

# The genus *Prosphaerosyllis* (Polychaeta: Syllidae: Exogoninae) in Brazil, with description of a new species

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*In studies carried out off the north-eastern and south-eastern coast of Brazil, three species of Prosphaerosyllis were found: P. isabellae, which was already recorded for Brazilian waters; P. xarifae, a newly recorded species for the area; and P. brachycephala sp. nov., a new to science species. Prosphaerosyllis brachycephala sp. nov., is characterized by having swollen anterior part of the body, prostomium retractable within the peristomium and anterior segments, short antennae, short peristomial and dorsal cirri, and falcigers with short, unidentate blades throughout. All these species are herein described and compared to the most similar congeners.*

**Keywords:** new species, new records, Syllidae, Exogoninae, *Prosphaerosyllis*, Brazil

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## INTRODUCTION

Syllidae Grube, 1850, is one of the largest families of polychaetes, currently comprising around 700 species, divided into more than 70 genera (Aguado *et al.*, 2007). The family is traditionally divided into 4 subfamilies: Syllinae Grube, 1850; Autolytinae Langerhans, 1879; Exogoninae Langerhans, 1879; and Eusylinae Malaquin, 1893. However, this is a 'more practical than scientific' division (Fauchald, 1977), both because of several new taxa being described with a mixture of features characteristic of different subfamilies (San Martín & López, 2003; San Martín *et al.*, 2007), and because the phylogenetic relationships within the family are unclear (Aguado *et al.*, 2007). The family comprises small-bodied errant polychaetes, inhabiting a multitude of marine environments. According to San Martín (2003), syllids are found in almost all littoral samples.

The proventricle, one of the synapomorphies of the family, is a muscular structure associated with the anterior part of the gut. It is involved in food intake and in the production of hormones related to reproductive cycles (Franke, 1999; San Martín, 2003). The easy observation of the proventricle through the transparent body wall of most syllids makes them easily recognizable to family level, although further identifications are considered difficult (Pleijel, 2001).

The family is little known in Brazilian waters, with approximately 80 species reported (Rullier & Amoureux, 1979; Morgado & Amaral, 1985; Nogueira, 2000, 2006; Nogueira *et al.*, 2001, 2004; Nogueira & San Martín, 2002; Amaral *et al.*, 2006; Fukuda & Nogueira, 2006; Paiva *et al.*, 2007;

Nogueira & Fukuda, 2008; Nogueira & Yunda-Guarín, 2008). Most of these reports, however, came from the south-eastern part of the country, and the family is nearly unknown on the remaining parts of the Brazilian coast. Yunda-Guarín (2007) provided the first records for the syllids occurring off the coast of the State of Ceará, including *P. brachycephala* sp. nov., herein described, and other new species (Nogueira & Yunda-Guarín, 2008).

The subfamily Exogoninae comprises some of the smallest species of syllids, many of them interstitial, but also commonly found associated with algae, sponges, corals, mussel beds, and similar substrates. The species of Exogoninae typically brood their eggs, in two different ways, which separate the taxa in this subfamily into two well-defined groups (San Martín, 2005). The first group broods eggs dorsally by means of special capillary notochaetae that are only present in mature specimens, which pin the eggs until free-swimming larvae hatch. The second group broods eggs ventrally by means of adhesive glands, possibly nourishing the embryos through a connection between the anus of the embryo and the modified nephridial pores of the parental specimen (San Martín, 2005). In this latter case, free-swimming larvae are absent and the embryos remain attached to the parent until they are fully developed, with several chaetigers.

The exogonine genus *Prosphaerosyllis* San Martín, 1984, is composed of small-sized syllids, usually with bodies covered dorsally and ventrally by numerous short, rounded to more or less elongated papillae. The antennae and cirri are articulated in two well-marked parts, with short cirrostyles retractable inside the longer cirrophores; usually the dorsal cirri on the second chaetiger are present, but some species may lack them. The pharynx and the proventricle are massive, with pharyngeal tooth usually situated far from the anterior margin. The species classified into this genus present dorsal brooding of eggs.

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Only one species of *Prosphaerosyllis* has been recorded for Brazilian waters, *P. isabellae* (Nogueira, San Martín & Amaral, 2001), by Temperini (1981), Nogueira (2000, 2006), Nogueira *et al.* (2001), and Gomes (2006), a species which was also reported for Western Australia (San Martín, 2005). More recently, *P. xarifae* (Hartmann-Schröder, 1960), the type species of the genus, was found among algae, sponges, and similar substrates on rocky shores off the coast of the State of São Paulo, south-eastern Brazil. Another species, *P. brachycephala* sp. nov., was collected from sandy bottoms off the coast of the State of Ceará, north-eastern Brazil. These records raise to three the number of species of *Prosphaerosyllis* occurring in Brazil. However, considering the great extent of the Brazilian coast and that the fauna of syllids occurring in the country has not yet been investigated thoroughly, it is likely that several other species of this genus will be found as more studies are carried out on the Brazilian coast.

## MATERIALS AND METHODS

The material for the present study came from four independent studies. The first of these, the project 'REVIZEE/Score Sul/Bentos Marinho', sampled the south-eastern and southern parts of the Brazilian Exclusive Economic Zone, between the States of Rio de Janeiro and Rio Grande do Sul, and was part of a larger taxonomic survey of the fauna of the Brazilian Exclusive Economic Zone. Collections were made from several types of bottom substrates, at depths from 60–800 m, with Van Veen grabs, box corers, and dredges (Amaral *et al.*, 2004).

The second study, project 'BIOTA/FAPESP/Benthic Marine Biodiversity in the State of São Paulo', was an extensive survey conducted on some beaches off the northern coast of the State of São Paulo, which analysed samples obtained from rocky shores from the intertidal zone to shallow waters, and from soft bottoms, at depths to 47 m. The material from both these projects was received previously sorted to family and preserved in 70% ethanol.

The third study, 'Biodiversity of Intertidal Polychaetes (Annelida: Polychaeta) on Rocky Shores off the State of São Paulo', was carried out by the Laboratório de Poliquetologia, Instituto de Biociências, Universidade de São Paulo. For this project, collections were made by scraping rocks along shores to extract small amounts of tufts of algae, colonies of sponges and ascidians, small pieces of sabelariid reefs, and similar substrates at neap tide. The material was studied alive under stereomicroscope; polychaetes were sorted, relaxed in a Petri dish with seawater and a few menthol crystals, fixed in 4% formaldehyde, and, a few weeks later, washed in fresh water and stored in 70% ethanol.

For the fourth study (Yunda-Guarín, 2007), samples were taken from ten randomly selected stations off the city of Fortaleza (State of Ceará), ranging from 1633–5178 m offshore. Four collections were made at each station, on 28 September 2004, 16 December 2004, 28 March 2005, and 5 July 2005, from the research vessel 'Prof. Martins Filho', belonging to the Instituto de Ciências do Mar, Universidade Federal do Ceará. Three samples were taken from each station at each collection, with a 3.6 l Van Veen grab. Samples were immediately fixed in 4% formaldehyde, animals were sorted under a stereomicroscope to the lowest

taxonomic level possible, washed, transferred to 70% ethanol, and identified to species. Further details on the collections, including abiotic characteristics of each station at each collection, were provided by Yunda-Guarín (2007) and Nogueira & Yunda-Guarín (2008).

