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ORIGINAL PAPER

Filling biodiversity gaps: benthic hydroids from the Bellingshausen Sea (Antarctica)

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Abstract The Bellingshausen Sea constitutes the third largest sea in the Southern Ocean, though it is widely recognized as one of the less-studied Antarctic areas. To reduce this lack of knowledge, a survey to study the biodiversity of its marine benthic communities was carried out during the *Bentart 2003* and *Bentart 2006* Spanish Antarctic expeditions. The study of the hydroid collection has provided 27 species, belonging to ten families and 15 genera. Twenty-one out of the 27 species constitute new records for the Bellingshausen Sea, raising the total number of known species to 37, as also do nine out of the 15 genera. *Candelabrum penola*, *Lafoea annulata,* and *Staurotheca juncea* are recorded for the second time. Most species belong to Leptothecata. Sertulariidae with 13 species (48%) is by far the most speciose family, and *Symplectoscyphus* with seven species (26%), including *S. bellingshauseni* sp. nov. and *S. hesperides* sp. nov., the most diverse genus. Considering the whole benthic hydroid fauna of the Bellingshausen Sea, 18 species (69%) are endemic to Antarctic waters, either with a circum-Antarctic (12 species, 46%) or West Antarctic (6 species, 23%) distribution, 23 (88%) are restricted to Antarctic or Antarctic/sub-Antarctic waters, and only three species have a wider distribution. Bellingshausen Sea hydroid fauna is composed of a relatively high diversity of typical representatives of the Antarctic benthic hydroid fauna, though with a surprisingly low representation of some of the most diverse and widespread Antarctic genera (*Oswaldella* and *Schizotricha*), what could be related to the fact that its shelf-inhabiting hydroid fauna remains practically unknown.

Keywords Biodiversity · Biogeography · Hydrozoa · New records · New species · Southern Ocean

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Introduction

The Bellingshausen Sea constitutes the third largest sea in the Southern Ocean. It is an extensive and little-explored area along the west side of the Antarctic Peninsula, extending between Alexander Island and Thurston Island. It also harbors Peter I Island, an isolated marine island located approximately 450 km north off Eights Coast. The Bellingshausen Sea has been widely recognized as one of the less-studied areas in the Southern Ocean.

Hitherto a single paper (Hartlaub 1904) has dealt with hydroids collected properly in the Bellingshausen Sea. That paper describes the hydroids collected during the Belgium Antarctic expedition with the *Belgica* (1897–1899) and includes 14 species from the Bellingshausen Sea, two identified only to generic level and nine considered new to science. At present, however, only five of Hartlaub's new species are considered well-known valid species, three are *species inquirenda*, and one is a previously described species. In addition, Hartlaub's records of three previously known species are doubtful.

During the *Bentart 2003* and *Bentart 2006* Spanish Antarctic expeditions with BIO *Hespérides*, in 2003 and 2006, respectively, a survey to study the biodiversity of marine benthic communities in the Bellingshausen Sea and the Antarctic Peninsula was carried out. Among the numerous benthic samples, an important collection of hydroids was present. The results obtained from the study of the

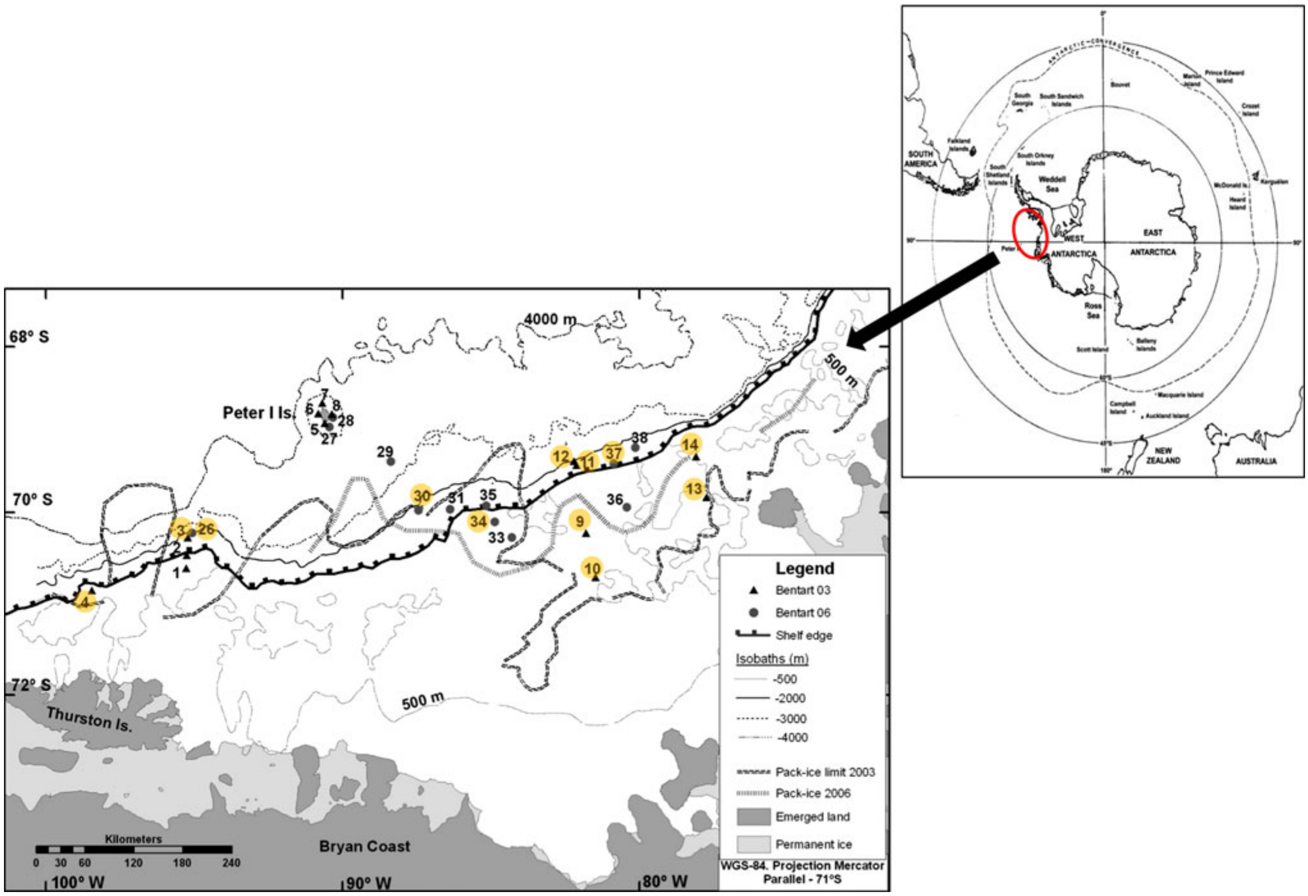

Fig. 1 Area of study and location of the sampling stations (*encircled* stations with samples containing hydroids)

Bellingshausen Sea hydroid collection are presented here. A total of 27 species has been found, including two new species to science (*Symplectoscyphus bellingshauseni* sp. nov. and *Symplectoscyphus hesperides* sp. nov.). Twenty-one out of the 27 are new records for the Bellingshausen Sea, as well as nine out of the 15 genera, raising the total number of known species from the area to 37.

Concerning Peter I Island, hydroids had previously been studied only in two papers (Broch 1948; Blanco and Bellusci de Miralles 1972), reporting 16 species in total. The study of benthic hydroids from Peter I collected during the *Bentart 2003* and *Bentart* 2006 expeditions has already been published (cf. Peña Cantero 2010a), reporting 23 species, 14 representing new records for the island (including a new species to science), and analyzing the faunistic peculiarities, bathymetric distribution, and biogeography of all the known species of Peter I.

Materials and methods

Materials examined here were collected in the Bellingshausen Sea during both the *Bentart 2003* and *Bentart 2006* Spanish expeditions with BIO *Hespérides* (cf. Fig. 1 for the location of the stations in the Bellingshausen Sea and Peter I Island and Table 1 for the data associated with the Bellingshausen Sea samples in which hydroids were found). Four types of benthos sampling gear (Agassiz trawl, Rock dredge, Box Corer grab and Supra-benthic sledge) were used. Hydrozoans were preserved in 70% ethanol.

The bathymetrical range surveyed extends from depths between 86 and 2,043 m. The shallowest stations are those off Peter I island. Stations from the Bellingshausen Sea are much deeper (>426 m) because pack-ice prevented us from getting into shallower waters.

For the bathymetrical approach, the groups established by Peña Cantero (2004) were used, whereas for the biogeographic study, the distributional models considered by Peña Cantero and García Carrascosa (1999) were employed.

Hydroids from Peter I Island are not considered here. Readers are referred to Peña Cantero (2010a) for details concerning the benthic hydroid fauna of that island. For the analyses of the bathymetric distribution and biogeography of the species present in the Bellingshausen Sea (Peter I excluded), only Hartlaub's clearly recognizable species and records are considered.

Table 1 Samples studied and related data (BC indicates Box Corer and S Suprabenthic sledge; otherwise samples collected with Agassiz trawl)

Sample	Date	Latitude (S)	Longitude (W)	Depth (m)	Area
3	01/02/2003	70°17′20.4″	95°12′2.5″	1,432	West
4	02/02/2003	70°51′57.6″	98°26′17.5″	426	West
4BC	02/02/2003	70°52′52″	98°26′07″	426	West
9	11/02/2003	70°14′35.9″	81°46′18.1″	540	Center
10	11/02/2003	70°44′17.5″	81°29′12.5″	494	Center
10-2	11/02/2003	70°44′16.8″	81°28′22.1″	494	Center
11	13/02/2003	69°27′12.6″	82°8′35.5″	1,294	Center
12	13/02/2003	69°24′13.3″	82°13′0.1″	2,043	Center
13-2	15/02/2003	69°49′20.3″	77°49′55.2″	602	East
14	16/02/2003	69°21′9.7″	78°4′21″	492	East
14-2	16/02/2003	69°21′8.3″	78°5′25.1″	493	East
26	20/01/2006	70°14′31.2″	95°1′58.8″	1,958	West
30	26/01/2006	69°58′50.5″	87°29′2.4″	1,801	Center
34	30/01/2006	70°7′21.3″	84°52′5.5″	603	Center
34-2	30/01/2006	70°6′58.3″	84°52′9.7″	603	Center
34S	01/02/2006	70°06′02″	84°52′37″	620–612	Center
37	03/02/2006	69°25′55.9″	80°50′39.2″	508	East

Results and discussion

Species of benthic hydroids currently known from the Bellingshausen Sea (Peter I excluded). (*) Species previously reported from the Bellingshausen Sea but absent in our material.

