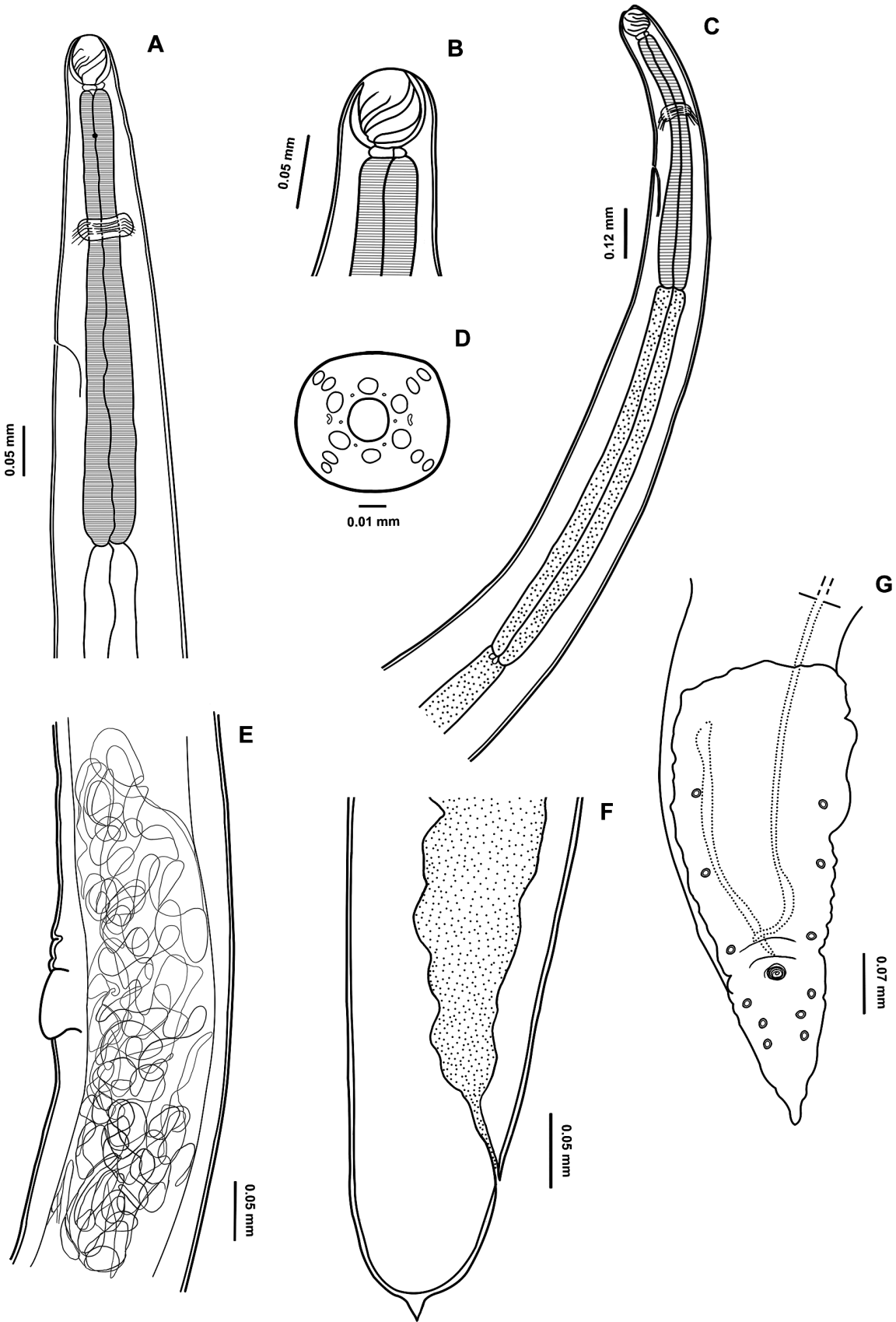


FIGURE 1. *Procamallanus (Spirocamallanus) juana* sp. nov. (A) Male, anterior end, lateral view. (B) Male, head, lateral view. (C) Female, anterior end, lateral view. (D) Female, apical view. (E) Female, vulva, lateral view. (F) Female, tail, lateral view. (G) Male, posterior end with spicules and papillae, ventral view.