Identifications were based on morphological characters; illustrations were done with the aid of a drawing tube attached to an Olympus BX-51<sup>®</sup> microscope. Measurements of the length of specimens were made from the tip of the prostomium, excluding antennae, to the tip of the pygidium, excluding anal cirri; measurements of width were taken at the proventricular level, excluding parapodia. For the study under scanning electron microscope (SEM), specimens were dehydrated in a series of ethanol solutions, with progressively increasing concentrations (75–100%), then critical-point-dried, covered with a layer of 10–20 nm of gold, and analysed under the SEM at the Laboratório de Microscopia Eletrônica, Museu de Zoologia, Universidade de São Paulo (MZUSP).

The description of *Prosphaerosyllis brachycephala* sp. nov., was based on the whole type-series, data from the holotype for each character are shown in parentheses immediately after the range of variation within the type-series.

The material was deposited at the MZUSP and the Museu de Zoologia, Universidade Estadual de Campinas (ZUEC).

## SYSTEMATICS

Family SYLLIDAE Grube, 1850  
Subfamily EXOGONINAE Langerhans, 1879  
Genus *Prosphaerosyllis* San Martín, 1984

## TYPE SPECIES

*Sphaerosyllis xarifae* Hartmann-Schröder, 1960, designated by San Martín, 1984a.

## DIAGNOSIS

Small bodied exogonines, covered dorsally and ventrally with numerous papillae, including on palps, cirri and parapodia. Prostomium with 3 short antennae, 4 eyes and, usually, 2 anterior eyespots; prostomium posteriorly covered by peristomium for variable extension. Peristomium with 1 pair of peristomial cirri. Dorsal cirri usually present on all chaetigers, absent on chaetiger 2 in a few species. Antennae, peristomial cirri, dorsal cirri throughout and anal cirri with spherical base (cirrophore) and pointed, distally blunt tip (cirrostyle) usually retractable within cirrophore, at least from midbody. Parapodial glands usually absent. Blades of falcigers usually unidentate and relatively short, usually progressively shorter ventralwards. Aciculae subdistally inflated and slightly curved, with acuminate tips. Pharynx long and wide, usually not surrounded by soft papillae, pharyngeal tooth conical, usually away from anterior margin; proventricle massive, about same size as pharynx. Reproduction by epigamy, with dorsal incubation of eggs by means of capillary notochaetae.

## REMARKS

San Martín (1984a) split the original genus *Sphaerosyllis* Claparède, 1863, into two subgenera, *Sphaerosyllis* and *Prosphaerosyllis*, based on the presence or absence of dorsal cirri on chaetiger 2, the size and shape of the pharynx compared to the proventricle, the size and position of the pharyngeal tooth, and the shapes of the antennae and cirri. Although this division was not immediately accepted by most other authors (Russell, 1989; Kudenov & Harris, 1995), recently San Martín (2003) raised *Prosphaerosyllis* to the generic level, taking into account the brooding system, which is also different in both genera. This proposal has been adopted by subsequent authors (Böggemann & Westheide, 2004; San Martín, 2005).

In Brazil, the only species of *Prosphaerosyllis* recorded prior to the present report is *P. isabellae* (Nogueira, 2000, 2006; Nogueira *et al.*, 2001; Gomes, 2006), which was also found in this study.

KEY FOR THE SPECIES OF *PROSPHAEROSYLLIS* RECORDED IN BRAZIL

1. Body distinctly thinner posterior to proventricle; prostomium retractable within peristomium and first segments; parapodial glands present from chaetiger 1 . . . . .  
*P. brachycephala* sp. nov.  
 – Body of relatively uniform width throughout; prostomium only covered by peristomium posteriorly; parapodial glands absent . . . . . 2
2. Midbody dorsal cirri with enlarged cirrophores, iridescent inclusions absent; yellowish pharyngeal glands scattered over posterior part of pharynx, paired rounded pharyngeal glands absent; proventricle with ~26 rows of muscle cells, extending through ~3 segments . . . . .  
*P. xarifae*  
 – Dorsal cirri similar throughout, with bulbous bases and button-like tips, iridescent inclusions present in cirrophores; 1 pair of rounded, brownish pharyngeal glands at level of chaetiger 1; proventricle with ~35 rows of muscle cells, extending through ~4 segments . . . . . *P. isabellae*

*Prosphaerosyllis brachycephala* sp. nov.  
 (Figures 1–2)

## TYPE MATERIAL

Holotype and paratypes 1–3 deposited at MZUSP, paratypes 4–7 deposited at ZUEC; holotype and paratypes 1–2, 6–7 preserved in 70% ethanol, paratypes 3–5 mounted on slides in glycerin jelly. Type-series from off Fortaleza, Ceará, Brazil. Holotype (MZUSP 901): 03°40'04.3"S 38°32'00.6"W, 10.5 m deep, coll. 28 September 2004; paratype 1 (MZUSP 902): 03°39'51"S 38°32'38.7"W, 11 m deep, coll. 28 September 2004; paratype 2 (MZUSP 903): 03°39'16.7"S 38°33'25.8"W, 13.5 m deep, coll. 5 July 2005; paratype 3 (MZUSP 904): 03°39'16.7"S 38°33'25.8"W, 13.5 m deep, coll. 5 July 2005; paratype 4 (ZUEC POL 29): 03°39'16.7"S 38°33'25.8"W,

12 m deep, coll. 28 March 2005; paratype 5 (ZUEC POL 29): 03°39'16.7"S 38°33'25.8"W, 12 m deep, coll. 28 March 2005; paratype 6 (ZUEC POL 30): 03°39'51"S 38°3'238.7"W, 11 m deep, coll. 28 September 2004; paratype 7 (ZUEC POL 31): 03°39'16.7"S 38°33'25.8"W, 12 m deep, coll. 16 December 2004. Morphological features of each specimen of the type series are listed in Table 1.

