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Deep sea *Ophelina* (Polychaeta: Opheliidae) from southern Brazil

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Four species of Ophelina*, collected from the deep waters off southern Brazil (700–2000 m) between 21°18 S and 23° S, are described, viz.,* Ophelina abranchiata*,* O. *cf.* cylindricaudata*,* O. chaetifera *and* O. aulogastrella. *These reports extend the distribution of* O. abranchiata *and* O. chaetifera *to the South Atlantic Ocean and the distribution of* O. aulogastrella *to the western South Atlantic.*

Keywords: Opheliidae, *Ophelina*, deep sea, South Atlantic

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INTRODUCTION

Unlike that of the North Atlantic and Antarctic waters, extensively studied over the last century, by way of European and North American surveys, the deep sea invertebrate fauna of the South Atlantic Ocean continues widely unknown. As a direct consequence, regional biota and biogeographical patterns remain almost completely obscure.

Polychaetes, among the most abundant and diverse of deep-sea groups (Gage & Tyler, 1991), have been the focus of several ecological, biogeographical and taxonomic studies involving this environment (e.g. Glover *et al.*, 2001; Pérez-Mendoza *et al.*, 2003; Böggemann & Purschke, 2005; Schüller & Ebbe, 2007; Fiege *et al.*, 2010).

The family Opheliidae, comprising around 150 species and eleven genera (Silva, 2007), and represented in both shallow and deep waters, has been described from deep waters of the Arctic (e.g. Støp-Bowitz 1945, 1948; Kongsrud *et al.*, 2011; Parapar *et al.*, 2011), North Atlantic (e.g. Hartman, 1965; Hartman & Fauchald, 1971; Hartmann-Schröder, 1996) and subantarctic and Antarctic regions (Monro, 1930; Hartman, 1966; Hartman-Schröder & Rosenfeldt, 1989; Maciolek & Blake, 2006; Schüller, 2008). Notwithstanding, Elias *et al.* (2003), by omitting any reference to Opheliidae from deep waters in their revision of the family from the south-western Atlantic, reveal our lack of knowledge regarding the deep-sea polychaete fauna of this region, one of the least explored worldwide (Rex *et al.*, 2006; Fiege *et al.*, 2010), thereby pointing to the need for descriptive studies directed towards an understanding of the biogeographical and bathymetric patterns involved.

This paper describes four species of the genus *Ophelina* collected from deep waters off the south Brazilian coast. *Ophelina chaetifera* and *O. abranchiata* are reported for the first time for the South Atlantic and *Ophelina aulogastrella* for the first time for the western South Atlantic.

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MATERIALS AND METHODS

Specimens were collected in the Campos Basin (South Brazil) during a survey made by PETROBRAS (the Brazilian Petroleum Company) under the scope of the 'Campos Basin Deep-sea Environmental Project' coordinated by CENPES/PETROBRAS. Sediment samples were collected using a 0.25m² Box-corer (Ocean Instruments, Unsel Spade Corer MK I). The collected sediment was separated into three strata: 0–2 cm; 2–5 cm and 5–10 cm. Subsequently, sediment was sieved (0.5 mm mesh-size) and fixed in 10% formalin. Specimens were then identified and deposited in the Biological Institute of the Universidade Federal do Rio de Janeiro (IBUFRJ).

RESULTS

SYSTEMATICS

Family OPHELIIDAE Malmgren, 1867
Genus *Ophelina* ørsted, 1843
Ophelina abranchiata Støp-Bowitz, 1948
(Figure 1)

Ophelina abranchiata Støp-Bowitz, 1948, pp. 22–23, figure 7.
Ammotrypane abranchiata Eliason, 1962, pp. 273–274, figure 19.

MATERIAL EXAMINED

19 specimens deposited in IBUFRJ-0631. Coordinates: 22°31′12.47″S–40°15′11.08″W; sediment strata: 0–2 cm; depth: 722 m; 21 November 2002; 3 specimens. Coordinates: 22°04′32.8″S–39°54′11.4″W; sediment strata: 0–2 cm; depth: 722 m; 30 June 2003; 3 specimens. Coordinates: 21°57′11.8″S–39°56′04.2″W; sediment strata: 0–2 cm; depth: 698 m; 29 June 2003; 5 specimens. Coordinates: 21°57′15.6″S–39°49′37.5″W;

sediment strata: 2–5 cm; depth: 1357 m; 25 June 2003; 2 specimens. Coordinates: 21°52′51.8″S–39°48′12.5″W; sediment strata: 2–5 cm; depth: 1372 m; 26 June 2003. Coordinates: 22°04′33.9″–39°52′05.1″; sediment strata 0–2 cm; depth: 1030 m; 30 June 2003; 2 specimens. IBUFRJ-0831 (scanning electron microscopy (SEM) stubs). Coordinates: 22°38′52.9″–40°04′16.3″; sediment strata 0–2 cm; depth: 1342 m; 14 June 2003; 2 specimens.