Anthoathecata Cornelius, 1992
Bougainvilliidae Lütken, 1850
'*Perigonimus*' sp. (*)

Perigonimus sp. Hartlaub, 1904: 8, pl. 1 fig. 1.

Remarks. Vanhöffen (1910) regarded Hartlaub's (1904) material conspecific with material he studied from the Davis Sea, considering it as a new species, *Perigonimus belgicae* Vanhöffen, 1910. It would be, however, necessary to examine both to ascertain whether they are actually conspecific. They come from opposite places of the Southern Ocean and clearly different depths. Moreover, they have apparently some distinct differences since Hartlaub's material has stems strongly widening distally. Hartlaub's and Vanhöffen's materials have stalked gonophores, unlikely released as medusa, so the species should be referred to as *Bimeria belgicae*.

Ecology and distribution. Hartaub's (1904) material was found at a depth of 569 m in the Bellingshausen Sea, epibiotic on a pycnogonid, whereas Vanhöffen's (1910) material was collected at 2,450 m off Posadowsky Bay, in the Davis Sea.

'*Perigonimus*' sp. (*)

Perigonimus sp. Hartlaub, 1904: 8–9, pl. 1 fig. 2.

Remarks. As already indicated by Hickson and Gravely (1907), Hartlaub's material could be conspecific with *Rhizorhagium antarcticum* (Hickson and Gravely, 1907), but its infertile condition provides insufficient support for this conclusion.

Ecology and distribution. Hartlaub's (1904) material was collected at a depth of 100 m in the Bellingshausen Sea, epibiotic on *Eudendrium* sp.

Eudendriidae L. Agassiz, 1862
***Eudendrium ramosum* (Linnaeus,** 1758) **(*)**

Eudendrium ramosum—Hartlaub, 1904: 9–10, pl. 1 fig. 3.

Remarks. Puce et al. (2002) considered Hartlaub's (1904) record of *Eudendrium ramosum* valid, constituting a clearly identifiable species of Antarctic *Eudendrium*. Nevertheless, reexamination of Hartlaub's (1904) material, especially characterization of the cnidome, is necessary to confirm its identification. Consequently, it is better for now to consider the record as dubious.

Ecology and distribution. Hartlaub's (1904) material was collected at depths between 400 and 550 m in the Bellingshausen Sea.

***Eudendrium* sp. 1**

Material examined. **Stn 34S**, a few little-branched stems and fragments, up to 70 mm high, with just a few polyps in very bad condition, on rock.

Description. Largest stems slightly polysiphonic, with two or three accessory tubes. Perisarc smooth, except at the origin of branches. Polyp c. 1 mm high, without basal groove.

Measurements of nematocysts (in μm): fusiform microbasic euryteles, 10.9 ± 0.2 × 4.9 ± 0.2 (10), range 10.5–11 × 4.5–5; ratio 2.2 ± 0.1, range 2.1–2.4; tear-shaped microbasic euryteles, 8.1 ± 0.2 × 3.9 ± 0.2 (10), range 8–8.5 × 3.5–4; ratio 2.1 ± 0.1, range 2.0–2.4.

Remarks. It is not possible, with the available material, to provide a proper identification. The material is infertile and there is no peculiar pattern in the distribution of the nematocysts. By the type and size of the nematocysts, it is close to *Eudendrium generale* von Lendenfeld, 1885, but in this species the large nematocysts form a band at the base of the polyp, the tentacles have a thorny appearance, and the stems are monosiphonic.

Ecology and distribution. The material was collected at a depth of 603 m, growing on rock.

***Eudendrium* sp. 2**

Material examined. **Stn 34S**, two stem fragments, up to 30 mm long, with male gonophores, basibiont of *Stegopoma plicatile*.

Description. Larger stem fragment slightly polysiphonic. Perisarc smooth, with just a few annulations at base of pedicels. Polyps and gonophores white. Polyp c. 1 mm high, provided with a proportionally large hypostome; this and tentacles extending for half or even more of the total length. Basal part of polyp without groove.

Male gonophores on completely reduced blastostyles, one-chambered and in different developmental states. Pedicels of blastostyles very short.

Measurements of the nematocysts (in μm): unidentified (with shaft), 19.7 ± 0.8 × 10.1 ± 0.8 (10), range 18–21 × 9–11; ratio 2.0 ± 0.2, range 1.7–2.3; microbasic euryteles, 9.7 ± 0.4 × 4.8 ± 0.3 (10), range 9–10 × 4.5–5; ratio 2.0 ± 0.1, range 1.8–2.2.

Remarks. It is not possible with the available material to identify this species. By the size of the nematocysts, it is close to *Eudendrium scotti* Puce et al., 2002, but in this species the large nematocysts (macrobasic euryteles) are disposed in two bands. In our material the unidentified large nematocysts have no special arrangement. In addition, the male gonophores are on normal polyps in *E. scotti*, whereas in our material they are on completely reduced blastostyles.

Ecology and distribution. The material, with male gonophores, was collected at a depth of 603 m in February. It was used as substratum by a stolonal colony of *Stegopoma plicatile*.

***Eudendrium* sp. 3**

Material examined. **Stn 34-2**, a few stems, up to 9 mm high, on *Halecium incertus*, basibiont of *Stegopoma plicatile*.

Description. Delicate stems up to 9 mm high and four polyps; frequently with a single distal polyp. Stems monosiphonic, though some with accompanying stolon at basal part giving rise to other stems (fake polysiphony). Polyp c. 500 μm high and c. 250 μm in maximum diameter, with c. 16 tentacles and a basal groove. Only one type of nematocyst observed (microbasic euryteles) c. 7.5 × 3.5 μm.

Remarks. By the presence of a single type of nematocyst as well as by the tiny stems, usually with a single distal polyp, our material is allied to *E. antarcticum*. However, due to the infertile condition and the presence of up to four polyps per stem, identification is taken only to the generic level.

Ecology and distribution. The material was collected at a depth of 603 m, epibiont on *Halecium incertus*. It is used in turn as substratum by a stolonal colony of *Stegopoma plicatile*.

Tubulariidae Allman, 1864
***Bouillonia denhartogi* Svoboda et al., 2006**
(Fig. 2a, b)

Material examined. **Stn 26**, two tubes, up to 12 mm long.

Remarks. Only one polyp is present, provided with c. 20 aboral tentacles. See Svoboda et al. (2006) for a comprehensive study on this species and the genus *Bouillonia*.

Ecology and distribution. *Bouillonia denhartogi* has been collected at depths from 330 to 3,450 m (Svoboda et al. 2006); our material was collected at a depth of 1,958 m. It has a circum-Antarctic distribution, being known from the Weddell Sea, the Ross Sea, off the South Sandwich Islands and off the west coast of the Antarctic Peninsula (Svoboda et al. 2006). This constitutes the first record from the Bellingshausen Sea.

Candelabridae Stechow, 1921
***Candelabrum penola* (Manton, 1940)** (Fig. 2c)

Material examined. **Stn 14-2**, one distally broken polyp with female gonophores.

Description. Polyp lacking distal tentacle-bearing body region. Hydrorhiza in the form of attachment tentacles, some of which with distal chitinous discs. In general, attachment tentacles grouped in a three- or four-finger hand-shaped structure; each "finger" representing a tentacle. Blastostyle-bearing region badly preserved. Most

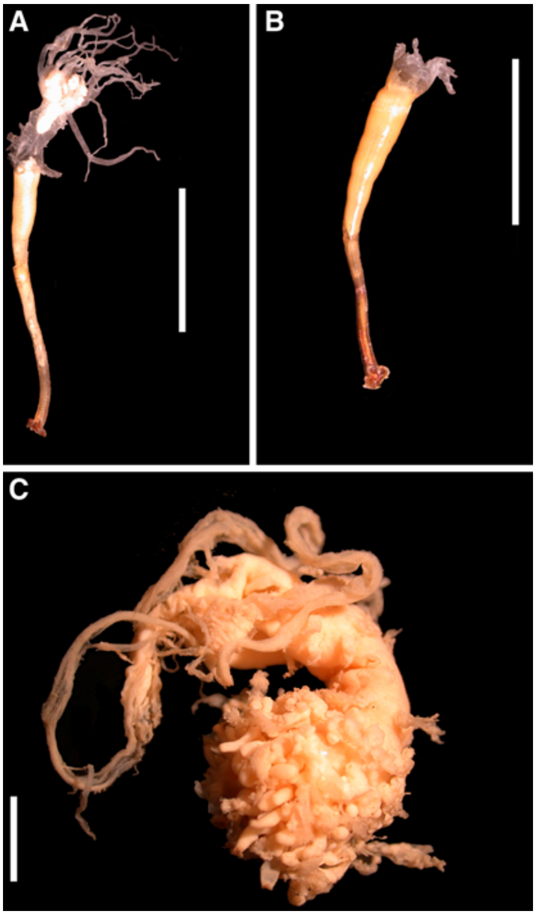

Fig. 2 **a**–**b**, *Bouillonia denhartogi*: **a** tube with polyp; **b** tube without polyp; **c** *Candelabrum penola*: polyp. (**a**, **b** from Stn 26; **c** from Stn 14-2). *Scale bar* 5 mm

blastostyles distally broken and only some immature gonophores present.