## ADDITIONAL MATERIAL EXAMINED

Off Fortaleza, Ceará, Brazil. Station 9 (03°39'16.7"S 38°33'25.8"W), 13 m deep: 9 specs, coll. 28 September 2004; 12 m deep: 40 specs, coll. 16 December 2004; 4 specs, coll. 28 March 2005; 13.5 m deep: 35 specs, coll. 5 July 2005. Station 6 (03°39'51"S 38°32'38.7"W), 11 m deep: 15 specs, coll. 28 September 2004; 12 m deep: 13 specs, coll. 16 December 2004; 7 specs, coll. 28 March 2005; 12.5 m deep: 45 specs, coll. 5 July 2005. Station 3 (03°40'04.3"S 38°32'00.6"W), 10.5 m deep: 9 specs, coll. 28 September 2004; 11 m deep: 15 specs, coll. 16 December 2004; 12 m deep: 4 specs, coll. 28 March 2005; 12.3 m deep: 12 specs, coll. 5 July 2005. Station 8 (03°40'17.1"S 38°33'37.5"W), 12 m deep: 8 specs, coll. 28 September 2004. Station 10 (03°40'18.8"S 38°34'32.2"W), 15.5 m deep: 17 specs, coll. 28 September 2004; 14 m deep: 3 specs, coll. 16 December 2004; 1 spec., coll. 28 March 2005. Station 7 (03°41'10.8"S 38°33'51.8"W), 13.1 m deep: 2 specs, coll. 5 July 2005. Station 4 (03°41'31.5"S 38°33'12.9"W), 12 m deep: 2 spec, coll. 12 December 2004; 11.5 m deep: 1 spec., coll. 5 July 2005. Station 1 (03°41'36"S 38°32'31.3"W), 12 m deep: 1 spec., coll. 28 September 2004.

## DESCRIPTION

Relatively large sized species, holotype with 23 chaetigers, 2.45 mm long, 0.37 mm wide (Table 1). Anterior body robust, progressively broader until around segment 3, of relatively uniform width until end of proventricle, then abruptly thinner (Figures 1A & 2A, C); few small papillae on dorsum, more prominent on palps and pygidium (Figure 2A–F). Prostomium short, truncate, retractable within peristomium and anteriormost chaetigers; distinction between palps and prostomium inconspicuous, palps short, completely fused dorsally (Figure 2A–E); 4 eyes in trapezoidal to rectangular arrangement, anterior pair of eyespots absent (Figure 1A); all antennae about same size, small, papilliform, with rounded cirrophores and short, button-like cirrostyles; median antenna inserted between posterior pair of eyes; lateral antennae inserted between anterior pair of eyes, each one close to an eye of a pair or slightly anterior to it. Peristomium much shorter than segments, especially dorsally; peristomial cirri about same size as antennae, located laterally to dorsal cirri on following segments (Figures 1A & 2B–E). Dorsal cirri present on all chaetigers, similar to antennae and peristomial cirri, but with more truncate tips; dorsal cirri located far from parapodial lobes on anterior chaetigers; ventral cirri papilliform, shorter than parapodial lobes, situated close to them (Figure 2B–C). Parapodia short, projecting for a short distance from body wall; light, hyaline parapodial glands present on all chaetigers (Table 1); anterior parapodia with 4–7 (5–7) falcigers each, 4–6 (4–6) falcigers per

