

ORIGINAL PAPER

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On *Antarctoscyphus* (Cnidaria, Hydrozoa), a new genus of antarctic hydroids and the description of two new species

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Abstract A new genus of the hydroid family Sertulariidae is established. Several species formerly assigned to the genus *Symplectoscyphus* Marktanner-Turneretscher, 1890 are included. A review of those species is given, including their main features along with some remarks. Two species new to science are added; the material of those species was collected in the Scotia Sea by the Spanish Antarctic Expedition “Antártida 8611”. Present autecological data are discussed.

that, as they are clearly different from the other species included in *Antarctoscyphus*, gen., nov., are considered to represent species new to science. They are described below as *Antarctoscyphus asymmetricus* sp. nov. and *A. encarnae* sp. nov., respectively.

Circumantarctic distribution is here considered as occurrence around the antarctic region proper; pan-antarctic distribution also includes the subantarctic region.

Introduction

During the study of collections of antarctic hydroids, our attention became focused on a number of species so far referred to the genus *Symplectoscyphus* Marktanner-Turneretscher, 1890, and that have certain features in common, clearly distinguishing them from the main group of species assigned to this large genus. The characteristics of that group concern the structure of the colony, mode of branching and shape of the gonothecae. We believe that those differences are important enough to separate that group generically from the remaining species of *Symplectoscyphus* and we propose to refer them to *Antarctoscyphus* gen. nov.

Peña Cantero (1991), from the material collected by the Spanish “Antártida 8611” expedition, described two species as *Symplectoscyphus* sp. 1 and *Symplectoscyphus* sp. 2 that in our opinion belong to the new genus and

Materials and methods

The material examined originates from the Scotia Ridge area (Antarctica) and was collected by trawling in the austral summer of 1986–1987.

Measurements give the interval between the maximum and minimum values recorded, together with mean and standard deviation.

The holotypes, together with some of the paratypes, are deposited in the collection of the Department of Animal Biology, University of Valencia, Spain. Additional paratypes have also been deposited in the collections of the Nationaal Natuurhistorisch Museum (National Museum of Natural History), Leiden, The Netherlands; in this case, the registration numbers are indicated by RMNH Coel. and a number.

List of stations

- ANT 133, 54°59.60′–55°01.00′S, 35°34.80′–35°37.90′W, off South Georgia, 229–240 m, 10 December 1986, stony bottom. *Antarctoscyphus asymmetricus* sp. nov.
 ANT 256, 58°57.90′–58°56.70′S, 26°38.10′–26°35.50′W, off Bristol Island, South Shetland Islands, 100–188 m, 26 December 1986, stony bottom. *Antarctoscyphus asymmetricus* sp. nov.
 ANT 446, 61°19.30′–61°21.50′S, 55°43.00′–55°41.20′W, off Elephant Island, 234–261 m, 21 January 1987, bottom of stones with mud. *Antarctoscyphus asymmetricus* sp. nov.
 ANT 469, 61°49.90′–61°49.70′S, 58°44.80′–58°40.10′W, off King George Island, South Shetland Islands, 200–220 m, 24 January 1987. *Antarctoscyphus encarnae* sp. nov.
 ANT 476, 61°54.30′–61°54.90′S, 58°59.70′–58°55.70′W, off King George Island, South Shetland Islands, 198–215 m, 25 January 1987. *Antarctoscyphus asymmetricus* sp. nov.

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ANT 477, 62°00.90'–62°02.50'S, 58°53.80'–58°53.70'W, off King George Island, South Shetland Islands, 100–136 m, 25 January 1987, muddy bottom. *Antarctoscyphus encarnae* sp. nov.

R.V. Nuevo Alcocero, St. 173, 60°53'–60°55'S, 55°46'–55°45'W, off Elephant Island, semi-pelagic trawl, no date. *Antarctoscyphus asymmetricus* sp. nov.

Results and Discussion

Family Sertulariidae Lamouroux, 1812

Antarctoscyphus gen. nov.

Type, by present designation: *Sertularella elongata* Jäderholm, 1904.

Diagnosis. Colonial hydroids of varied appearance, but with well-marked stem divided into internodes, following each other in more or less strongly marked, zig-zag fashion. Main stem either polysiphonic or monosiphonic. Each stem internode with one apophysis at distal end; apophyses alternately arranged. Each apophysis gives rise to pair of lateral branches and one hydrotheca situated in axil between both branches. These usually re-branched but occasionally unbranched. Branches also divided into internodes, though not arranged in zig-zag manner. One hydrotheca per internode; hydrothecae alternately arranged, but with strong tendency towards unilateral disposition; this condition being present in several species. Hydrotheca mainly tubular, with three cusps at its rim and with opercular apparatus composed of three flaps. Internal teeth present or absent. Colonies dioecious, with sexual dimorphism. Female gonotheca ovate and with acrocyt. Male gonotheca fusiform, with or without peduncle and with closing apparatus composed of nipple-shaped top. Gonothecae inserting on internodes of branches, arising from base of hydrothecae, often some spring from body of hydrotheca. Gonothecal walls smooth, without collar or neck. Cnidome composed of microbasic mastigophores, usually in two size classes.