Likely related to the absence of the tentacle-bearing body region, only a few empty nematocysts could be observed, though at least three types of capsules could be recognized: pear-shaped (microbasic mastigophores?) (20–21.5 × 6.5–8 µm), fusiform (14–15.5 × 5.5–6.5 µm), and rounded (desmonemes?) (15 × 10.5 µm).

Remarks. Two species of *Candelabrum* are known to inhabit Antarctic waters: *C. austrogeorgiae* (Jäderholm, 1904) and *C. penola* (Manton, 1940). In spite of the state of the available material, our specimen seems to be conspecific with the latter. *Candelabrum austrogeorgiae* has a different polyp structure, with body tentacles covering the whole hydranth, whereas in *C. penola* those tentacles are only present above the blastostyle-bearing region as it also occurs in our material.

Ecology and distribution. *Candelabrum penola* was originally described from two specimens found floating in a creek at the Argentine Islands (Manton 1940). The specimens were attached to the apex of a pennatulid torn from its substrate. Our material, with female gonophores, was collected at a depth of 492 m in February. This constitutes the second record of the species and the first record from the Bellingshausen Sea.

Hydractiniidae L. Agassiz, 1862
***Hydractinia angusta* Hartlaub, 1904** (*)

Hydractinia angusta Hartlaub, 1904: 7–8, pl. 4 figs 1–7.

Remarks. Species collected at depths from 3 (Stepanjants 1979) to 922 m (Peña Cantero and Ramil 2006). With a circum-Antarctic distribution. Reported in the Bellingshausen Sea by Hartlaub (1904).

Leptothecata Cornelius, 1992
Campanulinidae Hincks, 1868
***Opercularella belgicae* (Hartlaub, 1904)** (*)

Campanulina belgicae Hartlaub, 1904: 10, pl. 1 figs 8, 9.

Remarks. Species collected from the tidal level (Billard 1914) to a depth of 650 m (Millard 1977). Uncertain, mainly circum-Antarctic, distribution because several allied species could be involved (Peña Cantero et al. 2004). Reported in the Bellingshausen Sea by Hartlaub (1904).

***Stegella lobata* (Vanhöffen, 1910)**

Material examined. **Stn 9**, one colony with a few stems, up to 50 mm high, with male gonothecae, basibiont of *Filellum antarcticum*.

Ecology and distribution. Circum-Antarctic species (Peña Cantero et al. 2004), collected at depths from 10 (Naumov and Stepanjants 1972) to 700 m (Naumov and Stepanjants 1962); present material at 540 m. This constitutes the first record from the Bellingshausen Sea, though it is known from off Peter I Island (Broch 1948; Peña Cantero 2010a).

Tiarannidae Russell, 1940
***Stegopoma plicatile* (M. Sars,** 1863)

Lictorella (?) *operculata* Hartlaub, 1904: 12–13, pl. 1 figs 6, 7.

Material examined. **Stn 4**, stolonal colony, on *Halecium frigidum*; **Stn 11**, one stem c. 6 mm high, on *Eudendrium* sp.; **Stn 13-2**, four stems, up to 45 mm high, on gorgonian; **Stn 14**, two stems, up to 35 mm high; **Stn 34**, stolonal colony and an erect stem, c. 6 mm high, on *Halecium incertus*, plus an unattached stem, c. 45 mm high; **Stn 34-2**, one unattached stem, c. 35 mm high, two stems, up to 20 mm high, on axis of dead gorgonian, and a stolonal colony, on

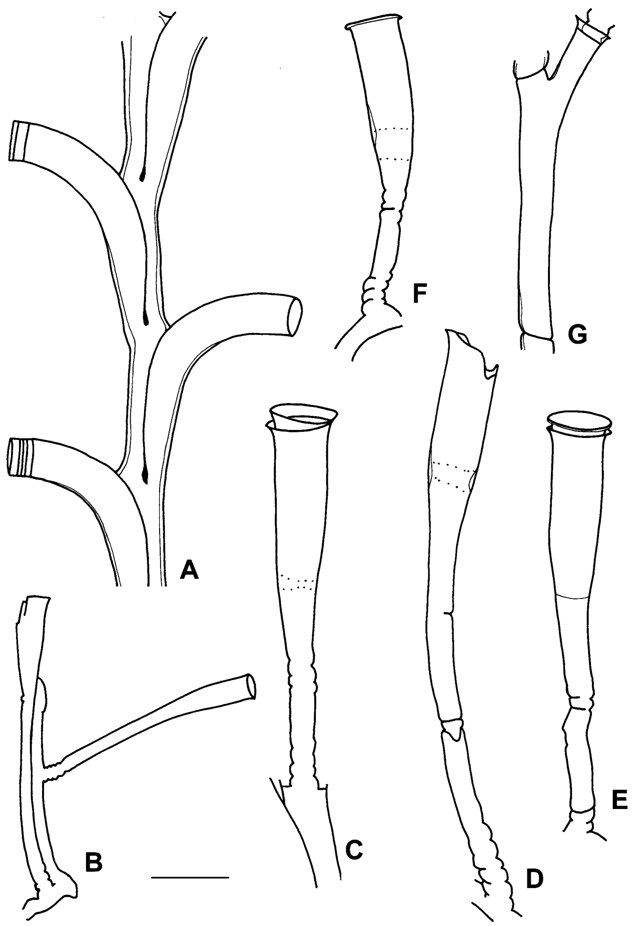

Fig. 3 **a** *Acryptolaria* sp.: hydrothecal shape and arrangement. **b–f** *Lafoea annulata*: **b** side-branch; **c–f** hydrothecae and pedicels. **g** *Halecium frigidum*: internode with hydrotheca. (**a**, **g** from Stn 4; **b–f** from Stn 34S). *Scale bar* 500 µm (**a**, **b**); 250 µm (**c–g**)

Eudendrium sp.3; **Stn 34S**, three stems, c. 50 mm high, on rock, one unattached stem, c. 22 mm high, and stolonal colonies, on *Eudendrium* sp.2 and *S. bellingshauseni* sp. nov.; **Stn 37**, numerous stems, up to 45 mm high, on axis of dead gorgonian.

Ecology and distribution. Species with a worldwide distribution, collected at depths from 385 (Vanhöffen 1910) to 1,019 m (Peña Cantero 2008) in the Southern Ocean where it is known from both East and West Antarctica (cf. Peña Cantero and Ramil 2006); present material from 426 to 1,294 m, epilithic on rock and epibiotic on gorgonian, *Eudendrium* sp., *Halecium frigidum* and *H. incertus*. Previously reported from the Bellingshausen Sea by Hartlaub (1904).

Lafoeidae A. Agassiz, 1865
***Acryptolaria* sp.** (Fig. 3a)

Acryptolaria sp. Peña Cantero, Svoboda and Vervoort, 2004: 2281, fig. 2A, B; Peña Cantero, 2010a: 764, fig. 2e.

? *Acryptolaria encarnae* Peña Cantero and Vervoort, 2010: 284–286, figs 8, 30, 31E.

? *Cryptolaria conferta*—Hartlaub, 1904: 13, pl. 2 fig. 1.

Material examined. **Stn 4**, two stems, c. 90 mm high each; **Stn 9**, one stem, c. 15 mm high; **Stn 14**, two stems, up to 90 mm high, covered by a sponge; **Stn 14-2**, two stems, up to 75 mm high; **Stn 34-2**, one stem fragment, c. 14 mm long.

*Remark*s. Measurements of large nematocysts (in µm): $20.1 \pm 0.8 \times 7.1 \pm 0.2$ (7), range 18.5–21 × 7–7.5; ratio 2.8 ± 0.1, range 2.6–3.0.

Our material is undoubtedly conspecific with that described as *Acryptolaria* sp. by Peña Cantero et al. (2004) and Peña Cantero (2010a). All this material is in turn close to *Acryptolaria encarnae* Peña Cantero and Vervoort, 2010, sharing the size of both hydrothecae and nematocysts ($19.9 \pm 0.3 \times 7.5 \pm 0.3$ (10), range 19–20 × 7–8; ratio 2.8 ± 0.1, range 2.5–2.8), and the general shape of the hydrothecae. The only noticeable differences are that in our material the diameter of the hydrotheca smoothly decreases basally at the adnate part, whereas in *A. encarnae* the hydrotheca is practically cylindrical, decreasing only slightly at the basal part. Also, whereas in *A. encarnae* the branches are straight, they form a slight zigzag in our material and widen where the hydrothecae become free. There are also doubts about the conspecificity on geographic grounds because *A. encarnae* is only known from New Caledonian waters in the Western Pacific. Hartlaub (1904) assigned with doubts to *Acryptolaria conferta* (Allman, 1877) material that could also belong here.

At present, it seems more reasonable to keep identification of the Antarctic material at generic level hoping that the discovery and the description of the unknown coppinia of *A. encarnae* could bring light into this issue. The coppinia of the Antarctic material was described by Peña Cantero et al. (2004: 2281): "Female coppinia fusiform, consisting of gonothecae closely set together around stem or main branches. Coppinia deprived of defensive tubes. Gonotheca fusiform, with a funnel-shaped aperture".

Ecology and distribution. The Antarctic material described by Peña Cantero et al. (2004) and Peña Cantero (2010a) was collected at depths between 208 and 450 m from the Weddell Sea and between 85 and 380 m from off Peter I Island, respectively; present material comes from depths between 426 and 603 m. *Acryptolaria encarnae* was found from depths between 430 and 515 m from the Loyalty Islands and the Norfolk Ridge area, in New Caledonian waters (Peña Cantero and Vervoort 2010).

***Filellum antarcticum* (Hartlaub, 1904)**

? *Lafoëa antarctica* Hartlaub, 1904: 11, pl. 2 fig. 2.

Material examined. **Stn 9**, several hydrothecae, with coppinia, on *Stegella lobata*.