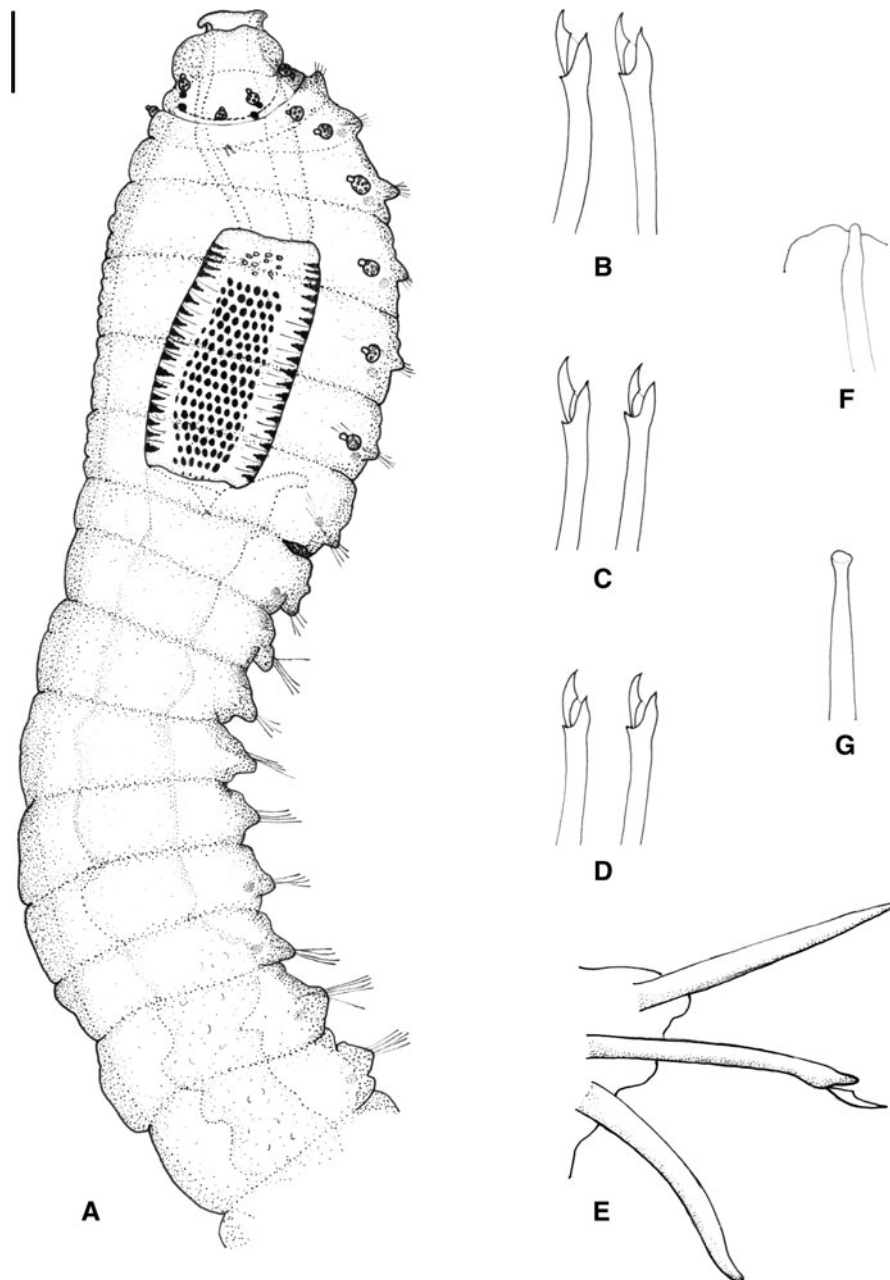


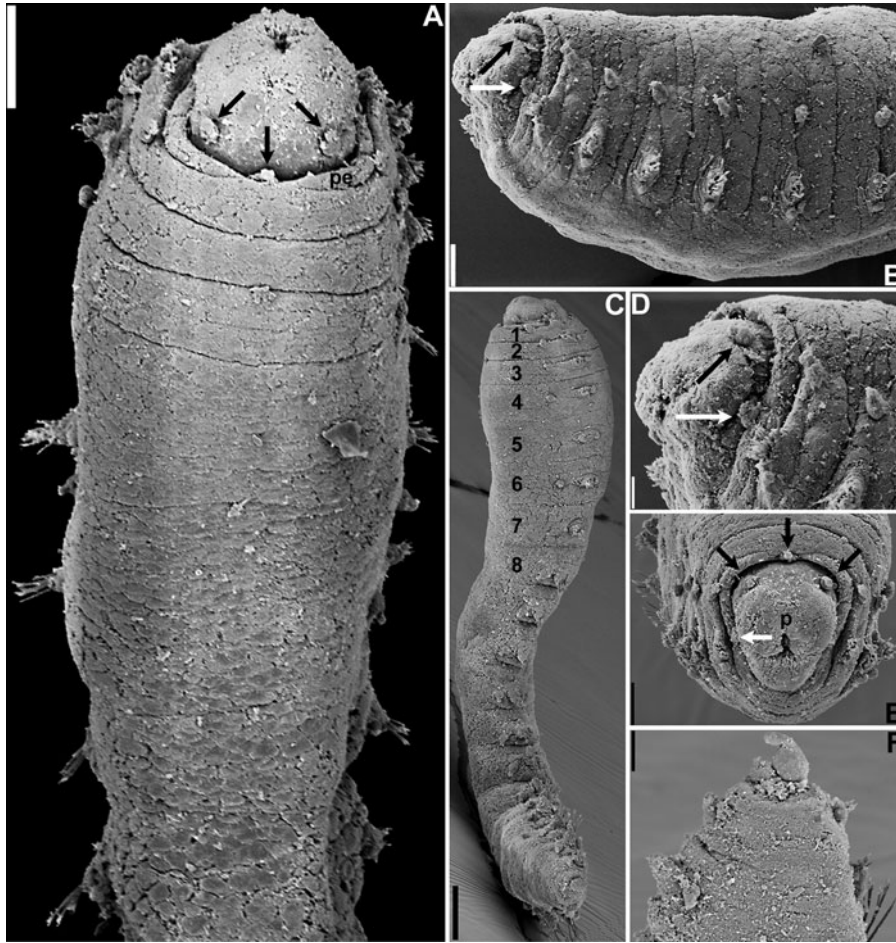
Fig. 1. *Prosphaerosyllis brachycephala* sp. nov., paratype 4 (ZUEC POL 29). (A) Anterior body, right dorso-lateral view; (B) falcigers, anterior parapodium; (C) falcigers, midbody parapodium; (D) falcigers, posterior parapodium; (E) parapodium, posterior chaetiger; (F) acicula, posterior parapodium; (G) acicula distally enlarged, found in posterior parapodia of some specimens. Scale bars: A, 100  $\mu$ m; B–G, 10  $\mu$ m.

parapodium from midbody, progressively diminishing in number towards posterior end (Figure 1E); falcigers with smooth blades and shafts, blades about same length throughout,  $\sim 7$ – $9$  (7)  $\mu$ m long (Figure 1B–D; Table 1). Dorsal simple chaetae present from anterior chaetigers, usually from chaetiger 1, smooth, slightly sigmoid (Figure 1E); ventral simple chaetae only present on posterior chaetigers, smooth, more sigmoid than dorsal simple chaetae (Figure 1E). Single acicula per parapodium throughout, straight, slightly oblique subdistally on posterior chaetigers, with distally blunt tip protruding from parapodia lobe (Figure 1F); a second type of aciculae, distally enlarged, with apparently hollow concavity, may be present on posterior parapodia (Figure 1G). Pygidium semicircular, with papillae more conspicuous than on dorsal

surface of body; anal cirri larger than antennae, peristomial and dorsal cirri (Figure 2F; Table 1), with rounded bases and digitiform tips, but not articulated. Pharynx through  $\sim 3.5$ – $4.5$  (4.5) segments, with smooth anterior margin and conical tooth located near midlength of pharynx; proventricle extending for 3.5–4 (3.5) chaetigers, with  $\sim 22$ – $25$  (24) rows of muscle cells (Figure 1A; Table 1).

#### VARIATION

The largest specimen examined was paratype 4, with 26 chaetigers, 3.4 mm long, 0.4 mm wide, the smallest was paratype 6, with 19 chaetigers, 1.61 mm long, 0.3 mm wide. Parapodial



**Fig. 2.** *Prosphaerosyllis brachycephala* sp. nov., SEM (A, C, E—specimen 1; B, D, F—specimen 2). (A) Anterior body, dorsal view; (B) anterior body, left lateral view; (C) entire body, left lateral view; (D) anterior end, left lateral view; (E) anterior end, frontal view; (F) posterior end, dorsal view. Numbers refer to segments; black arrows point to antennae; white arrows point to peristomial cirri; p, palps; pe, peristomium. Scale bars: A, 60  $\mu$ m; B, E 40  $\mu$ m; C, 100  $\mu$ m; D, 20  $\mu$ m; F, 30  $\mu$ m.

glands are inconspicuous, empty in some specimens examined (Table 1). Second type of aciculae only present in paratypes 4 and 5. Paratype 3 with one egg attached to left parapodium of chaetiger 13.

## REMARKS

*Prosphaerosyllis brachycephala* sp. nov., is similar to *P. isabellae* in the position of the insertion of antennae; the morphology of antennae, peristomial and dorsal cirri; the palps being conspicuously papillated; and in the size and morphology of the blades of falcigers. However, *P. isabellae* is distinguished from *P. brachycephala* sp. nov., because it lacks retractable prostomium; its proventricle has more rows of muscle cells, 32–36 rows, against 22–25 rows as in *P. brachycephala* sp. nov., and in having a characteristic pair of pharyngeal glands at the level of chaetiger 1 (see below).

*Prosphaerosyllis brevicirra* (Hartmann-Schröder, 1960) is another species similar to *P. brachycephala* sp. nov., in having the antennae, cirri and blades of falcigers shorter than most species of the genus, and protruding aciculae. *P. brevicirra* differs from *P. brachycephala* sp. nov., in not

having a retractable prostomium; in the peristomium being only slightly shorter than segments; the pharyngeal tooth being located on the anterior quarter of the pharynx; and the proventricle having  $\sim 20$  rows of muscle cells (Hartmann-Schröder, 1960).

*Prosphaerosyllis brachycephala* sp. nov., resembles *P. magnoculata* (Hartmann-Schröder, 1986) in having papillated palps; a similar position of insertion of the antennae; the peristomium shorter than the anterior segments; similar length of the blades of the falcigers; morphology of the aciculae; and the number of rows of proventricular muscle cells. *Prosphaerosyllis magnoculata* differs from *P. brachycephala* sp. nov., in lacking a retractable prostomium; in having 1 pair of anterior eyespots in addition to the 2 pairs of eyes; and having falcigers with spinulated blades on the anterior chaetigers (Hartmann-Schröder, 1986; San Martín, 2005).

*Prosphaerosyllis riseri* (Perkins, 1980) is also similar to *P. brachycephala* sp. nov., with similar length of the blades of falcigers and morphology of the aciculae and dorsal and ventral simple chaetae. However, *P. riseri* is distinguished from *P. brachycephala* sp. nov., by having the midbody dorsal cirri with large cirrophores and reduced cirrostyles; dorsalmost falcigers on all chaetigers with slightly spinulated

Table 1. Variation among the type-series of *Prosphaerosyllis brachycephala* sp. nov.

