

A new deep sea species of *Paramphinome* (Polychaeta: Amphinomidae) from southern Brazil

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A new species of Paramphinome (Polychaeta: Amphinomidae) is described from southern Brazil (900–2000 m). Paramphinome posterobranchiata sp. nov. differs from already described species by having a small body (1–9 mm); a low number of chaetigers (10–29); branchiae in few chaetigers (0–3) and starting more posterior than in most species; and by a reduced caruncle.

Keywords: Amphinomidae, *Paramphinome*, deep sea polychaeta, vertical distribution in sediment

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INTRODUCTION

The amphinomid genus *Paramphinome* Sars, 1872 includes small deep-water species which are often very abundant in quantitative deep-sea studies (eg. Hartman & Fauchald, 1971; Narayanaswamy *et al.*, 2003). This genus is worldwide distributed, mainly in deep waters and is characterized by the presence of one, two or three pairs of small notopodial hooks on each side of first chaetiger.

The genus *Paramphinome* was proposed by Sars (Sars, 1872) to include *P. pulchella* from the Norwegian coasts, as the replacement name for *Paramphinome pulchella* Sars, 1869, which are *nomina nuda*. In 1930, *Paramphinome australis* Monro, 1930 from off Signy Island (sub-Antarctic) was described based on one specimen. Gustafson (1930) briefly described two other species: *P. grandis* from Japan and *P. splendens* from the Gilbert and Ellis Islands, western Pacific. Hartman (1964) recognized and briefly redescribed *P. australis* while *P. grandis* was considered doubtful by Imajima & Hartman (1964) because it was known only from an illustration of a fragmented individual without indication for the presence of the first chaetigers hooks. Fauvel (1932) described *P. indica* from the Arabian Sea, which differed from *P. pulchella* in body size and number of branchiate chaetigers.

Hartman (1965) redescribed *Paramphinome jeffreysii* (McIntosh, 1868) and made a new combination from *Hipponoa jeffreysii* McIntosh, 1868. She considered *P. jeffreysii* as a senior synonym of *P. pulchella*.

Up to now there are approximately eight valid species in the genus: *P. jeffreysii* (McIntosh, 1868); *P. oculifera* (Augener, 1913); *P. australis* Monro, 1930; *P. grandis* Gustafson, 1930; *P. splendens* Gustafson, 1930; *P. indica*

Fauvel, 1932; *P. trionyx* Intes & Le Loeuff, 1975 and *P. pacifica* Fauchald & Hancock, 1981.

This study describes a new *Paramphinome* species from southern Brazil. This new species differs from all other described species by the lower number of branchiate chaetigers, branchiae starting in a posterior region on the body, shorter body size and a much reduced caruncle.

MATERIALS AND METHODS

Specimens were collected in the Campos Basin (southern Brazil, Rio de Janeiro state coast, between 21°18' S and 23° S) during a survey made by PETROBRAS (Brazilian Petroleum Company) under the scope of the project 'Campos Basin Deep-sea Environmental Project' coordinated by CENPES/PETROBRAS. Sediment samples were collected using a box-corer. The sediment collected was separated in three strata: 0–2 cm; 2–5 cm and 5–10 cm. After this the sediment of each stratum was sieved (0.5 mm mesh-size) and fixed in 10% formalin. We used an analysis of variance (Sokal & Rohlf, 1995) to test the difference of specimen density among the different strata.

The new species holotype was deposited at the polychaete collection of the Zoology Department of Universidade Federal do Rio de Janeiro, Brazil (IBUFRJ) together with ten paratypes. Ten paratypes were also deposited at Centro de Estudos do Mar of Universidade Federal do Paraná, Brazil: (MCBM-BPO) and the other ten were deposited at the Museu de História Natural of 'Universidade Estadual de Campinas' (MNH-BPO).

SYSTEMATICS

Family AMPHINOMIDAE Lamarck, 1818
Genus *Paramphinome* Sars, 1872
Paramphinome posterobranchiata sp. nov.
(Figures 1–3)

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MATERIAL EXAMINED

Holotype (IBUFRJ-0588): complete, 5 mm long, 0.6 mm wide, 25 chaetigers, 22 May 2003, 22° 04' S–39° 47' W, 1600 m deep. Paratypes: (IBUFRJ-0608; MCBM-BPO 1315; MNH-BPO 16/1–5): 1.0–7.0 mm long, 0.3–0.8 mm wide, 10–29 chaetigers, collected between 2002 and 2003 in many stations around the geographical coordinates cited above, between 900 and 2000 m deep.