Remarks. Hartlaub (1904) originally described *Filellum antarcticum* from the Bellingshausen Sea as *Lafoea antarctica*. Nevertheless, the type material was infertile and today it is lost. This prompted Peña Cantero et al. (2004) to designate a neotype for the species.

Ecology and distribution. *Filellum antarcticum* has been collected at depths from 14 (Millard 1964, 1975) to 423 m (Peña Cantero et al. 2004); present material at 540 m, epibiotic on *Stegella lobata*. Coppinia in February. This species is widely distributed in Antarctic waters, though Millard (1964, 1975) also recorded it from Mossel Bay, South Africa (cf. Peña Cantero et al. 2004). This constitutes the first record from the Bellingshausen Sea, though it is also known from Peter I Island (Peña Cantero 2010a).

***Filellum* sp.** (*)

Lafoea plicata Hartlaub, 1904: 12, pl. 2 fig. 3.

Remarks. Hartlaub (1904) described another species of *Filellum* as *Lafoea plicata*. Again, however, the description was based on infertile material, presently lost, so it is neither possible to characterize the species nor to assign it to any of the known species of the genus, so it is considered a doubtful species (cf. Peña Cantero et al. 2004).

***Lafoea annulata* Watson,** 2003 (Fig. 3b–f)

Lafoea annulata Watson, 2003: 158–159, figs 8A–E.

Material examined. **Stn 34S**, one stem c. 8 mm high.

Description. The stem is polysiphonic throughout, unbranched, except for a side-branch formed by a hydrotheca on which a stolon grows and gives rise to another hydrotheca (Fig. 3b).

Hydrothecae irregularly arranged, resting on a relatively long pedicel which widens distally merging smoothly with the hydrotheca (Fig. 3c–f). Without distinct separation between hydrotheca and pedicel; boundary usually marked by two circles of desmocytes (Fig. 3c, d, f), obscure when polyp is present. Hydrothecal pedicel annulated at base and sometimes in other parts. Hydrotheca elongated, with distal circular aperture with an even and slightly everted rim (Fig. 3c, e, f). With up to four renovations. Frequently hydrotheca originating from an older broken hydrotheca (Fig. 3c).

Measurements (in µm): diameter at aperture 200–220, height of hydrotheca (to lower circle of punctae) 450–540, length of pedicel 500–1,400, diameter at the level of lower circle of punctae 110–150, larger nematocysts 16–17 × 7.5–8, smaller nematocysts c. 7 × 2.

Remarks. There is an almost complete agreement between the present material and that described by Watson. The main difference concerns the nematocysts, which Watson (2003: 159) described as "bean-shaped, probably isorhizas, 21–22 × 8.5–9 µm, none discharged, but containing a long, probably isometric, closely coiled tubule". We found nematocysts slightly smaller, but clearly anisorhizas, as they are provided with a shaft shorter than the capsule length.

Ecology and distribution. *Lafoea annulata* was only known from off Macquarie Island (56°15.7′–56°18′S, 158°30.2′–158°28.7′E), where it was collected at depths between 500 and 600 m (Watson 2003). Our material was found at a depth of 603 m. This constitutes the second record for the species and the first Antarctic one.

Haleciidae Hincks, 1868

***Halecium frigidum* Peña Cantero,** 2010 (Fig. 3g)

Material examined. **Stn 4**, one stem fragment, c. 40 mm long, almost without branches, basibiont of *Stegopoma plicatile*; **Stn 9**, one stem, c. 75 mm high, on pebble; **Stn 37**, two stems, c. 140 mm and 53 mm high, hydrorhizal stolons attached to gravel.

Remarks. Our material is in complete agreement with that described by Peña Cantero (2010a), having polysiphonic stems with paired branches, alternate branching every third hydrotheca, and hydrothecae of similar size and shape.

Ecology and distribution. Previously recorded at depths between 216 (Peña Cantero 2010a) and 415 m (Peña Cantero and García Carrascosa 1995); present material at depths from 426 to 540 m, epilithic on gravel and pebbles. Basibiont for stolonal colony of *Stegopoma plicatile*. West Antarctic distribution, being known so far from the South Orkney Islands (Peña Cantero and García Carrascosa 1995) and Peter I Island (Peña Cantero 2010a). This is the first record from the Bellingshausen Sea.

***Halecium incertus* Naumov and Stepanjants,** 1962

Material examined. **Stn 34**, two stems, c. 170 and 75 mm high, basibiont of *Stegopoma plicatile*; **Stn 34-2**, a distal stem fragment, c. 43 mm long.

Ecology and distribution. Species with an Antarctic-Kerguélen distribution (Peña Cantero and Gili 2006), collected at depths from 15 (Stepanjants 1979) to 1,019 m (Peña Cantero 2008); present material at 603 m. Used as substrate by stolonal colony of *Stegopoma plicatile*. This constitutes the first record from the Bellingshausen Sea.

***Halecium* sp.** (*)

Halecium tenellum: Hartlaub, 1904: 13–14, pl. 1 fig. 5.

Remarks. Hartlaub (1904) assigned to *H. tenellum* material from the Bellingshausen Sea. We have, however, serious doubts about the correctness of the identification. *Halecium tenellum* has never been reported again from the Antarctic region and Hartlaub's description and figures could correspond to other Antarctic species of *Halecium*. We prefer keeping it to generic level until Hartlaub's material could be reexamined.

Schizotrichidae Peña Cantero et al., 2010
***Schizotricha vervoorti* Peña Cantero, 1998**

Material examined. **Stn 9**, two stems, up to 310 mm high, with male gonothecae; **Stn 10-2**, one basally broken stem, c. 200 mm high, with female gonothecae.

Ecology and distribution. *Schizotricha vervoorti* has been collected at depths from 50 (Peña Cantero 1998) to 1,152 m (Peña Cantero and Vervoort 2005); present material between 494 and 540 m, with gonothecae in February. Species with a West Antarctic distribution, though it has also been reported in the South Pacific far away from Antarctic waters (cf. Peña Cantero and Vervoort 2005). This constitutes the first record from the Bellingshausen Sea, though it is known from Peter I Island (Blanco and Bellusci de Miralles 1972; Peña Cantero 2010a).

Kirchenpaueriidae Stechow, 1921
***Oswaldella bifurca* (Hartlaub, 1904) (*)**

Schizotricha bifurca Hartlaub, 1904: 16–17, pl. 3 figs 4–8.

Ecology and distribution. Circum-Antarctic species collected at depths between 342 and 1,610 m (Peña Cantero and Vervoort 2004). Reported from the Bellingshausen Sea by Hartlaub (1904).

Sertulariidae Lamouroux, 1812
***Antarctoscyphus elongatus* (Jäderholm, 1904)**

Material examined. **Stn 26**, one stem, c. 100 mm high.

Ecology and distribution. Antarctic-Kerguélen species, collected at depths between 10 (Naumov and Stepanjants 1972) and 710 m (Peña Cantero 2008); present material at 1,958 m, notably increasing its bathymetric range. This constitutes the first record from the Bellingshausen Sea.

***Antarctoscyphus spiralis* (Hickson and Gravely, 1907)**

Material examined. **Stn 26**, numerous stems and fragments, up to 120 mm high; **Stn 30**, one basally broken stem, c. 70 mm high, in bad condition.

Ecology and distribution. Circum-Antarctic species (Stepanjants 1979), collected at depths between 6 (Naumov and Stepanjants 1972) and 1,873 m (Peña Cantero 2010a); present material from 1,801 to 1,958 m. This constitutes the first record from the Bellingshausen Sea, though it is known from Peter I Island (Peña Cantero 2010a).

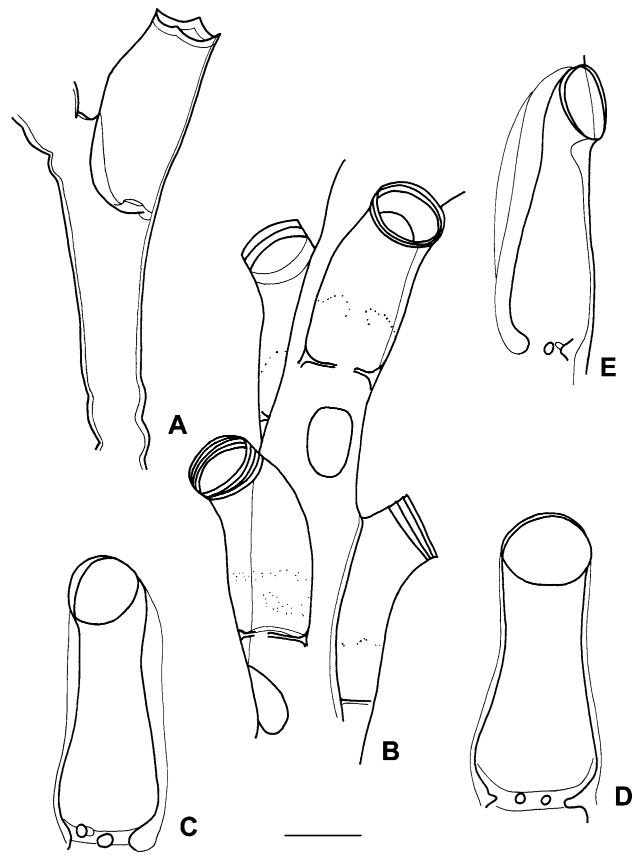

Fig. 4 **a** *Sertularella sanmatiasensis*: internode with hydrotheca. **b** *Staurotheca dichotoma*: hydrothecal shape and arrangement. **c–e** *S. juncea*: hydrothecae. (**a** from Stn 30; **b** from Stn 34; **c–e** from Stn 4BC). *Scale bar* 250 µm

***Sertularella sanmatiasensis* El Beshbeeshy, 1991** (Fig. 4a)

Material examined. **Stn 30**, one stem fragment, c. 42 mm long, in bad condition.

Ecology and distribution. Species with a West Antarctic-Patagonian distribution (Peña Cantero 2006), collected at depths between 30 (Stepanjants 1979) and 500 m (El Beshbeeshy 1991); present material at 1,801 m, considerably increasing its bathymetric range. This constitutes the first record from the Bellingshausen Sea.