	Holotype	Paratype 1	Paratype 2	Paratype 3	Paratype 4	Paratype 5	Paratype 6	Paratype 7
	MZUSP 901	MZUSP 902	MZUSP 903	MZUSP 904	ZUEC POL 29	ZUEC POL 29	ZUEC POL 30	ZUEC POL 31
Number of chaetigers	23	28	23	21	26	26	19	24
Total length × width at proventricle (mm)	2.45 × 0.37	2.75 × 0.39	1.93 × 0.42	2.08 × 0.40	3.40 × 0.40	2.81 × 0.40	1.61 × 0.30	2.23 × 0.42
Length of blades of falcigers (µm)/number of falcigers per parapodium	~7/5-7	~7/~6	~7/4-6	7-9/5-7	~7/6	~7/5-6	~7/5-6	~7/5-6
Anterior body	~7/4-6	~7/4-5	~7/4-5	7-9/4-5	~7/4-6	~7-8/4-5	~7/4	~7/4
Midbody	~7/4-5	~7/4	~7/3-4	7-9/4-5	~7/4-5	~7/4-5	~7/3-4	~7/3-4
Posterior body	4-5 (everted)	4	3-5-4	4	4 (everted)	3-5	3-5	~4 (everted)
Length of pharynx (number of chaetigers)	3-5; 24	3-5; 25	4; 22	4; 23	4; 24	3-5-4; 24	4; 23	4; 24
Length of proventricle (number of chaetigers); number of rows of muscle cells	45/52	55/55	47/47	—/50	30/—	58/—	52/55	~55/—
Length of anal cirri—right/left (µm)	Conspicuous	Inconspicuous	Inconspicuous	Conspicuous	Conspicuous	Inconspicuous	Inconspicuous	Inconspicuous
Parapodial glands								

blades; a different pattern of distribution of dorsal papillae; and the proventricle with fewer rows of muscle cells, 17–18 rows (Perkins, 1980; Russell, 1991).

San Martín (2003) provided the description of a *Prosphaerosyllis* sp. which had previously been identified as *Sphaerosyllis brevicirra* by Alós (1989) and which resembles *P. brachycephala* sp. nov., in having the antennae, peristomial and dorsal cirri shorter than in most species of the genus, and in the morphology of the aciculae, falcigers, and dorsal and ventral simple chaetae. However, *Prosphaerosyllis* sp. differs from the new Brazilian species in lacking a retractable prostomium; in the peristomium being just slightly shorter than the chaetigers; in the absence of dorsal cirri on chaetiger 2; and in the anal cirri being just slightly larger than the dorsal cirri of the posterior chaetigers, instead of having anal cirri much larger than all dorsal cirri as in *P. brachycephala* sp. nov. (Figure 2F).

Finally, the Australian species *P. multipapillata* (Hartmann-Schröder, 1979) and the Mediterranean species *P. adela* San Martín, 1984, are probably the species most similar to *P. brachycephala* sp. nov., in having a retractable prostomium; antennae, peristomial and dorsal cirri shorter than most species of the genus; and short, smooth to finely spinulated blades of falcigers. Both *P. multipapillata* and *P. adela* differ from *P. brachycephala* sp. nov., in the pattern of distribution and shape of papillae, *P. multipapillata* having the body heavily covered dorsally and ventrally with small, rounded papillae, and *P. adela* having only a few digitiform papillae, more conspicuous on the anterior body. In addition, *P. multipapillata* has the antennae and cirri papilliform, and *P. adela* has aciculae subdistally enlarged and surrounded by a crown of spines, dorsal cirri with truncate tips, and anal cirri with enlarged cirrophores and short, button-like cirrostyles (San Martín, 1984a, 2003, 2005).

## ETYMOLOGY

The epithet 'brachycephala' comes from the Greek, meaning 'truncated head', in reference to the retractable prostomium of this species.

*Prosphaerosyllis xarifae* (Hartmann-Schröder, 1960)  
(Figure 3)

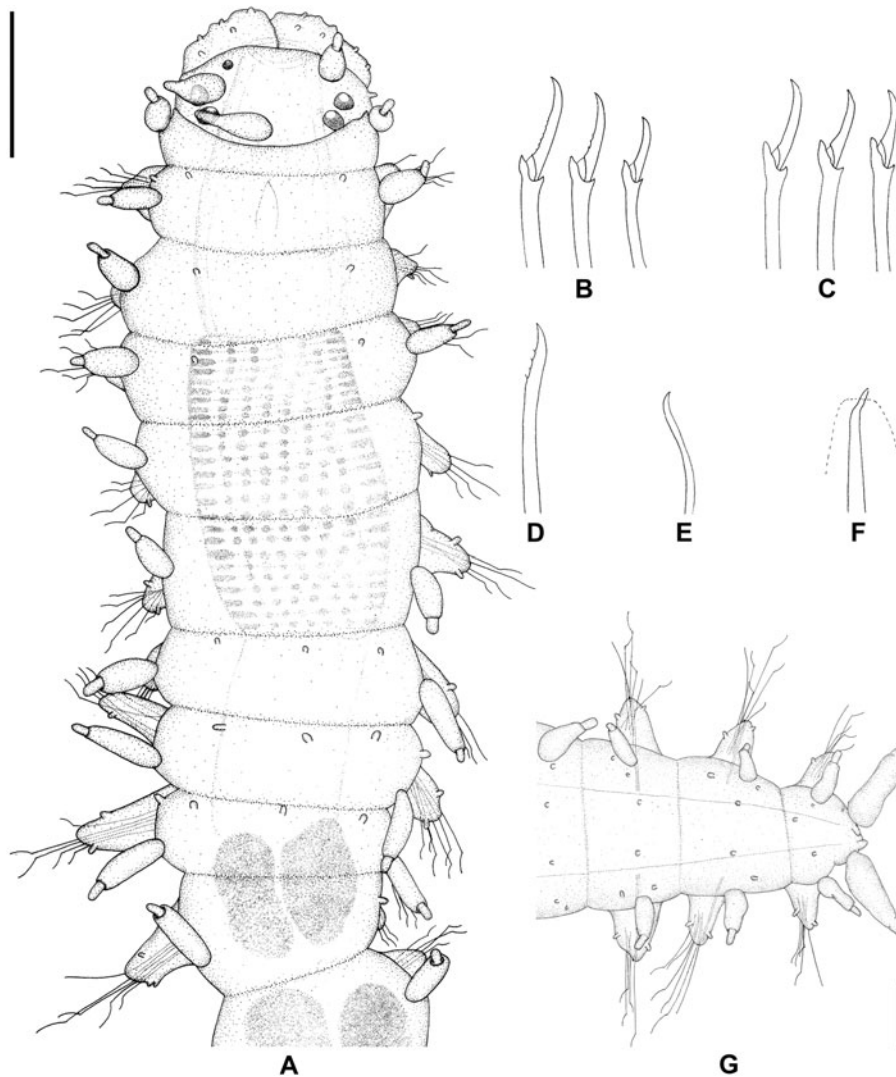
*Sphaerosyllis xarifae* Hartmann-Schröder, 1960: 103, figures 121–124; 1980: 56; San Martín, 1984b: 236, lámina 54.