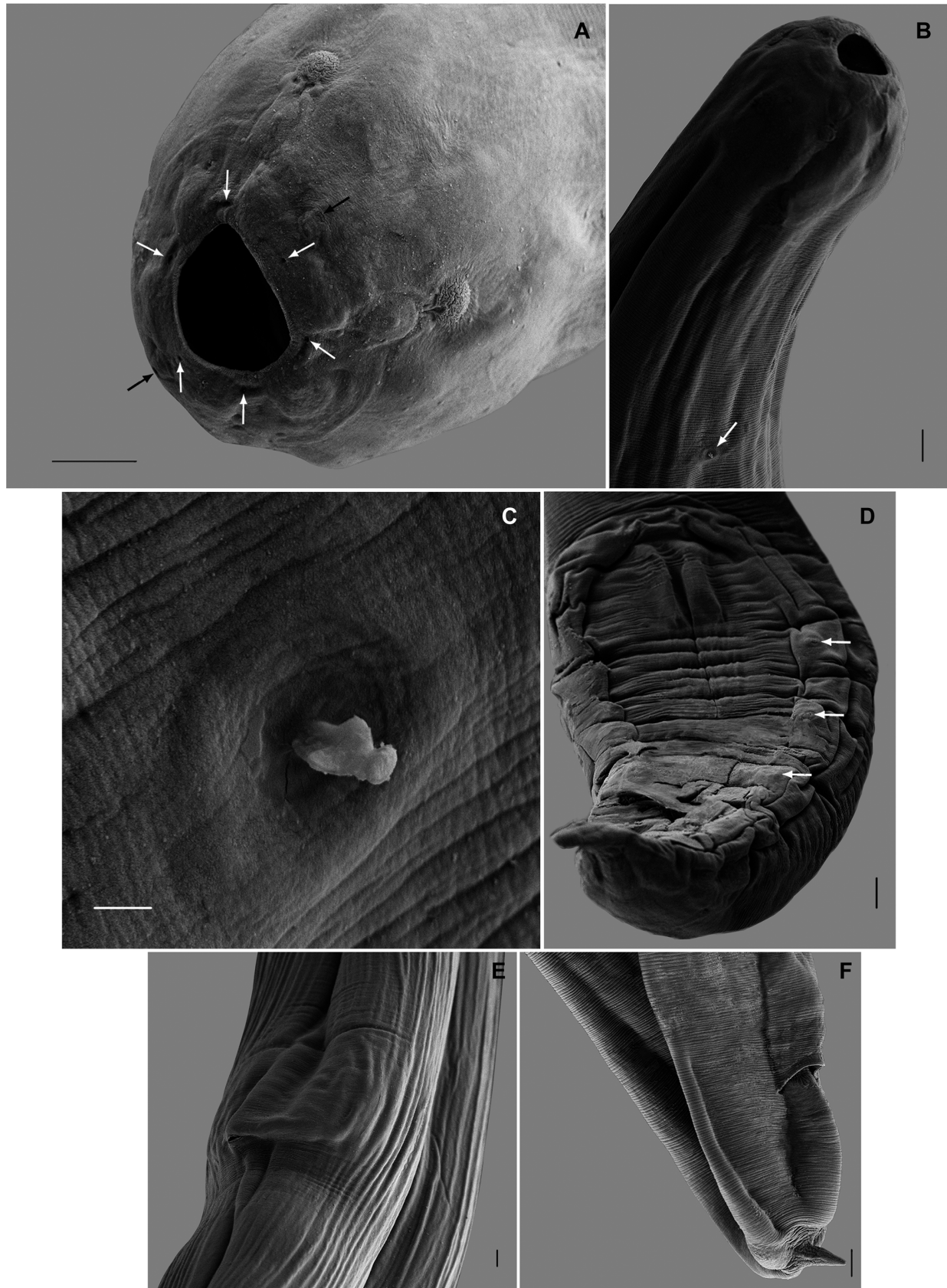


FIGURE 2. *Procammallanus (Spirocammallanus) juana* sp. nov. (SEM micrographs) (A) Male, cephalic end. Six pores (white arrows), amphids (black arrows). Scale=10µm. (B) Anterior end of male, sublateral view. Deirid (white arrow). Scale= 10µm. (C) Detail deirid. Scale=1µm. (D) Posterior end of male, ventral view. Preanal papillae (white arrows). Scale=10µm. (E) Female, vulva, subventral view. Scale=10µm. (F) Female, posterior end, lateral view. Scale=10µm.

Procamallanus (Spirocamallanus) hilarii Vaz & Pereira, 1934

Specimens examined. Six males and one female CH-N-FML #7732 isolated from *Hyphessobrycon anisitsi* (Eigenmann, 1907) (CI-FML #6429) from Salado River, Añatuya, General Taboada Department, Province of Santiago del Estero (28° 48' 42" S, 62° 39' 0.9" W), Northwest Argentina.

Infection parameters. Prevalence: 57% (4/7), mean intensity 1.75 nematodes per fish.

Diagnosis. Medium nematodes with transversely striated cuticle. Buccal capsule with 13–18 spiral thickenings, basal ring well development. Muscular esophagus claviform, much shorter than glandular esophagus. Male with three pairs of preanal, 1–2 pairs adanal and three pairs of postanal papillae. Gubernaculum absent. Spicules short and subequal. Larger spicule 0.070–0.082, small spicule 0.050–0.062. Tail conical. In females, vulva in middle of body; uterus containing larvae. Tail rounded with terminal caudal appendix.

Remarks. The morphological and morphometric analyses of the specimens analyzed by light microscopy, allowed the identification of *Procamallanus (Spirocamallanus) hilarii*, agreeing with the original description. *Procamallanus (S.) hilarii* belongs to a morphological group of species without caudal alae and with short and