DESCRIPTION

Body length: 4–10 mm; body width: 0.2–0.5 mm; number of chaetigers: 17–19. Body fusiform, iridescent and deeply grooved both ventrally and laterally, ventral groove the deeper (Figure 1A). Prostomium conical, longer than wide, with an acuminate palpode and a pair of nuchal organs in the posterior region, one of which notably everted in an examined specimen (Figure 1B). Proboscis not observed. Parapodia one and all inconspicuous, and lacking both prechaetal and postchaetal lobes (Figure 1C, D). Branchiae absent. Chaetae capillaries smooth, all of the same thickness, delicate and few in number (Figure 1C, D). Neuropodial and notopodial chaetae of the same size. Anal tube, lost in almost all the specimens, but when present approximately one-fifth of the body length and transversely ringed, with the long midventral cirrus, as long as or longer than the tube itself, attached to the end (Figure 1E).

GEOGRAPHICAL AND BATHYMETRIC DISTRIBUTION

East Greenland (type locality); east coast of the USA, 300–4540 m; Guianas, 1500 m (Hartman, 1965); Iberian Peninsula (Parapar & Moreira, 2008); Mediterranean (Castelli *et al.*, 1995); Asian Arctic (Kröncke, 1998) and Peru (Borowski, 2001). In this study, this species was found between 722 and 1934 m.

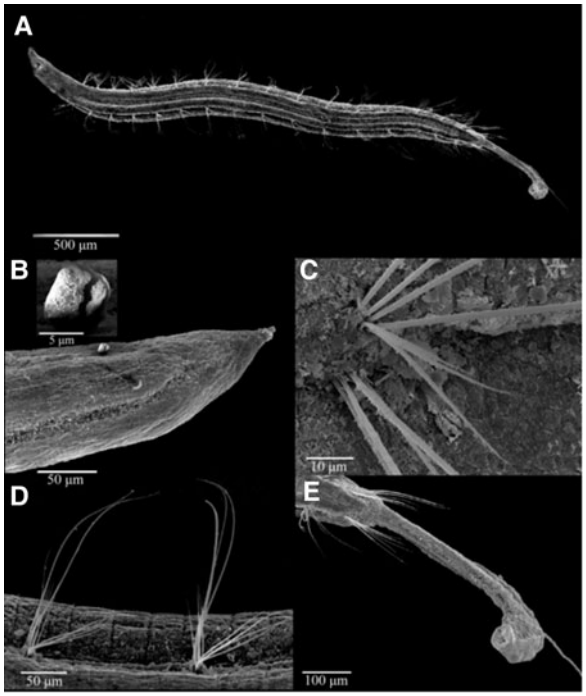

Fig. 1. *Ophelina abranchiata*: (A) complete specimen, ventral view; (B) prostomium, dorso-lateral view, nuchal organ; (C) parapodium, mid-region region; (D) parapodia and chaetae, mid-body; (E) anal tube and cirrus. IBUFRJ-0831.

DISCUSSION

Ophelina abranchiata Støp-Bowitz, 1948 was first described based on specimens without the anal tube, Eliason (1962) having been the first to describe the structure itself in this particular species (Parapar *et al.*, 2011). Incidentally, of the 19 specimens herein examined, only five presented this structure. Silva (2007) noticed that two species, considered by the author as junior synonymous, were described based on specimens also lacking the anal tube, viz., *Polyophthalmus translucens*, Hartman, 1960 and *Ophelina farallonensis,* Blake 1996. Even though Silva's (2007) work is an unpublished thesis, and so has no taxonomic value, Parapar *et al.* (2011) followed him considering *O. farallonensis* as junior synonymous, while Kongsrud *et al.* (2011) pointed to the necessity of examination of specimens of both species in order to decide upon the validity of *O. farallonensis*. Our material is similar to the descriptions of specimens from the North Sea (Hartman-Schröder, 1996), the east coast of the USA, and Guianas (Hartman, 1965). Parapar *et al.* (2011) described lateral organs between the parapodia of all the segments, including the first three achaetous, but this could not be observed in our material. In this study, *O. abranchiata* was the dominant species of Opheliidae encountered all over the bathymetric range surveyed.