*Prosphaerosyllis xarifae*. San Martín, 2003: 225, figures 119–120; 2005: 60, figures 15–16.

## MATERIAL EXAMINED

'Biodiversity of Intertidal Polychaetes (Annelida: Polychaeta) on Rocky Shores off the State of São Paulo'. Santos–Ilha das Palmas (24°00'S 46°19'W): 3 specs (ZUEC POL 32–34), coll. 5 October 2005.

'Project BIOTA/FAPESP/Benthic Marine Biodiversity in the State of São Paulo'. São Sebastião–Praia Baleia (23°46'S 45°39'W), on rocky shore: 3 specs (MZUSP 905), coll. 8 April 2001; 1 spec. (ZUEC POL 35), coll. 12 December 2001; 2 specs, coll. 13 December 2001.



**Fig. 3.** *Prosphaerosyllis xarifae* (MZUSP 905). (A) Anterior body, dorsal view; (B) falcigers, anterior parapodium; (C) falcigers, midbody and posterior parapodia; (D) dorsal simple chaeta; (E) ventral simple chaeta; (F) acicula; (G) posterior body, dorsal view. Scale bars: A, 100  $\mu\text{m}$ ; B–F, 10  $\mu\text{m}$ ; G, 50  $\mu\text{m}$ .

## DESCRIPTION

Small sized species, largest specimen examined incomplete, with 18 chaetigers, 1.39 mm long, 0.22 mm wide; smallest specimen examined complete, with 8 chaetigers, 0.5 mm long, 0.13 mm wide (Table 2). Dorsum with small, rounded papillae arranged in longitudinal and transverse lines, more conspicuous on palps and on segments after proventricle. Prostomium ovate, larger than palps; palps short, fused, except for a terminal notch; prostomium with 4 eyes in trapezoidal arrangement and 1 pair of anterior eyespots situated close to anterior margin; median antenna inserted between posterior pair of eyes or slightly anteriorly, each lateral antenna inserted in front of one eye of anterior pair (Figure 3A). Peristomium about half length of anterior segments, covering posterior part of prostomium, especially laterally; peristomial cirri same size as lateral antennae or slightly shorter. Antennae, peristomial cirri, and dorsal cirri on anterior chaetigers with bulbous bases and short tips, antennae sometimes not articulated in cirrophores and cirrostyles; all dorsal cirri articulated, those on midbody chaetigers with elongated cirrophores (Figure 3A). Anterior and midbody

chaetigers with 5–7 falcigers per parapodium, posterior chaetigers with 3–5 falcigers per parapodium (Table 2); falcigers with unidentate, usually smooth blades, but sometimes dorsal-most falcigers on anterior chaetigers with short, thin spines on margin; blades of falcigers with dorsoventral gradation in length, measuring 10–21  $\mu\text{m}$  on anterior parapodia (Figure 3B; Table 2), 10–16  $\mu\text{m}$  on midbody and posterior parapodia (Figure 3C; Table 2). Dorsal simple chaetae present on all parapodia, similar in width to shafts of falcigers, slightly sigmoid, unidentate, with short subdistal spines (Figure 3D); ventral simple chaetae only present on posterior parapodia, smooth, sigmoid, thinner than dorsal simple chaetae (Figure 3E). Single acicula per parapodium throughout, aciculae acuminate, subdistally oblique, with tips slightly protruding from parapodial lobes, more conspicuously on posterior parapodia (Figure 3F). Pygidium semicircular, with prominent papillae, and 1 pair of anal cirri with similar shape to posterior dorsal cirri, but larger (Figure 3G). Pharynx extending through 2.5–4 segments, with yellowish pharyngeal glands scattered on posterior part, pharyngeal tooth large, conical, situated at midlength of pharynx or slightly anteriorly; proventricle similar in size to pharynx,

**Table 2.** Variation among some specimens of *Prosphaerosyllis xarifae* analysed for the present study; all specimens mounted on slides in glycerin jelly.

	Specimen 1 ZUEC POL 32	Specimen 2 MZUSP 905	Specimen 3 MZUSP 905	Specimen 4 MZUSP 905	Specimen 5 ZUEC POL 35
Number of chaetigers	18 (incomplete)	17	15 (incomplete)	8	16
Total length × width at proventricle (mm)	1.39 × 0.22	1.38 × 0.22	1.24 × 0.18	0.50 × 0.13	1.36 × 0.23
Length of blades of falcigers (µm)/number of falcigers per parapodium					
Anterior body	11–21/5–7	10–18/7	11–18/6–7	10–16/6–7	10–19/6–7
Midbody	12–15/6–7	11–16/5–7	10–16/6–7	10–16/5–7	13–16/6
Posterior body	11–15/4	11–14/3–4	—	10–12/2–5	10–14/5
Length of pharynx (number of chaetigers)	4	3 (everted)	3 (everted)	2.5	3 (everted)
Length of proventricle (number of chaetigers); number of rows of muscle cells	2.5–3; 24	3; 22	3; 25	2; 26	3; 22
Length of anal cirri—right/left (µm)	—	83/75	—	—	—
Dorsally attached eggs	1 pair/chaetiger on chaetigers 10–12	—	—	—	On left parapodia of chaetigers 8–10, 13

through 2–3 segments, with 22–26 rows of muscle cells (Figure 3A; Table 2).

## REMARKS

Two other species of *Prosphaerosyllis* are similar to *P. xarifae* in having dorsal cirri on midbody chaetigers with elongated cirrophores and short, button-like cirrostyles: *P. riseri* (Perkins, 1980) and *P. campoyi* (San Martín, Acero, Contonente & Gómez, 1982). However, *P. xarifae* is distinguished from *P. riseri* by having longer blades of falcigers, measuring 10–21 µm, against ~8 µm as in *P. riseri*, and by having the proventricle with more rows of muscle cells, 22–26 rows, against 17–18 in *P. riseri*.

*Prosphaerosyllis campoyi* differs from *P. xarifae* in the morphology of falcigers, especially from midbody chaetigers, with the dorsalmost falcigers having heavily spinulated blades, and dorsal simple chaetae being slightly curved distally, similar to the tips of the blades of falcigers (San Martín, 2003, figure 117D), instead of sigmoid as in *P. xarifae*.

## DISTRIBUTION

Red Sea: Sarso Island, Farasan Archipelago (Hartmann-Schröder, 1960). South Pacific Ocean: Queensland, Australia. Eastern Indian Ocean: Western Australia, Australia. Southern Sea: South Australia, Australia (San Martín, 2005). North-east Atlantic Ocean: from Bay of Biscay to Canary Islands (San Martín, 2003). South Atlantic Ocean: São Paulo, Brazil; this is the first record of this species for the South Atlantic.