DESCRIPTION OF THE HOLOTYPE

Holotype with 27 chaetigers, 5 mm length, 0.6 mm width.

Anterior part of the body inflated. Body yellowish, without colour patterns. Eyes and caruncle absent. Mouth surrounded by large round prostomial buccal cushion. Sac-like pharynx eversible. Prostomium with three antennae and two palps, median antenna placed in the prostomial posterior half, lateral antennae anterior (Figure 1A, M). Palps and lateral

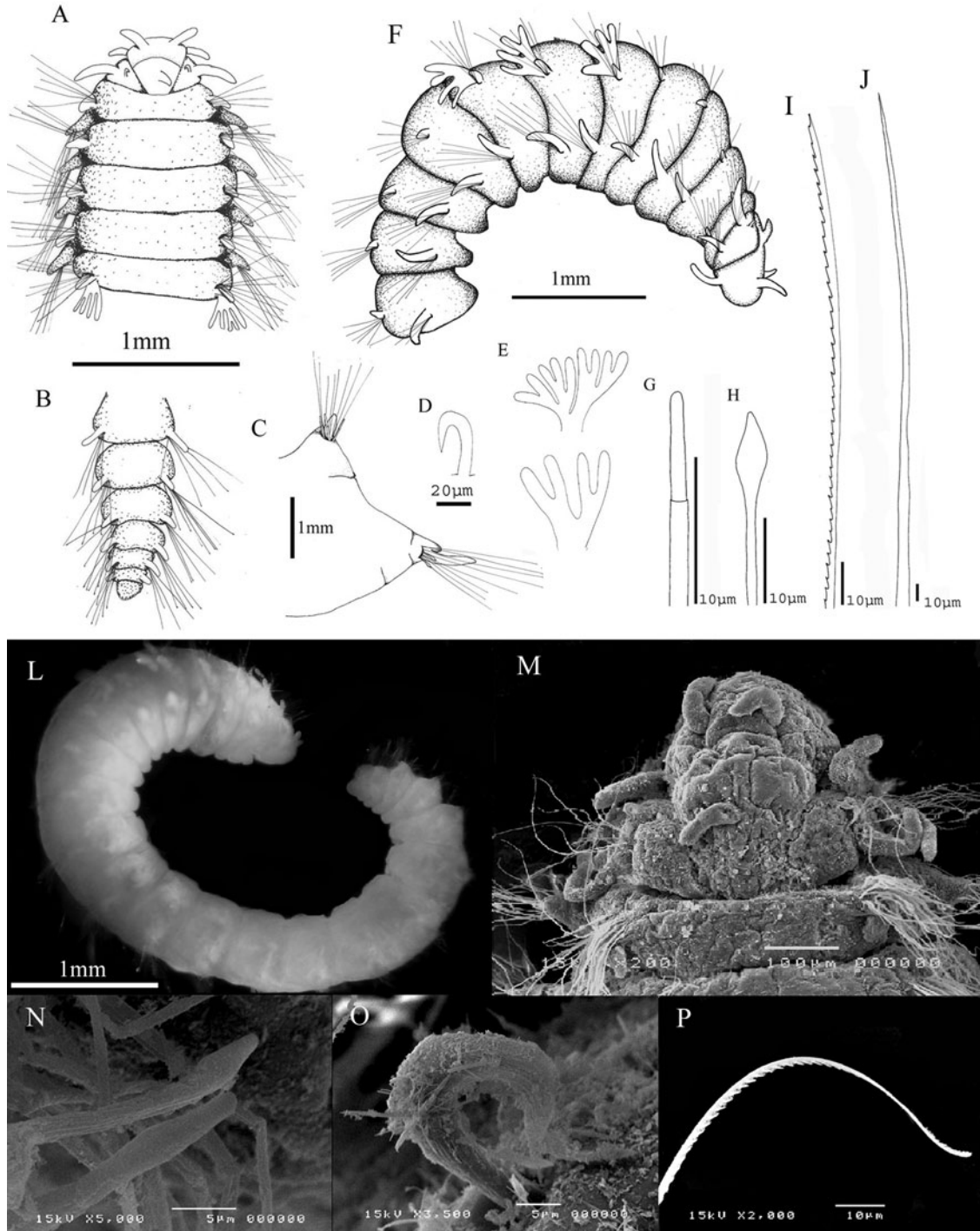


Fig. 1. *Paramphinome posterobranchiata* sp. nov. (A) Anterior end in dorsal view; most chaetae of chaetiger 1 were omitted; (B) posterior end in ventral views; (C) parapodia of chaetiger 15; (D, O) hook; (E) branchiae; (F) anterior region in lateral view; (G) notopodial spine; (H, N) neuropodial spine subdistally inflated; (I, P) neuropodial slender marginally serrated chaetae; (J) notopodial and neuropodial slender, smooth capillaries; (L) a paratype in lateral view; (M) prostomium.

antennae similar in length, longer than median antennae. Dorsal and ventral cirri of first chaetiger three times longer than those of posterior chaetigers. Along the whole body ventral cirri longer than dorsal ones (Figure 1A, F & C). Parapodial rami well separated. All notopodial lobes short, blunt, dorsal cirri long, posteriorly attached; neuropodia more prominent, usually truncate; with ventral cirri longer than chaetal lobe (Figure 1C). Branchia dichotomously branched with up to ten filaments (Figure 1E); holotype with 3 pairs (see variation of this character below). Notochaetae of three types: (1) hooks directed forward (Figure 1A, M & O), present only in first