***Staurotheca antarctica* Hartlaub, 1904**

Staurotheca antarctica Hartlaub, 1904: 16, pl. 1 fig. 4, pl. 2 fig. 4.

Material examined. **Stn 34S**, a colony fragment, c. 20 mm long; **Stn 34-2**, a colony fragment, c. 23 mm long.

Ecology and distribution. Circum-Antarctic species (Peña Cantero and Vervoort 2003), collected at depths between 55 (Peña Cantero and Vervoort 2003) and 661 m (Peña

Cantero et al. 1997); present material at 603 m. Previously reported from the Bellingshausen Sea by Hartlaub (1904).

***Staurotheca dichotoma* Allman,** 1888 (Fig. 4b)

Material examined. **Stn 10**, two colony fragments, up to 30 mm long, with male gonothecae; **Stn 34**, one colony, c. 37 mm high; **Stn 34-2**, one colony, c. 55 mm high; **Stn 34S**, one stem fragment, c. 12 mm long.

*Remark*s. The material from Stn 10 has verticils of three hydrothecae, whereas that from Stn 34 has decussate pairs, sometimes in X, and even some hydrothecae are in sub-opposite pairs. Colonies slightly polysiphonic at base, branched subdichotomously in approximately one plane. The material from Stn 34 differs in having slightly smaller hydrothecae. There is a ring of desmocytes by the middle of the hydrotheca (Fig. 4b).

Measurements of microbasic mastigophores from Stn 34 (in µm): larger group, $20.6 \pm 0.4 \times 4.8 \pm 0.2$ (10), range $20–21 \times 4.5–5$; ratio 4.3 ± 0.2, range 4.0–4.7; smaller group, c. 8×2.

Ecology and distribution. Antarctic-Kerguélen distribution (Peña Cantero and Vervoort 2003), collected at depths from 82 (Totton 1930) to 799 m (Peña Cantero et al. 1997); present material between 494 and 603 m, with gonothecae in February. This constitutes the first record from the Bellingshausen Sea, though it was previously known from Peter I Island (Peña Cantero 2010a).

***Staurotheca fallax* (Hartlaub, 1904) (*)**

Sertularella fallax Hartlaub, 1904: 14–15, pl. 2 fig. 4.

*Remark*s. Hartlaub (1904) recognized that material available to him was insufficient for a complete description, and he even doubted its assignment to *Sertularella*. It now seems clear that the species belong to *Staurotheca*, giving its even rim and hydrothecal arrangement, usually in pairs, but also alternate, what also fits into that genus. The type material could not be located and it is apparently lost, so that it is not possible to reexamine it to establish its actual systematic status. It should be considered a *species inquirenda*.

***Staurotheca juncea* (Vanhöffen, 1910)** (Fig. 4c–e)

Material examined. **Stn 4**, one stem, c. 180 mm high; **Stn 4BC**, one stem, c. 40 mm high, on gravel.

Description. 180-mm-high stem with a rhizoidal hydrorhiza extending for about 25 mm; stolons relatively thick and attached to gravel. Stem polysiphonic in the first 30 mm. There are four to six longitudinal rows of hydrotheae. Strong perisarc development. 40-mm-high stem also with rhizoidal hydrorhiza. With four longitudinal rows of hydrothecae, apart from 15-mm-long stolon-shaped basal part deprived of hydrothecae.

Measurements of nematocysts (in µm): larger group, $21.2 \pm 1.1 \times 5.3 \pm 0.3$ (12), range $19–23 \times 5–5.5$, ratio 4.0 ± 0.2, range 3.6–4.2; smaller one: c. 8×2.5.

*Remark*s. This species is clearly characterized by the unbranched, *Equisetum*-like stems, though in the material from Stn 4, there is a side-branch. Moreover, though the hydrothecae in general appearance are similar to those of *S. pachyclada* (Jäderholm, 1904) (cf. Peña Cantero and Vervoort 2003), they are clearly distinguishable by the presence of a mushroom-shaped diaphragm (there are two strong abcauline protuberances pointing into the hydrothecal lumen) in *S. juncea* (Fig. 4c–e).

Ecology and distribution. Species previously collected only at a depth of 385 m in the Davis Sea (Vanhöffen 1910); our material was found at 426 m, epilithic on gravel. This constitutes the second record for the species and the first record from the Bellingshausen Sea. Our finding also points to a circum-Antarctic distribution for the species.

***Staurotheca stolonifera* (Hartlaub, 1904) (*)**

Sertularia stolonifera Hartlaub, 1904: 15, pl. 3 figs 2, 3.

*Remark*s. Because the type material is lost (cf. Peña Cantero et al. 1997), the identity of the species is uncertain and it is therefore considered a *species inquirenda*.

***Symplectoscyphus bellingshauseni* sp. nov.** (Figs. 5a, 6)

Material examined. **Stn 34-2**, one stem, c. 40 mm high (Holotype, MNCN 2.03/442, Museo Nacional de Ciencias Naturales, Madrid, Spain), with incipient gonothecae, plus three fragments, up to 19 mm long; **Stn 34S**, four stems, up to 20 mm high, on rock, basibiont of *Stegopoma plicatile*.

Description (Holotype). Stem, c. 40 mm high, polysiphonic along first 20 mm (Fig. 5a). Branching either in one plane or in two planes making an obtuse angle, alternate at every third hydrotheca, though with irregularities. Up to fourth-order branches observed: at 10 mm high, primary branch much developed, forming a second-order one which gives rise to several third-order branches, the first of these forming several fourth-order branches (Fig. 5a). With some anastomoses between branches.

Hydrothecae alternately arranged (Fig. 6a), smoothly curved abcaudally, though sometimes with a slight inflexion point where adcauline wall becomes free (Fig. 6). Hydrotheca free to internode for slightly over half of its adcauline wall. Free part of adcauline hydrothecal wall straight or slightly convex. Abcauline wall straight or

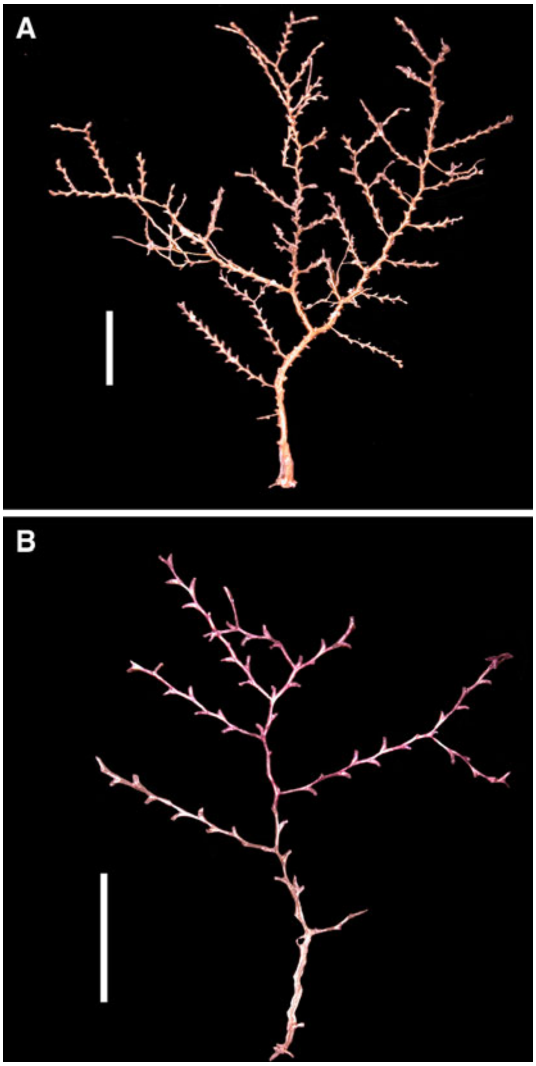

Fig. 5 **a** *Symplectoscyphus bellingshauseni* sp. nov.: colony. **b** *S. hesperides* sp. nov.: colony. (**a**, **b** from holotypes). *Scale bar* 5 mm

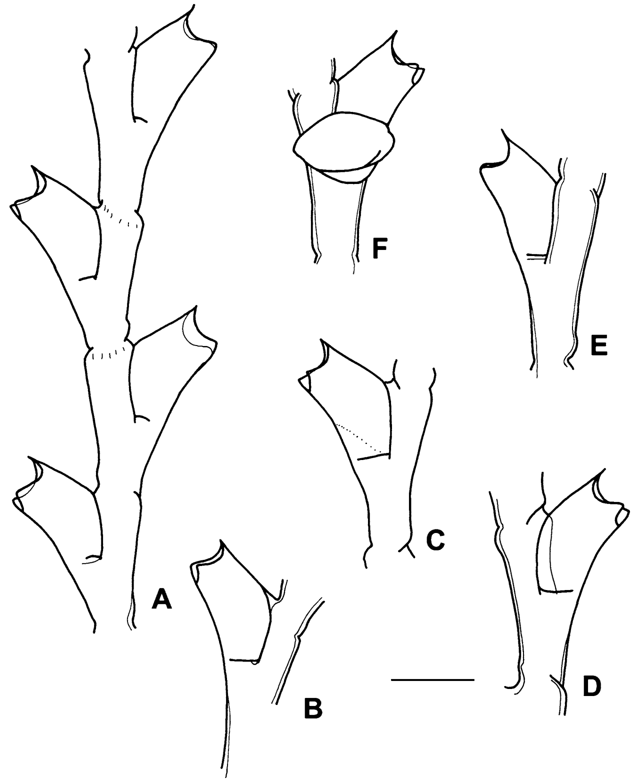

Fig. 6 *Symplectoscyphus bellingshauseni* sp. nov.: **a** hydrothecal arrangement; **b–e** hydrothecae; **f** incipient gonotheca. (**a**, **e**, **f** from holotype; **b** from Stn 34S; **c**, **d** from Stn 34-2). *Scale bar* 250 µm

slightly concave. Hydrothecal aperture directed up- and outwards. Rim of hydrothecal aperture provided with three quite sharp cusps separated by deep embayments; adcauline cusp straight or slightly curved adcaudally at its distal end (Fig. 6). Hydrothecae usually with renovations obscuring primary hydrothecal rim.