*Prosphaerosyllis isabellae* (Nogueira, San Martín & Amaral, 2001)

(Figures 4–5)

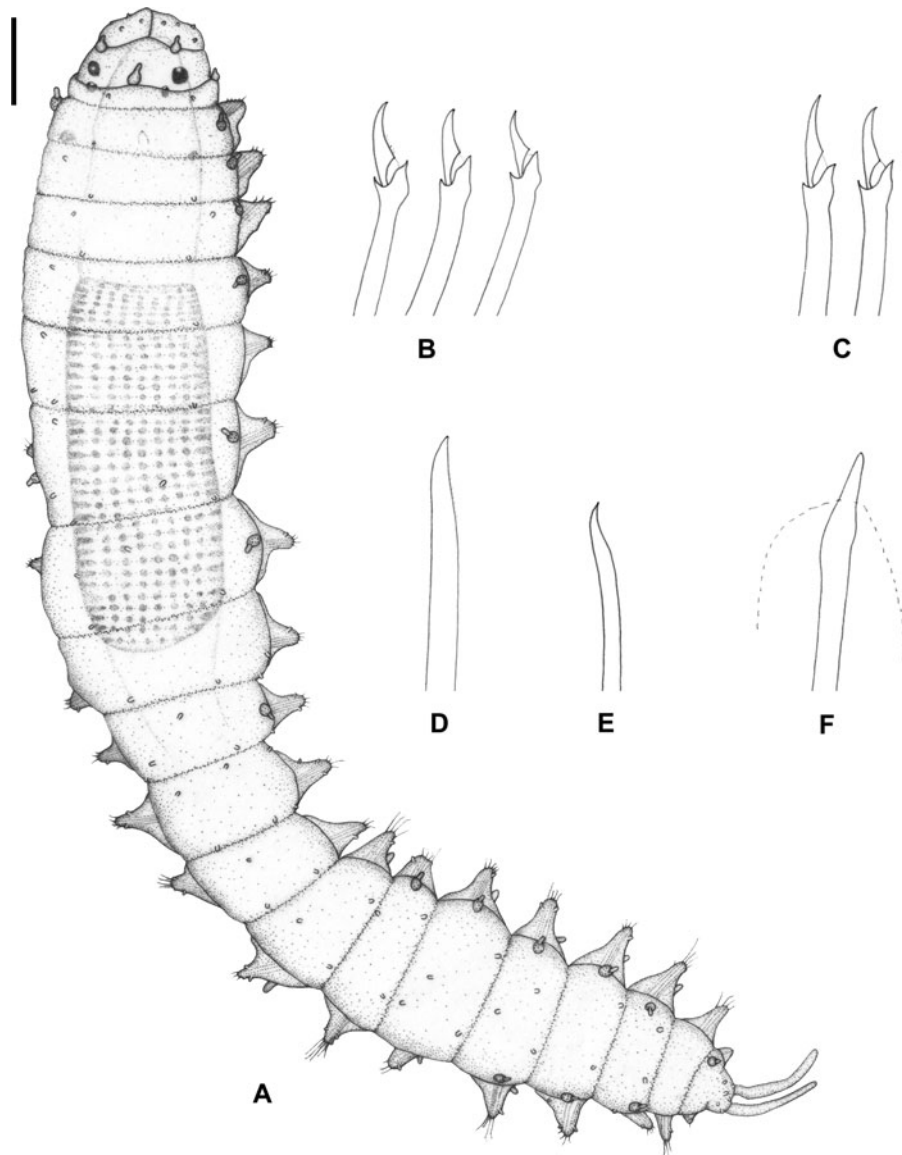
*Sphaerosyllis isabellae* Nogueira *et al.*, 2001: 1777, figure 1; Nogueira, 2000: 40, figure 8; 2006: 144.

*Prosphaerosyllis isabellae*. San Martín, 2005: 68, figure 23  
? *Sphaerosyllis* sp. Temperini, 1981: 20, figures 38–42.

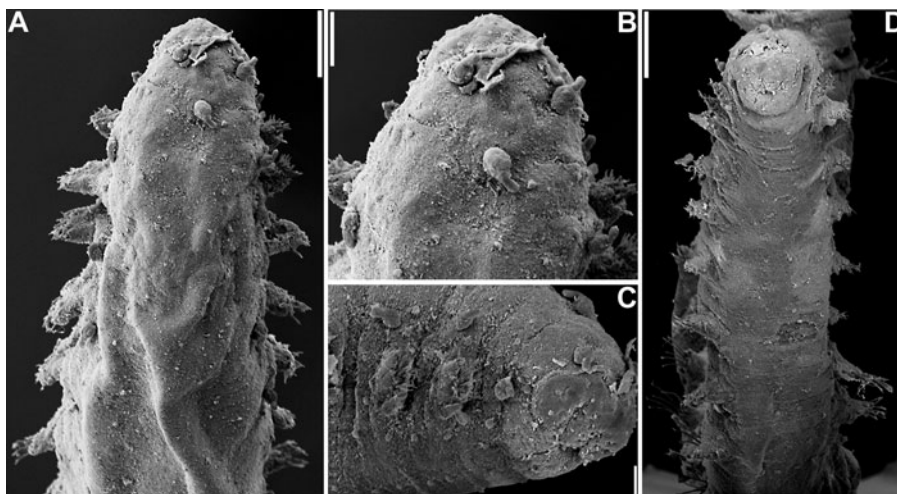
## MATERIAL EXAMINED

Project 'REVIZEE/Score Sul/Bentos'. State of Rio de Janeiro—Station 6747 (23°17'S 42°42' W), 100 m deep: 1 spec., coll. 16 February 1998; Station 6759 (23°20'S 41°22'W), 110 m deep: 20 specs (ZUEC POL 36–40), coll. 28 February 1998; Station 6762 (23°26'S 41°15'W), 145 m deep: 3 specs, coll. 27 February 1998; Station 6756 (23°48'S 41°40'W), 650 m deep: 1 spec., 17 February 1998; Station 6744 (23°51'S 42°49'W), 254 m deep: 1 spec. (MZUSP 908), coll. 15 February 1998; Station 6742 (23°59'S 43°09'W), 208 m deep: 1 spec., coll. 15 February 1998; Station 6739 (24°02'S 43°30'W), 147 m deep: 6 specs (MZUSP 909), coll. 14 February 1998. State of São Paulo—Station 6674 (24°31'S 44°54'W), 122 m deep: 1 spec. (MZUSP 907), coll. 11 January 1998; Station 6678 (24°46'S 45°11'W), 99 m deep: 1 spec., 12 January 1998; Station 6679 (25°18'S 44°52'W), 808 m deep: 1 spec. (MZUSP 906), 12 January 1998.





**Fig. 4.** *Prosphaerosyllis isabellae*. (A) Entire body, dorsal view; (B) falcigers, anterior parapodium; (C) falcigers, midbody and posterior parapodia; (D) dorsal simple chaeta; (E) ventral simple chaeta; (F) acicula, posterior parapodium. Scale bars: A, 100  $\mu\text{m}$ ; B–F, 10  $\mu\text{m}$ .