similar spicules in males, represented by *P. (S.) chimusensis* (Freitas & Ibañez), *P. (S.) inopinatus* Travassos, Artigas & Pereira, *P. (S.) krameri* (Petter), *P. (S.) neocaballeroi* (Caballero-Deloya), *P. (S.) paraensis* Pinto & Noronha, *P. (S.) pintoii* (Khon & Fernandes) and *P. (S.) saofranciscensis* (Moreira, Oliveira & Costas) (Moravec *et al.* 2004).

By the general morphology, *Procamallanus (S.) hilarii* is most closely related with *P. (S.) neocaballeroi*. Both species present numerous spiral ridges (13–19) occupying the whole inner surface of the buccal capsule and a glandular esophagus at least three times longer than muscular esophagus. *Procamallanus (S.) neocaballeroi* can be readily distinguished from *Procamallanus (S.) hilarii* by possessing equal spicules and four pairs of preanal papillae and six pairs of postanal papillae. Moreover these species differ in the geographical distribution in the Neotropical Region. *Procamallanus (S.) hilarii* was recorded for Brazil, Perú and Argentina; while *P. (S.) neocaballeroi* has only been recorded in Mexico (Moravec 1998).

Discussion. The genus *Procamallanus* Baylis, 1923 comprises numerous species described in a broad variety of host and geographical regions, in both marine and freshwater fishes. Although, many authors (Andrade-Salas *et al.* 1994) consider *Spirocamallanus* Olsen, 1952 as a distinct genus, Moravec & Sey (1988) consider *Spirocamallanus* a subgenus of *Procamallanus* to accommodate the species where both males and females have the buccal capsule with spiral ridges. Nevertheless, it is clear that this taxonomic system based on the morphology of the buccal capsule is more or less artificial and does not reflect the phylogenetic relationships (Moravec & Thatcher 1997).