Measurements of nematocysts (in µm): larger group, $8.9 \pm 0.3 \times 2.6 \pm 0.3$ (10), range $8.5–9.5 \times 2–3$; ratio 3.5 ± 0.5, range 2.8–4.5; smaller one, c. 6×2.

Remarks. Only a few incipient gonothecae are present (Fig. 6f). Although it is not possible to know the actual shape of the gonotheca, it seems to be characterized by the presence of rings.

Among the Antarctic species of the genus, only *Symplectoscyphus cumberlandicus* (Jäderholm, 1904), *S. frondosus* Peña Cantero, 2010, *S. liouvillei* (Billard, 1914), and *S. sofiae* Peña Cantero et al., 2002 are also characterized by forming polysiphonic, erect stems. *Symplectoscyphus frondosus* and *S. liouvillei* are clearly different in the structure of their stems, which give rise to spirally arranged primary branches. Moreover, their hydrothecae are different in being straight or just slightly abcaudally directed. Their hydrothecae are also larger, particularly in *S. liouvillei* which, in addition, has a larger portion of the adcauline wall adnate to the internode. In addition, in both species the gonothecae lack rings.

By the colony structure, *S. bellingshauseni* sp. nov. is closer to *S. cumberlandicus* and *S. sofiae*. In both species branching occurs in one plane, usually following an alternate pattern. In addition, in *S. cumberlandicus* branching occurs typically at every third hydrotheca as it happens to *S. bellingshauseni* sp. nov. They all also have gonothecae with ringed walls. Our material is, however, completely different from both species in shape and size of the hydrothecae.

By the shape of the hydrothecae, *S. bellingshauseni* sp. nov. is close to *S. weddelli* Peña Cantero et al., 2002. However, it differs because in *S. weddelli* the stems are monosiphonic, the branching is irregular and in several planes, the branches originate laterally at the hydrothecal base, and the plane formed by the hydrothecae of lower-order branches is

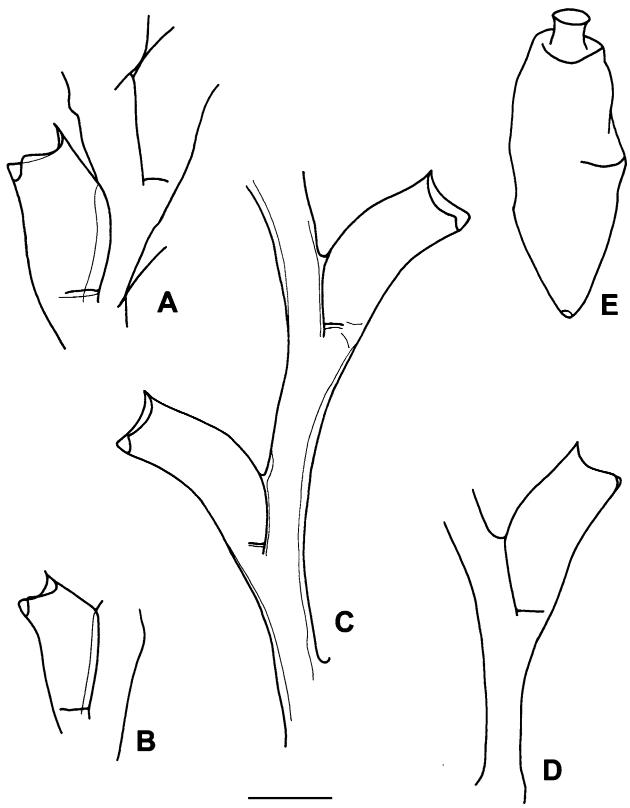

Fig. 7 **a** *Symplectoscyphus cumberlandicus*: hydrotheca. **b** *S. exochus*: hydrotheca. **c**–**e** *S. paulensis*: **c**–**d** hydrothecae; **e** gonotheca. (**a** from Stn 9; **b** from Stn 26; **c**, **e** from Stn 34-2; **d** from Stn 34S). *Scale bar*: 500 µm (**c**–**e**); 250 µm (**a**, **b**)

perpendicular to that formed by the hydrothecae of previous ones. Moreover, hydrothecae are distinctly larger and usually adnate to internodes over more than half of their adcauline length.

Ecology and distribution. *Symplectoscyphus bellingshauseni* sp. nov. was collected at a depth of 603 m in the center of the Bellingshausen Sea, epilithic on rock. It is used as substratum by stolonal colonies of *Stegopoma plicatile*.

Etymology. The specific name *bellingshauseni* is a tribute to Fabian von Bellingshausen who commanded the second Russian expedition to circumnavigate the globe, being considered to be the first to have seen the Antarctic continent, and after whom is also named our area of study (i.e., the Bellingshausen Sea).

***Symplectoscyphus cumberlandicus* (Jäderholm,** 1905) (Fig. 7a)

Material examined. **Stn 9**, one stem, c. 70 mm high.

Ecology and distribution. Circum-Antarctic species (Peña Cantero et al. 2002), collected at depths between 8 (Naumov and Stepanjants 1972) and 380 m (Peña Cantero 2010a); present material at 540 m. This constitutes the first record from the Bellingshausen Sea, though it was previously known from Peter I Island (Broch 1948; Blanco and Bellusci de Miralles 1972; Peña Cantero 2010a).

***Symplectoscyphus curvatus* (Jäderholm, 1917)**

Material examined. **Stn 12**, several stems, up to 50 mm high, with gonothecae, on axis of dead gorgonian.

Ecology and distribution. Circum-Antarctic species (Stepanjants 1979), collected at depths between 49 (Peña Cantero 2008) to 799 m (Peña Cantero et al. 2002); present material at 2,043 m, widely extending its lower bathymetric limit, epibiotic on dead gorgonian and with gonothecae in February. This constitutes the first record from the Bellingshausen Sea, though it is known from Peter I Island (Blanco and Bellusci de Miralles 1972; Peña Cantero 2010a).

***Symplectoscyphus exochus* Blanco,** 1982 (Fig. 7b)

Material examined. **Stn 26**, one stem, c. 70 mm long.

Ecology and distribution. Species with a West Antarctic distribution (Peña Cantero 2010b), collected at depths between 15 (Vervoort 1972b) to 634 m (Peña Cantero et al. 2002); present material at 1,958 m, notably increasing its bathymetric range. This constitutes the first record from the Bellingshausen Sea.

***Symplectoscyphus hesperides* sp. nov.** (Figs. 5b, 8)

Material examined. **Stn 3**, one polysiphonic stem, c. 22 mm high, broken into two fragments c. 12 mm each (Holotype, MNCN 2.03/443, Museo Nacional de Ciencias Naturales, Madrid, Spain).

Description. Stem, 22 mm high, slightly polysiphonic along first 8 mm (Fig. 5b). Branching in one plane, but irregular; up to second-order branches present (Fig. 5b). Hydrothecae alternately arranged roughly in one plane (Figs 5b, 8a). Hydrotheca almost cylindrical, distinctly directed abcaudally, with a clear inflexion point where the adcauline wall becomes free (Fig. 8a–d). Hydrotheca adnate to internode in one-third or less of its adcauline length (free/adnate ratio 2.1–2.4). Abcauline wall slightly concave. Free part of adcauline wall only slightly convex, practically straight. Cusps of hydrothecal aperture sharp and separated by deep embayments (Fig. 8a–d). Hydrothecal aperture usually with many renovations hiding the original rim.

Measurements of nematocysts (in µm): larger group, $8.8 \pm 0.3 \times 2.6 \pm 0.2$ (10), range $8.5–9 \times 2.5–3$; ratio 3.4 ± 0.3, range 2.8–3.6; smaller group c. 6×1.5.

*Remark*s. Only the basal part of a gonotheca is present (Fig. 8e). Although it is not possible to know the actual shape of the gonothecae, it seems clear that they lack the rings so characteristic of a group of species of the genus.

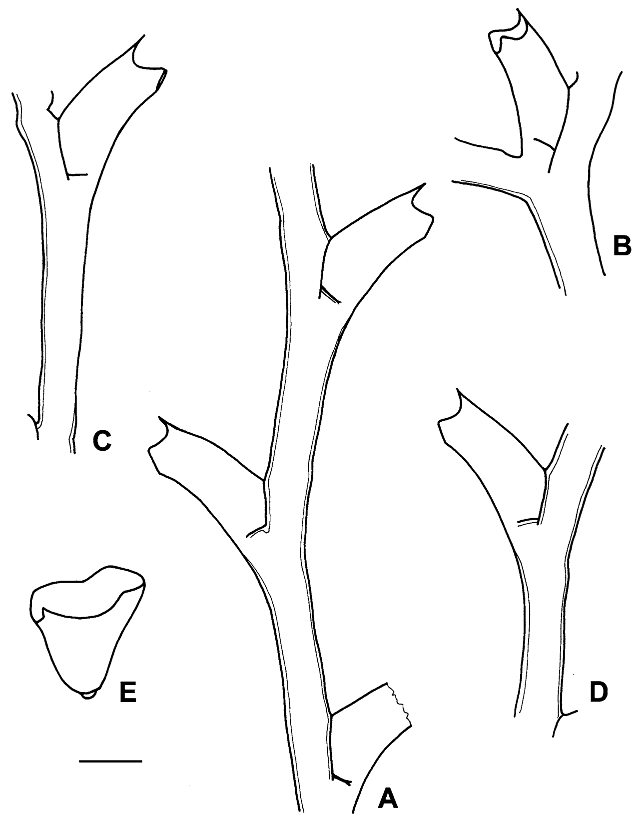

Fig. 8 *Symplectoscyphus hesperides* sp. nov.: **a** hydrothecal arrangement; **b–d**, hydrothecae; **e** incipient gonotheca. (All drawings from holotype). *Scale bar* 250 μm

This species resembles *S. anae* Peña Cantero et al., 2002 in the smooth walls of the gonothecae and in the general shape of the hydrotheca, with the free part of the adcauline wall being much larger than the adnate portion. However, the free/adnate ratio differs, with hydrothecae in *S. anae* being adnate over a distinctly larger distance (1.5–1.6). In addition, *S. anae* has never been reported with polysiphonic colonies, its branching occurs in several planes, there may be anastomoses among its branches, its internodes are much shorter, its hydrothecae are larger and more curved, and its nematocysts are distinctly larger ($13.9 \pm 0.8 \times 3.3 \pm 0.3$ (10), range 12.5–15 × 3–3.5, ratio 4.3 ± 0.4 (10), range 3.7–4.8).