**Fig. 5.** *Prosphaerosyllis isabellae*, SEM. (A) Anterior body, dorsal view; (B) anterior end, dorsal view; (C) anterior end, right lateral view; (D) anterior body, ventral view. Scale bars: A, 60  $\mu\text{m}$ ; B, 30  $\mu\text{m}$ ; C, 20  $\mu\text{m}$ ; D, 90  $\mu\text{m}$ .

**Table 3.** Variation among some specimens of *Prospheerosyllis isabellae* analysed for the present study; all specimens mounted on slides in glycerin jelly.

	Specimen 1 MZUSP 906	Specimen 2 MZUSP 907	Specimen 3 MZUSP 908	Specimen 4 ZUEC POL 36	Specimen 5 MZUSP 909
Number of chaetigers	27	26	31	26	23 (incomplete)
Total length × width at proventricle (mm)	1.98 × 0.25	2.78 × 0.30	2.87 × 0.28	2.65 × 0.26	2.26 × 0.27
Length of blades of falcigers (µm)/number of falcigers per parapodium					
Anterior body	8–12/8–10	7–9.5/8	7–11/9	~10/7	7–10/7
Midbody	8–12/5–7	7–10/4–5	7–11/6–8	7–10/5–6	7.5–9.5/4–6
Posterior body	8–12/3–5	7–10/4	8.5–12/3–5	7–11/3–5	7.5–9/3–4
Length of pharynx (number of chaetigers)	~5 (everted)	~4	~4	4.5	4.5–5 (everted)
Length of proventricle (number of chaetigers); number of muscle cell rows	5; 32	4.5; 34	4.5; 35	4; 30	4; 27
Length of anal cirri—right/left (µm)	—/89	~100/95	~80/70	Absent	Absent
Eyespots	Absent	Present	Absent	Absent	Absent

## DESCRIPTION

Body short, largest specimen examined with 31 chaetigers, 2.87 mm long, 0.28 mm wide; smallest specimen examined with 27 chaetigers, 1.98 mm long, 0.25 mm wide (Table 3). Body without pigmentation, covered by small papillae, more conspicuous on palps and pygidium (Figures 4A & 5C–D); dorsally, papillae arranged in 2 well-marked longitudinal dorso-lateral rows, each with 1 papilla per segment, located close to posterior border of segment, plus some sparse papillae (Figures 4A & 5A); ventrally, papillae forming 4 longitudinal rows, of which 1 row on each side of body, consisting of 1 papilla just below each parapodium, and 2 rows formed by a pair of midventral papillae on each chaetiger (Figure 5C–D). Palps short, totally fused (Figures 4A & 5A–D). Prostomium slightly longer than palps, with 4 eyes in rectangular to trapezoidal arrangement and, sometimes, 1 pair of anterior eyespots; median antenna inserted between posterior pair of eyes or slightly anteriorly to them, lateral antennae inserted close to anterior margin of prostomium (Figures 4A & 5A–C). Peristomium shorter than subsequent segments, covering posterior part of prostomium, sometimes including posterior pair of eyes (Figure 4A); peristomial cirri short, shorter than antennae and dorsal cirri. Antennae, peristomial and dorsal cirri with rounded cirrophores and short, distally tapering cirrostyles, apparently retractable at least on dorsal cirri (Figures 4A & 5A–C); dorsal cirri present on all chaetigers, with iridescent inclusions in cirrophores; ventral cirri digitiform, similar in length to parapodial lobes, or slightly shorter (Figure 5C–D). Anterior chaetigers with 7–10 falcigers per parapodium, 4–8 on each midbody parapodium, 3–5 falcigers on each posterior parapodium; falcigers with smooth shafts and finely spinulated blades on anterior chaetigers, blades smooth from midbody onwards; blades short, unidentate, with slight dorsoventral gradation in length, measuring 7–12 µm throughout (Figure 4B–C; Table 3). Dorsal simple chaetae present from chaetiger 1, sigmoid, smooth (Figure 4D), sometimes projecting for a short extension from parapodial lobes on anterior segments, more prominent from proventricular level; ventral simple chaetae present from midbody, similar to dorsal simple chaetae but thinner, with sharper tips (Figure 4E). One acicula per parapodium throughout, subdistally oblique, with acuminate tip (Figure 4F). Pygidium with one pair of elongated anal cirri. Pharynx extending for 4–5 segments, with 1 pair of

rounded, yellowish pharyngeal glands at level of chaetiger 1; pharyngeal tooth small, located slightly anteriorly to mid-length of pharynx; proventricle similar in length to pharynx, with 27–35 rows of muscle cells (Figure 4A; Table 3).

## REMARKS

As pointed out in the original description (Nogueira *et al.*, 2001), it is likely that *P. isabellae* was first described by Temperini (1981), in an unpublished MSc dissertation, as *Sphaerosyllis* sp. Temperini (1981) based her description on one incomplete specimen, which seems similar to *P. isabellae*. However, that description did not include several important taxonomic characters, and, because the material is not deposited, it is not possible to check if that specimen really belonged to *P. isabellae*.

*Prospheerosyllis isabellae* is similar to *P. palpoperillata* (Hartmann-Schröder, 1992) in the general morphology of the body and chaetae, but it differs from this species by having smaller antennae, peristomial and dorsal cirri; iridescent inclusions in the dorsal cirri; a longer pharynx, with 1 pair of pharyngeal glands at the level of chaetiger 1; and by having more rows of muscle cells in the proventricle, ~27–35 rows, against 28 rows in *P. palpoperillata* (Hartmann-Schröder, 1992).

*Prospheerosyllis tetralix* (Eliason, 1920) also resembles *P. isabellae* because it has a similar morphology of the falcigers and aciculae, and length of the proventricle. However, *P. isabellae* differs from *P. tetralix* by having iridescent inclusions in cirrophores of the dorsal cirri; 1 pair of pharyngeal glands; and more rows of muscle cells in the proventricle, as *P. tetralix* has 25 rows of muscle cells (San Martín, 2003).

Finally, *P. isabellae* closely resembles *P. brevicirra* (Hartmann-Schröder, 1960) in having short antennae and cirri throughout, and the blades of the falcigers similar in length. In the original description of *P. isabellae*, Nogueira *et al.* (2001) remarked that *P. brevicirra* was probably the species most similar to *P. isabellae*. However, *P. isabellae* is distinguished from *P. brevicirra* by having more conspicuously papillated palps; iridescent inclusions in the dorsal cirri; one pair of pharyngeal glands; and more rows of muscle cells in the proventricle, as *P. brevicirra* has 20 rows of muscle cells (Hartmann-Schröder, 1960).

## DISTRIBUTION

South Atlantic Ocean: Rio de Janeiro and São Paulo, Brazil.  
South Pacific Ocean: Tasmania, Australia. Eastern Indian Ocean: Western Australia, Australia (San Martín, 2005).

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