Andrade-Salas *et al.* (1994) proposed an alphabetic list with all nominal species grouped according to the geographical zones. However, this list is outdated, because later new species of *Procamallanus* were described. With respect to the Neotropical Realm, species of *Procamallanus (Spirocamallanus)* occur both in marine and continental water systems. To date, there are 29 species recorded from freshwater fishes, and they are widely distributed for the Neotropical Realm; mainly in Mexico, Lesser Antilles, Venezuela, Brasil, Paraguay, Perú and Argentina.

In Argentina, there are five species of *Procamallanus (Spirocamallanus)* (*P. (S.) inopinatus*, *P. (S.) rarus*, *P. (S.) huacraensis*, *P. (S.) hilarii* and *P. (S.) pintoii*) recorded from characiform and siluriform freshwater fishes, mainly distributed in the regions northwest and northeast of the country. In the province of Corrientes, northeast region, it was registered *P. (S.) inopinatus* in Totorá y Pérez Lagoon, Riachuelo basin, and Riachuelo River Lagoon; and *P. (S.) rarus* in Paraná River. *Procamallanus (S.) inopinatus* presents a wide host range. It was recorded from specimens of Characiformes (*Brycon orbignyianus* Valenciennes, *Poptella paraguayensis* Eigemann, *Leporinus maculatus* Müller & Troschel, *Serrasalmus marginatus* Valenciennes, *S. spilopleura* Kner, *Pygocentrus nattereri* Kner) and Siluriformes (*Luciopimelodus pati* Valenciennes and *Pseudoplatysoma corruscans* Spix & Agassiz). By contrast, *P. (S.) rarus* was only found in *P. albicans* (Chemes & Takemoto 2011). Moreover, there are many records of both species in Brasil. *Procamallanus (S.) inopinatus* is also recorded from Paraguay and Venezuela and *P. (S.) rarus* from Perú (Moravec 1998). The new species herein described is most closely related with *P. (S.) rarus* by the presence of caudal alae and both species were found in the same host, *P. albicans*.

With respect to the northwest region, there are three species recorded: *P. (S.) huacraensis*, *P. (S.) pintoii* and *P. (S.) hilarii*. The first two were found only in catfishes: *Trichomycterus corduvensis* and *T. spegazzini* respectively

(All Trichomycteridae). *Procamallanus* (*S.*) *huacraensis* was registered from Huacra and Vis-Vis Rivers, and Dike Agua Fresca (Catamarca Province). While, there is a unique record of *P. (S.) pintoii* in irrigation ditch tributary of River Yacones (Vaqueros municipality, Salta Province). *Procamallanus (S.) hilarii* was recorded in a wide host spectrum: *Salminus brasiliensis* Cuvier (= *S. maxillosus* Valenciennes), *Megaleporinus obstusidens* Valenciennes (= *Leporinus obstusidens* Valenciennes), *Oligosarcus jenynsii* Günther, *Hoplias malabaricus* Bloch, *A. abramis* Jenyns, *A. lacustris* Lutken, *A. rutilus* Jenyns, *Piabina thomasi* Fowler (all characids); *Pimelodus albicans* Valenciennes (Pimelodidae, Siluriformes) and *Jenynsia alternimaculata* Fowler (Anablepidae, Cyprinodontiformes). Its geographical distribution includes dam, rivers, streams and tributaries from several localities of the provinces of Tucumán, Santiago del Estero and Salta (Northwest Argentina) (Ailan *et al.* 2014; Antelo *et al.* 2016; Ramallo 2008). *Procamallanus (S.) juana* sp. nov. was also found in *P. albicans*. Thus both species (*P. (S.) juana* sp. nov. and *P. (S.) hilarii*) share the same host species and present records in the province of Santiago del Estero. However, these species differ in their general morphology, mainly in the presence of caudal alae, the number of spiral ridges in the buccal capsule and the number of caudal papillae in males (Moravec 1998).

With the new finding, the number of species of *Procamallanus (Spirocamallanus)* was extended for the Neotropical Realm. Moreover, *P. (S.) hilarii* extends its host range and geographical distribution.

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