Ecology and distribution. *Symplectoscyphus hesperides* sp. nov. was collected at a depth of 1,432 m at the western limit of the Bellingshausen Sea.

Etymology. The specific name "hesperides" is a tribute to the Spanish polar research vessel BIO *Hespérides*.

***Symplectoscyphus paulensis* Stechow, 1923** (Fig. 7c–e)

Material examined. **Stn 34-2**, several stems, up to 78 mm high (largest one with a gonotheca); **Stn 34S**, four stems and fragments, up to 40 mm high.

Remarks. The largest stem from Stn 34-2 is slightly polysiphonic at the first 10 mm. At the end of the polysiphonic part, there are two stems, also slightly polysiphonic along the first 10 mm. The branching is alternate every third hydrotheca and in one plane. Usually primary branches long and unbranched. Only a basal primary branch with two secondary ones. Internodes usually arranged in a distinct, sometimes strong, zigzag pattern.

Measurements of nematocysts from Stn 34-2 (in μm): larger group, $10.7 \pm 0.5 \times 3.0 \pm 0.0$ (10), range 10–11 × 3; ratio 3.6 ± 0.2, range 3.3–3.7; smaller group c. 7 × 2.

Ecology and distribution. *Symplectoscyphus paulensis* has been collected at depths between 140 (Stepanjants 1979) and 1,064 m (Watson 2003); present material at 603 m. Species with a wide distribution in the southern hemisphere, being known off St. Paul Island, in the southern Indian Ocean (Stechow 1923), off Mozambique (Millard 1967), on Vema Seamount (Vervoort 1972a), Patagonian shelf (Stepanjants 1979), Macquarie Island (Watson 2003) and New Zealand (Vervoort and Watson 2003). This constitutes the first Antarctic record for the species.

***Symplectoscyphus plectilis* (Hickson and Gravely, 1907)**

Material examined. **Stn 26**, a mass of stems, c. 10 mm in diameter.

Ecology and distribution. Circum-Antarctic species (Stepanjants 1979), collected at depths between 7 (Vervoort 1972b) to 457 m (Totton 1930); present material at 1,958 m, notably extending its lower bathymetric limit. This constitutes the first record from the Bellingshausen Sea.

Campanulariidae Johnston, 1836

***Billardia subrufa* (Jäderholm,** 1904)

Material examined. **Stn 9**, a few monosiphonic stems, up to 35 mm high; **Stn 37**, one stem fragment, c. 40 mm long.

Ecology and distribution. Species with an Antarctic-Patagonian distribution (Peña Cantero et al. 2004), collected at depths between 25 (Stepanjants 1972) and 1,030 m (Peña Cantero et al. 2004); present material from 508 to 540 m. This constitutes the first record from the Bellingshausen Sea, though it was previously known from Peter I Island (Peña Cantero 2010a).

General remarks

Thirty-seven species have been found in the Bellingshausen Sea (Peter I excluded) (cf. Table 2), belonging to the orders Anthoathecata and Leptothecata, to 13 families, and to 19

Table 2 Benthic hydroids from the Bellingshausen Sea (in bold species found in the present study)

	Depth (m)	Known range (m)	Substrate	Epibionts	Distribution	Reference
'*Perigonimus*' sp.	–	569	–	–	–	H
'*Perigonimus*' sp.	–	100	–	–	–	H
E. ramosum	–	400–550	–	–		H
***Eudendrium* sp. 1**	603	–	Rock		–	PS
***Eudendrium* sp. 2**	603	–		*S. plicatile*	–	PS
***Eudendrium* sp. 3**	603	–	*H. incertus*	*S. plicatile*	–	PS
B. denhartogi[a]	1,958	330–3,500	–	–	CA	PS
C. penola[a]	492	–	–	–	WA	PS
H.angusta	–	3–922	–	–	CA	H
O. belgicae	–	0–650	–	–	CA	H
S. lobata[a]	86–540	10–700	–	*F. antarcticum*	CA	PS
S. plicatile	492–1,294	385–1,019	Rock, gorgonian, *Eudendrium* sp., *H. incertus*	–	W	H, PS
***Acryptolaria* sp.**	85–603	208–450	–	–	–	H, PS
F. antarcticum[a]	124–540	14–423	*S. lobata*	–	CA+	PS
Filellum sp.[b]	–	–	–	–	–	H
L. annulata[a]	603	500–600	–	–	W	PS
H. frigidum[a]	220–540	401–415	Pebble, gravel	*S. plicatile*	WA	PS
H. incertus[a]	603	15–1,019	–	*S. plicatile*	AK	PS
Halecium sp.[c]	–	–	–	–	–	H
S. vervoorti[a]	86–540	50–1,152	–	*Filellum* sp.	WA+	PS
O. bifurca	–	342–1,610	–	–	CA	H
A. elongatus[a]	1,958	10–710	–	–	AK	PS
A. spiralis[a]	1,191–1,958	6–720	–	–	CA	PS
S. sanmatiasensis[a]	1,801	30–500	–	–	WAP	PS
S. antarctica	603	55–661	–	–	CA	H, PS
S. dichotoma[a]	86–494	82–799	–	–	AK	PS
S. fallax	–	459	–	–	–	H
S. juncea[a]	426	385	Gravel	–	CA	PS
S. stolonifera	–	569	–	–	–	H
***S. bellingshauseni* sp. nov.**[a]	603	–	Rock	*S. plicatile*	WA	PS
S. cumberlandicus[a]	86–540	8–275	–	–	CA	PS
S. curvatus[a]	86–2,043	49–799	Axis of dead gorgonian	–	CA	PS
S. exochus[a]	1,958	15–634	–	–	WA	PS
***S. hesperides* sp. nov.**[a]	1,432	–	–	–	WA	PS
S. paulensis[a]	603	140–1,064	–	–	W	PS
S. plectilis[a]	1,958	7–457	–	–	CA	PS
B. subrufa[a]	86–540	25–1,030	–	–	AP	PS

[a] new records

Distribution: *AK* Antarctic-Kerguélen, *AP* Antarctic-Patagonian, *CA* Circum-Antarctic, *WA* West Antarctic, *WAP* West Antarctic-Patagonian, *W* Wider Distribution. References: *H* Hartlaub (1904), *PS* Present Study. [b] *Lafoea plicata*, [c] *H. tenellum*

genera. Anthoathecates are represented by nine species belonging to Bougainvillidae, Eudendriidae, Tubulariidae, Candelabridae, and Hydractiniidae. The species of leptothecates, much better represented, belong to the families Campanulinidae, Tiarannidae, Lafoeidae, Haleciidae, Schizotrichidae, Kirchenpaueriidae, Sertulariidae, and Campanulariidae.

At the family level, Sertulariidae is by far the most diverse family with 15 species (40%), followed by Eudendriidae and Lafoeidae with four (c. 11%). These three families, representing only 25% of the family diversity, embrace 62% of the species diversity.

At the generic level, the predominant genera are *Symplectoscyphus* with seven species (19%), *Staurotheca* with five (14%), *Eudendrium* with four (11%), and *Halecium* with three (8%). It is remarkable the dominance of these five genera that represent only 21% of the genus diversity, but 52% of the species.

Twenty-seven out of the 37 species were found in the present study, four of which could not be identified to species level and 21 representing new records for the Bellingshausen Sea, including *Symplectoscyphus bellingshauseni* sp. nov. and *S. hesperides* sp. nov. Nine out of the 15 genera found in the collection are also first recorded for the area. The Antarctic species *Candelabrum penola* and *Staurotheca juncea* are recorded for the second time, *Lafoea annulata* is recorded for the second time, constituting also the first Antarctic record, and *Symplectoscyphus paulensis* is first recorded from Antarctic waters.

Table 2 also shows the bathymetric range of the species in the area surveyed, as well as the known bathymetric range. It is remarkable that most species are eurybathic, with few of them being restricted to the continental shelf. This might be related to the substantial depths from which most of the samples were collected. Five out of the six bathymetric groups established by Peña Cantero (2004) are recognized in the study. The most important ones are those formed by eurybathic species that extend throughout the entire bathymetric range from shallowest waters to bathyal or even abyssal depths (9 species, 34.7%), and by species present in deep waters and on the continental shelf but excluding the shallowest waters (9 species, 34.7%). Also noteworthy is the group of apparently strictly deep-water species (3 species, 11.5%), represented by *L. annulata*, *S. bellingshauseni* sp. nov., and *S. hesperides* sp. nov. The remaining species are restricted to shelf waters (5 species, 19%), but they form two assemblages, one embracing those species absent from the shallowest waters (2 species, 7.7%) and the other including species distributed throughout the whole continental shelf (3 species, 11.5%). The remaining group proposed by Peña Cantero (2004), namely species exclusively inhabiting the shallowest sublittoral, is not represented because that bathymetric zone was not sampled.