Ophelina chaetifera (Hartman, 1965) (Figure 2)

Ammotrypane chaetifera Hartman, 1965, p. 187, pl. 43.

MATERIAL EXAMINED

IBUFRJ-0632. Coordinates: 21°52′51.8″S–39°48′12.5″W; sediment strata: 2–5 cm; depth: 1372 m; 26 June 2003; 1 specimen. Coordinates: 22°11′04.4″S–39°47′04.8″W; sediment strata: 2–5 cm; depth: 1650 m; 22 June 2003; 2 specimens. Coordinates: 22°30′34.9″S–39°41′44.9″W; sediment strata: 0–2 cm; depth: 1968 m; 16 June 2003; 1 specimen. Coordinates: 22°31′28.3″S–40°03′49.3′W; sediment strata: 0–2 cm; depth: 1039 m; 18 June 2003; 2 specimens. Coordinates: 22°26′28.8″S–39°58′53.3″W; sediment strata: 0–2 cm; depth: 1042 m; 20 June 2003; 2 specimens. IBUFRJ-0832 (SEM stubs). Coordinates: 22°30′21.7″S–39°56′53.7′W; sediment strata: 2–5 cm; depth: 1346 m; 21 June 2003; 2 specimens.

DESCRIPTION

Body length 3–4.3 mm; body width 0.3–0.7 mm; number of chaetigers: 24–26. Body slender, fusiform, deeply grooved both ventrally and laterally (Figure 2A), ventral groove the deeper and ringed in the anterior region (Figure 2B). Prostomuim long and conical, with an acuminate palpode and a pair of posterior nuchal organs (Figure 2A, B). Proboscis sac-like, covered by tuft of cilia. Six pairs of branchiae, present on the anterior (2nd to 4th) and posterior (21st to 23rd) chaetigers. The last three segments are abranchiate (Figure 2C). Parapodia biramous, prechaetal lobes more developed than postchaetal. Chaetae all smooth-capillary (Figure 2E). The first parapodium has a more developed prechaetal lobe and longer notochaetae, compared to the remainder. All smooth-capillary chaetae of two thicknesses. Notochaeta and neurochaeta around twelve or more, organized in two rows. The last six chaetigers have thicker and longer chaetae. The anal tube is conical, longer than wide

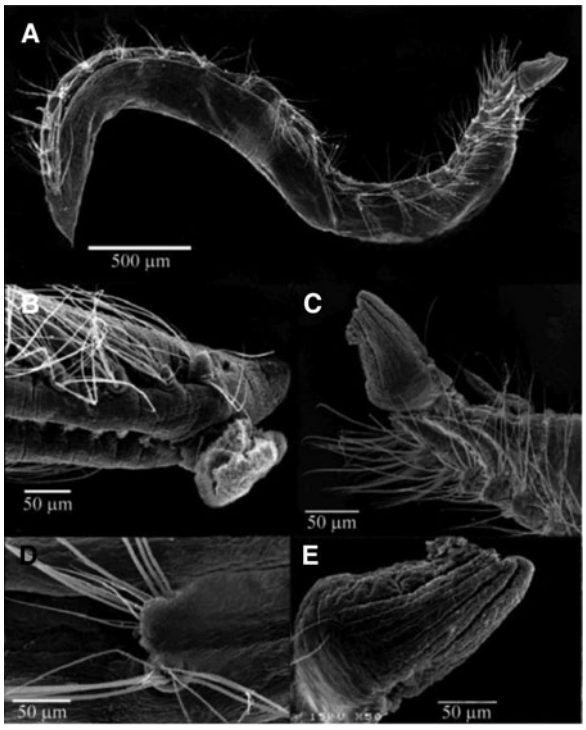

Fig. 2. *Ophelina chaetifera*: (A) complete specimen, dorso-lateral view; (B) prostomium, ventro-lateral view; (C) posterior region, dorso-lateral view; (D) parapodium, mid-body region; (E) anal tube, filament detached. IBUFRJ-0832.