notopodia (extremely difficult to observe in optical microscope); (2) stout spines (in number of 2, 3 or 4) (Figure 1G); and (3) slender, longer, smooth ribbon-shape setae (Figure 1J). Neurochaetae of three types: (1) a few thick, subdistally swollen spines (Figure 1H, N); (2) several slender marginally serrated chaetae (Figure 1I, P); and (3) some slender, long, smooth ribbon-shape chaetae (Figure 1J). Anus terminal, with median oval papilla (Figure 1B).

Variation. Branchia is absent in specimens with less than 14 chaetigers, starting in chaetiger 6 in specimens with more than 14 chaetigers (Figure 1A, F). Larger specimens can present up to three pairs of branchiae, but always starting in chaetiger 6 (Figure 2). It is noteworthy that specimens having 21 chaetigers might have one, two or three pairs of branchiae. The number of notopodial hooks on the first chaetiger might vary from one (holotype) to two (some paratypes).

A growth curve is presented in Figure 3. It shows a strong correlation between total number of chaetigers and body length of specimens, indicating that growth in this species is accomplished by the increase of new segments in a linear fashion.

REMARKS

Paramphinome posterobranchiata sp. nov. is unique for having a posterior start of the first branchiae despite its small body size. In all other species of *Paramphinome*, branchiae starts in chaetiger 3 or chaetiger 4, while in *P. posterobranchiata*

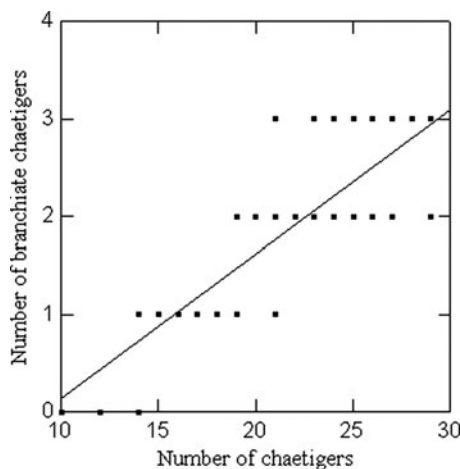


Fig. 2. Regression of number of branchiate chaetigers on number of chaetigers. Number of branchial pairs = $-1.33 + 0.145 \times$ number of chaetigers; $R = 0.92$.