Finally, Table 2 also shows the biogeographic distribution model assigned to each species. Both circum-Antarctic (12 species, 46%) and West Antarctic (6 species, 23%) representatives constitute the contingent of endemic species which is by far the most dominant assemblage (69%). Of these two groups, the clearly dominant one is that formed by circum-Antarctic species. Another interesting assemblage is that constituted by species restricted to both Antarctic and sub-Antarctic waters. In this group, species with Antarctic-Kerguélen (3 species, 11.5%), Antarctic-Patagonian (1 species, 3.8%), or West Antarctic-Patagonian (1 species, 3.8%) distributions are included. Thus, most species (88.5%) are restricted to Antarctic or Antarctic/sub-Antarctic waters, and only three species (11.5%) are found outside those regions.

In summary, the Bellingshausen Sea hydroid fauna might be considered as being composed of typical representatives of the Antarctic benthic hydroid fauna. Nevertheless, it is characterized by a surprisingly low representation of some of the most diverse and widespread Antarctic genera, including *Oswaldella* and *Schizotricha* (with 26 and 13 known Antarctic species, respectively). These genera are represented in the Bellingshausen Sea by a single species. This may be due to a lack of knowledge on the shelf-inhabiting hydroid fauna of the area. Hartlaub's (1904) material came mainly from depths between 400 and 569 m, while collections examined here were taken from 426 to 2,043 m because pack-ice prevented us from getting into shallower waters. Most of the samples (cf. Fig. 1) come from the shelf edge and upper slope. Consequently, practically nothing is known of the benthic hydroid fauna of typical shelf waters, acknowledged to be the richest both in numbers of species and abundance. It is also noteworthy that, in spite of the low numbers of samples containing hydroids and the general scarcity of material of the species, the species richness is remarkable. Most species found in the present study were collected at a single station. Exceptions included *S. plicatile* and *Acryptolaria* sp., found at five stations, *H. frigidum* at three, and *S. vervoorti*, *S. dichotoma,* and *B. subrufa* at two.

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References

Billard A (1914) Hydroïdes. Deuxième Expédition Antarctique Française (1908–1910) commandée par le Dr Jean Charcot. Masson, Paris, pp 1–34

Blanco OM, Bellusci de Miralles DA (1972) Hidrozoos de la isla Pedro I. Contrib Inst Antárt Argent 145:1–41

Broch H (1948) Antarctic hydroids. Sci Res Norw Antarctic Exped 1927–1928(28):1–23

El Beshbeeshy M (1991) Systematische, Morphologische und Zoogeographische Untersuchungen an den Thekaten Hydroiden des Patagonischen Schelfs. Dissertation, University of Hamburg

Hartlaub C (1904) Hydroiden. Result voyage S.Y. Belgica 1897–1899 (Zool) 7:1–19, pls 1–4

Hickson SJ, Gravely FH (1907) Coelenterata. II. Hydroid zoophytes. Natl Antarct Exped 1901–1904 Nat Hist 3:1–34, pls 1–4

Manton S(M) (1940) On two new species of the hydroid *Myriothela*. Scient Rep Br Graham Land Exped 1(4):255–293, pls 1–4

Millard NAH (1964) The Hydrozoa of the south and west coasts of South Africa. Part II. The Lafoeidae, Syntheciidae and Sertulariidae. Ann S Afr Mus 48:1–56

Millard NAH (1967) Hydroids from the south-west Indian Ocean. Ann S Afr Mus 50:168–194

Millard NAH (1975) Monograph on the Hydroida of southern Africa. Ann S Afr Mus 68:1–513

Millard NAH (1977) Hydroids from the Kerguelen and Crozet shelves, collected by the cruise MD.03 of the Marion-Dufresne. Ann S Afr Mus 73:1–47

Naumov DV, Stepanjants SD (1962) Hydroida (Thecaphora) collected by the Soviet Antarctic expedition on the M/V 'Ob' in Antarctic and subantarctic waters. In: Biol res Soviet Antarct Expedition 1955–1958 1 (in Russian). Issled Fauny Morei 1(9):68–106

Naumov DV, Stepanjants SD (1972) Marine invertebrates from Adélie Land collected by the XIIth and XVth French antarctic expeditions. 3. Hydroida. Téthys Suppl 4:25–60

Peña Cantero AL (1998) Two new Antarctic species of the genus *Schizotricha* Allman, 1883 (Cnidaria, Hydrozoa). Polar Biol 19:77–84

Peña Cantero AL (2004) How rich is the deep-sea Antarctic benthic hydroid fauna? Polar Biol 27:767–774

Peña Cantero AL (2006) Benthic hydroids from the south of Livingston Island (South Shetland Islands, Antarctica) collected by the Spanish Antarctic expedition Bentart 94. Deep Sea Res II 53:932–948

Peña Cantero AL (2008) Benthic hydroids (Cnidaria: Hydrozoa) from the Spanish Antarctic expedition Bentart 95. Polar Biol 31:451–464

Peña Cantero AL (2010a) Benthic hydroids (Cnidaria: Hydrozoa) from Peter I Island (Southern Ocean, Antarctica). Polar Biol 33:761–773

Peña Cantero AL (2010b) On a new Antarctic species of *Symplectoscyphus* Marktanner-Turneretscher, 1890 (Cnidaria, Hydrozoa, Sertulariidae), with an annotated checklist of the Antarctic species of the genus. Zootaxa 2494:29–44

Peña Cantero AL, García Carrascosa AM (1995) Hidrozoos bentónicos de la campaña Antártida 8611. Publ Espec Inst Esp Oceanogr 19:1–148

Peña Cantero AL, García Carrascosa AM (1999) Biogeographical distribution of the benthic thecate hydroids collected during the Spanish "Antártida 8611" expedition and comparison between Antarctic and Magellan benthic hydroid faunas. Sci Mar 63(Supl 1): 209–218

Peña Cantero AL, Gili JM (2006) Benthic hydroids (Cnidaria, Hydrozoa) from off Bouvet Island (Antarctic Ocean). Pol Biol 29:764–771

Peña Cantero AL, Ramil F (2006) Benthic hydroids associated with volcanic structures from Bransfield Strait (Antarctica) collected by the Spanish Antarctic expedition GEBRAP96. Deep-Sea Res II 53:949–958

Peña Cantero AL, Vervoort W (2003) Species of *Staurotheca* Allman, 1888 (Cnidaria: Hydrozoa: Sertulariidae) from US Antarctic expeditions, with the description of three new species. J Nat Hist 37:2653–2722

Peña Cantero AL, Vervoort W (2004) Species of *Oswaldella* Stechow, 1919 (Cnidaria: Hydrozoa: Kirchenpaueriidae) from US Antarctic expeditions, with the description of three new species. J Nat Hist 38:805–861

Peña Cantero AL, Vervoort W (2005) Species of *Schizotricha* Allman, 1883 (Cnidaria: Hydrozoa: Halopterididae) from US Antarctic expeditions with the description of two new species. J Nat Hist 39:795–818

Peña Cantero AL, Vervoort W (2010) Species of *Acryptolaria* Norman, 1875 (Cnidaria, Hydrozoa, Lafoeidae) collected in the Western Pacific by various French expeditions, with the description of nineteen new species. Zoosystema 32(2):267–332

Peña Cantero AL, Svoboda A, Vervoort W (1997) Species of *Staurotheca* Allman, 1888 (Cnidaria, Hydrozoa) from recent antarctic expeditions with R.V. 'Polarstern', with the description of six new species. J Nat Hist 31:329–381

Peña Cantero AL, Svoboda A, Vervoort W (2002) Species of *Symplectoscyphus* Marktanner-Turneretscher, 1890 (Cnidaria: Hydrozoa, Sertulariidae) from recent Antarctic expeditions with R.V. Polarstern, with the description of four new species. J Nat Hist 36:1509–1568

Peña Cantero AL, Svoboda A, Vervoort W (2004) Antarctic hydroids (Cnidaria: Hydrozoa) of the families Campanulinidae, Lafoeidae and Campanulariidae from recent Antarctic expeditions with R.V. Polarstern, with the description of a new species. J Nat Hist 38:2269–2303

Puce S, Cerrano C, Bavestrello G (2002) *Eudendrium* (Cnidaria, Anthomedusae) from the Antarctic Ocean with description of two new species. Polar Biol 25:366–373

Stechow E (1923) Neue Hydroiden der Deutschen Tiefsee-expedition, nebst Bemerkungen über einige andre Formen. Zool Anz 56(1–2): 1–20

Stepanjants SD (1972) Hydroidea of the coastal waters of the Davis Sea (collected by the XIth Soviet Antarctic Expedition of 1965–1966). In: Biol res Soviet Antarct Exped 5 (in Russian). Issled Fauny Morei 11:56–79

Stepanjants SD (1979) Hydroids of the antarctic and subantarctic waters. In: Biol res Soviet Antarct Exped 6 (in Russian). Issled Fauny Morei 20:1–200, pls 1–25

Svoboda A, Stepanjants SD, Ljubenkov J (2006) The genus *Bouillonia* (Cnidaria: Hydrozoa: Anthoathecata). Three species from the northern and southern hemispheres, with a discussion of bipolar distribution of this genus. Zool Med 80–4(14):185–206

Totton AK (1930) Coelenterata. Part V. Hydroida. Nat Hist Rep Br Antarct Terra Nova Exped 1910 5:131–252, pls 1–3

Vanhöffen E (1910) Die Hydroiden der Deutschen Südpolar-Expedition 1901–1903. Dtsch Südpolar Exped 1901–1903 11:269–340

Vervoort W (1972a) Hydroids from the Theta, Vema and Yelcho cruises of the Lamont-Doherty geological observatory. Zool Verh 120:1–247

Vervoort W (1972b) Hydroids from submarine cliffs near Arthur Harbour, Palmer Archipelago, Antarctica. Zool Med 47:337–357

Vervoort W, Watson JE (2003) The Marine Fauna of New Zealand: Leptothecata (Cnidaria: Hydrozoa) (Thecate Hydroids). NIWA Biodivers Mem 119:1–538

Watson JE (2003) Deep-water hydroids (Hydrozoa: Leptolida) from Macquarie Island. Mem Natl Mus Vic 60(2):151–180