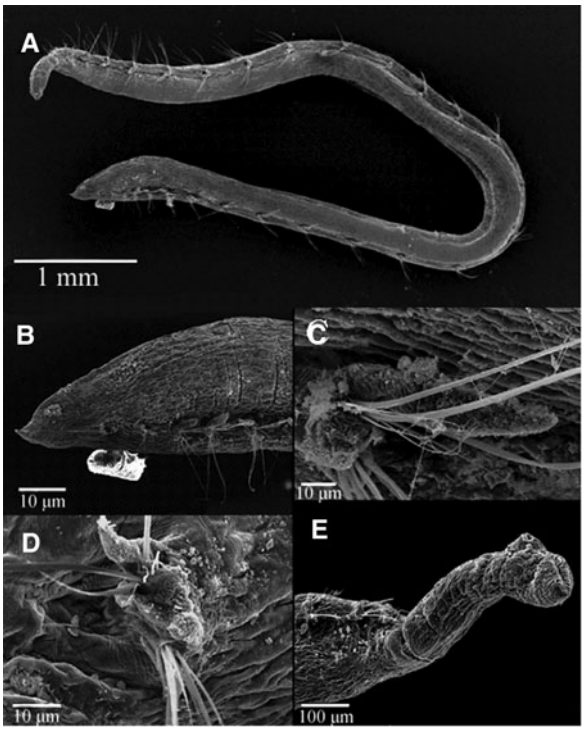

Fig. 3. *Ophelina* cf. *cylindricaudata*: (A) complete specimen, dorso-lateral view; (B) prostomium, dorso-lateral view; (C) parapodium, mid-body region; (D) parapodium, posterior region; (E) anal tube. IBUFRJ-0833.

and longitudinally grooved (Figure 2D), with a delicate and articulated midventral filament.

GEOGRAPHICAL AND BATHYMETRIC DISTRIBUTION

East coast of the USA, New England (type locality), at 1500–4667 m, and the Guianas at 1500 m (Hartman, 1965). In this study, this species was found between 1039 and 1650 m.

DISCUSSION

The specimens examined in this study are similar to the description of Hartman (1965), only differing in the number of branchiate chaetigers, three anterior and three posterior, whereas Hartman (1965) described three anterior and two posterior. Later, Hartman & Fauchald (1971) described two and three respectively, a discrepancy which could be due to an intraspecific variation. This is the first report of *Ophelina chaetifera* to the South Atlantic Ocean.

Ophelina cf. *cylindricaudata* (Hansen, 1878) (Figure 3)

Ammotrypane cylindricaudatus Hansen, 1878, pp. 8–9, pl.VI, figures 1–8.

MATERIAL EXAMINED

2 specimens deposited in IBUFRJ-0633. Coordinates: 22°11′04.4″S–39°47′04.8″W; sediment strata: 2–5 cm; depth: 1650 m; 22 June 2003; 1 specimen.

IBUFRJ-0833 (SEM stubs). Coordinates: 22°11′04.4″S–39°47′04.8″W; sediment strata: 2–5 cm; depth: 1650 m; 22 June 2003; 1 specimen.

DESCRIPTION

Body length: 10–17 mm; body width: 0.2–0.4 mm; number of chaetigers: 29–31 (Figure 3A). Body fusiform, ventrally and laterally grooved, ventral groove the deeper than lateral. Body whitish, digestive tract visible in the posterior region. Prostomium conical, longer than wide, grooved ventrally, with an anterior palpode and a pair of well-developed slitlike nuchal organs (Figure 3B). Body with 2–4 anterior abranchiate chaetigers, 5–9 branchial chaetigers (branchiae diminishing in size from the first (5th) to the last branchiate (10th–13th) chaetiger), a median abranchiate region, 3–6 branchial chaetigers in the terminal region and 3–5 final abranchiate chaetigers. Inconspicuous parapodia, lacking pre and postchaetal lobes, biramous, with long, delicate fascicles of chaetae on each ramus. All chaetae smooth capillaries of two sizes. Notochaeta around eight in number, organized in two rows of chaetae. Neurochaeta, also of two thicknesses, are organized in the same pattern (Figure 3C, D). Anal tube cylindrical, around four times longer than wide, with the dorsal edge longer than the ventral and provided with a long, delicate, articulated ventral cirrus, usually lost, but its position marked by its attachment point (Figure 3E).

GEOGRAPHICAL AND BATHYMETRIC DISTRIBUTION

Norway (type locality), 763–911 m; east coast of the USA, 200–1500 m (Hartman, 1965); Iberian Peninsula (Parapar & Moreira, 2008); eastern Pacific Ocean, 600–1000 m (Maciolek & Blake, 2006) and Antarctic, 65–600 m (Hartmann-Schröder & Rosenfeldt, 1989). In this study, the species was found between 1357 and 1650 m.