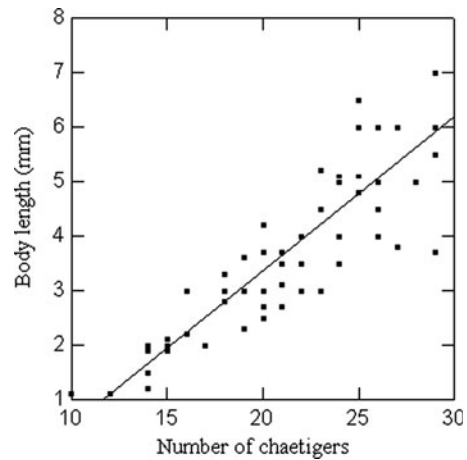


Fig. 3. Regression of body length on number of chaetigers. Body length = $-2.57 + 0.30 \times$ number of chaetigers; $R = 0.83$.

sp. nov., they start in chaetiger 6. Therefore, this species cannot be regarded as a juvenile of any other already known species, once ontogenetic variation in this species is expressed in the increment of branchiae in an anterior–posterior fashion (Figure 2). The ontogenetic variation in the number of branchiate chaetigers is very important for delineating the new species since branchial patterns are usually used as a taxonomic character in this genus and also in other genera of Amphinomidae (e.g. *Linopherus*). Furthermore, its body size, number of chaetigers and number of branchiate chaetigers are reduced when compared to all other *Paramphinome* species.

Another difference between *P. posterobranchiata* and other species of *Paramphinome* is its much reduced or even fused caruncle which may be related to a miniaturization process. The caruncle in *Paramphinome* is usually Y-shaped and extremely reduced, and has been considered by Gustafson (1930) as the most primitive for the family Amphinomidae.

It is rather difficult to consider such ‘reduced’ characteristics (small body size, small number of chaetigers and pairs of branchia and fused caruncle) in *P. posterobranchiata* as either plesiomorphic or apomorphic character states within *Paramphinome* when no phylogeny of the genus is available.

A new species of *Paramphinome* from the Brazilian continental shelf was noticed in a MSc thesis (Temperini, 1981); it was never formally published, although having been recorded in several later studies (Paiva, 1993; Amaral & Nonato, 1994; Brasil & Silva, 2000). Nevertheless, the undescribed species is larger (6–13 mm), has more chaetigers (35–45), more branchiate chaetigers (5), starting in more anterior chaetiger (4) and has been found in shallower depths (160 m).

A comparison of the character states of the four most referred species of *Paramphinome* and the new species herein described is presented in Table 1.

ECOLOGICAL REMARKS

Of 100 specimens collected, 69 were in the upper 2 cm, 28 in 2–5 cm and only 3 were found in 5–10 cm. The average number of individuals per litre of sediment was 1.38, for the 0–2 cm strata; 0.88, for the 2–5 cm strata and 0.23 for the lower strata (5–20 cm). Differences among the

Table 1. Character variation and current distribution of the most referred *Paramphinome* species and *P. posterobranchiata* sp. nov.

Species	Number of chaetigers	Length (mm)	Width (mm)	1° branchial chaetiger and number of pairs	Geographical distribution	Depth-range (m)
<i>P. jeffreysii</i> (McIntosh, 1867)	25–40	15	1.5	4: 4–8 pairs	North Atlantic Ocean	20–2500
<i>P. australis</i> Monro, 1930	25–40	46	2–4	4: 15 pairs	South Orkney Islands	244–800
<i>P. indica</i> Fauvel, 1932	25–28	15–20	4–5	4: 10–13 pairs	Arabian Sea	1600
<i>P. pacifica</i> Fauchald & Hancock, 1981	37	11	2	3: 3–6 pairs	USA, Pacific coast	1800–2900
<i>P. posterobranchiata</i> sp. nov.	10–29	1–7	0.2–1	6: 0–3 pairs	Off southern Brazil	900–2000

three strata were significant (ANOVA, $F = 22.4$, $P < 0.001$). *Paramphinome posterobranchiata* is probably a surface dweller, that could be a predator, as other members of the family, or a deposit-feeder using the sac-like pharynx to get the organic matter deposited on sediment.

ETYMOLOGY

This specific name refers to the posterior start of the branchiae when compared to all other species of the genus *Paramphinome*.

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