DISCUSSION

In the original description, based on specimens from the Norwegian coast, Hansen (1878) made no mention of the long ventral filament attached to the end of the anal tube. This feature was described later by Støp-Bowitz (1945),

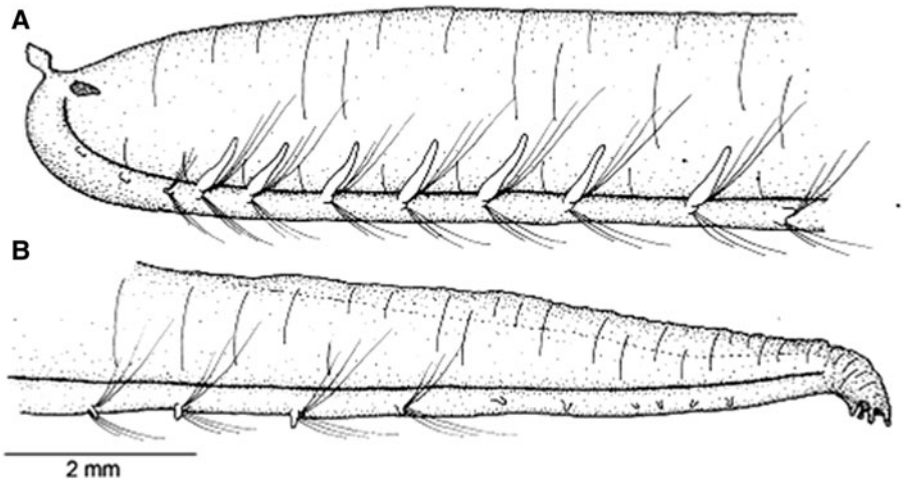

Fig. 4. *Ophelina aulogastrella*: (A) anterior region, lateral view; (B) posterior region, lateral view. IBURFRJ-1420.

together with the revelation that the type specimen has 28 chaetigers, thus different from the 34 originally described by Hansen (1878). Some descriptions of this species differ as to the presence or absence of a palpode on the prostomium (Hartman (1965)—present versus Maciolek & Blake (2006)—absent), and the distribution of branchial cirri along the body (e.g. branchiae from chaetiger 2 to 24 (Day, 1973; Uebelacker, 1984), and from chaetiger 2 to 9 (Hartman, 1965; Maciolek & Blake, 2006)).

Kongsrud *et al.* (2011) redescribed *O. cylindricaudata* and erected a lectotype and a paralectotype based on the two syntypes. After the examination of many specimens, they concluded that the palpode is often lost and that this species has branchiae all along the body, except for the first and last four chaetigers, being rudimentary in mid-body. The wide distribution of *O. cylindricaudata* (reported from the Arctic (e.g. Quijon & Snelgrove, 2005) to the Antarctic (e.g. Sicinski, 2004)), plus the differences between the descriptions of specimens led us to propose that this species may constitute a species complex needing revision, as already suggested by several studies (e.g. Maciolek & Blake, 2006; Kongsrud *et al.*, 2011).

Ophelina aulogastrella (Hartman & Fauchald, 1971) (Figure 4)

Ammotrypane aulogastrella Hartman & Fauchald, 1971, p. 130, pl. 21, figures a–c.

MATERIAL EXAMINED

1 specimen deposited in IBUFRJ-1420. Coordinates: 21°58′36.06″S–39°46′30.28″W; sediment strata: 2–5 cm; depth: 1691 m; 8 October 2001; 1 specimen.

DESCRIPTION

Body length 17 mm; body width 2 mm; number of chaetigers: 33. Body deeply grooved ventrally and laterally, ventral groove the deeper. Prostomuim rounded, with a spherical palpode, plus a pair of slitlike nuchal organs on the anterior region (Figure 4A). Branchiae present from chaetiger 4 to 10 (Figure 4A). Parapodia small and inconspicuous, biramous, the first located anteriorly to the oral aperture. Chaetae all smooth-capillary, absent in first two chaetigers. Notochaeta and neurochaeta of the same length, and absent in the last six chaetigers. The pygidium terminates ventrally in an anal scoop opening, its lateral margins bounded by eight short papillae at the outer edges (Figure 4B).

GEOGRAPHICAL AND BATHYMETRIC DISTRIBUTION

East coast of the USA (type locality) 196–5023 m, the Guianas, 1500–4825 m (Hartman & Fauchald, 1971); Gabon, 2770 m; Angola, 3660 m and New Zealand, 4400 m (Kirkegaard, 1996). In this study, this species was found at 1691 m.

DISCUSSION

The studied specimen, although differing from the original description by the absence of a pair of pigidial cirri, drawn but not described in the original description, is similar in all the other morphological characters, such as the distribution of branchiae, morphology of the prostomium and shape of the anal tube. This is the first report of *O. aulogastrella* in the western South Atlantic.

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