List of species referred to *Antarctoscyphus*:

Antarctoscyphus asymmetricus sp. nov.

?*Antarctoscyphus biformis* (Jäderholm, 1905) (= *Sertularella biformis* Jäderholm, 1905)

Antarctoscyphus elongatus (Jäderholm, 1904) (= *Sertularella articulata* Jäderholm, 1904)

Antarctoscyphus encarnae sp. nov.

Antarctoscyphus grandis (Blanco, 1977) (= *Symplectoscyphus grandis* Blanco, 1977)

Antarctoscyphus gruzovi (Stepan'yants, 1979) (= *Sertularella gruzovi* Stepan'yants, 1979)

Antarctoscyphus mawsoni (Briggs, 1938) (= *Symplectoscyphus mawsoni* Briggs, 1938)

Antarctoscyphus spiralis (Hickson & Gravely, 1907) (= *Sertularella spiralis* Hickson & Gravely, 1907)

Remarks. The genus *Symplectoscyphus* Marktanner-Turneretscher, 1890 includes a large number of species (Vervoort, 1993). It is mainly characterized by the presence of three cusps at the hydrothecal rim and by the three-valved opercular apparatus. Some authors, for instance Broch (1948) and Stepan'yants (1979), did not consider the number of cusps sufficiently important and included all three-cusped species in the genus *Sertularella* Gray, 1848, typically characterized by the presence of four cusps at the hydrothecal rim.

During our study of the large number of species so far considered as belonging to *Symplectoscyphus*, we noticed the presence of two clearly distinguishable groups of species. Both groups have in common three cusps at the hydrothecal rim, but they differ in other features as colony structure, mode of branching and shape of the gonothecae. These differences in our opinion warrant the description of the genus *Antarctoscyphus* gen. nov.

The species here referred to *Antarctoscyphus* gen. nov. share the feature of the presence of a distinct main stem, divided into internodes arranged in a zig-zag manner to a varied degree, each internode being provided with an apophysis at the distal end carrying two lateral branches and one hydrotheca in the axil between those branches. The apophyses are alternately arranged but usually there is variation in their position along the stem, giving rise to a spiral disposition. These features have never been observed in the species now included in *Symplectoscyphus* that typically have colonies without a distinct stem or that lack apophyses and paired branches if a main stem is present. In *Antarctoscyphus* gen. nov. the paired branches either do not re-branch (as for instance in *A. mawsoni*) or they re-branch once or more frequently (as in the remaining species included in this genus). In such species, when the paired branches give rise to new branches, these spring from a more or less developed apophysis, found on the opposite side of the hydrotheca. In this way the hydrotheca on the internode falls outside the space limited by the two branches. This situation is contrary to the mode of branching found in *Symplectoscyphus*, in which the new branches spring from the same side as the hydrotheca; the hydrotheca consequently falls in the space limited by the two branches. Finally, the gonotheca in *Antarctoscyphus* gen. nov. has smooth walls and no distal neck; in *Symplectoscyphus* there is typically a tubular neck with the aperture at the end of the gonotheca, while the gonothecal walls normally have spiral or circular ribs, though these can be almost absent in some species [e.g. *Symplectoscyphus glacialis* (Jäderholm, 1904), *Symplectoscyphus hero* Blanco, 1977, *Symplectoscyphus plectilis* (Hickson & Gravely, 1907), *Symplectoscyphus naumovi* Blanco, 1969], which have only slightly undulating walls. Also, the species of *Antarctoscyphus* gen. nov. seem to have a well-marked sexual dimorphism, with long and fusiform male gonothecae and ovate female gonothecae with an acrocyt. The species of *Symplectoscyphus* are widely distributed

in the northern and southern hemispheres, whilst *Antarctoscyphus* gen. nov. is composed of species endemic to the antarctic region.

In some species of *Antarctoscyphus* gen. nov. (*A. elongatus*, *A. spiralis*, *A. gruzovi*) the young colony has a weakly developed stem divided into short and straight, thecate internodes with alternately arranged hydrothecae. As growth proceeds it gives rise to the first apophysis and paired branches and the zig-zag disposition becomes visible. This feature may be shared by all species of the genus and points to its relationship with *Symplectoscyphus*.

Etymology: The generic name *Antarctoscyphus* comes from the words Antarctic, referring to the southern region and “scyphus” meaning beaker.

?*Antarctoscyphus biformis* (Jäderholm, 1905)

Sertularella biformis Jäderholm 1905: p. 28, pl. 11, Figs. 1–3.

Not *Sertularella biformis*; Totton 1930: p. 199, Fig. 45, pl. 2, Fig. 8; Naumov and Stepan'yants 1972: p. 47, Fig. 9; Stepan'yants, 1979: 66, pl. 11, Fig. 5 [= *Antarctoscyphus grandis* (Blanco, 1977)].

Remarks. This species has not been rediscovered since the original description by Jäderholm (1905). The material described by Jäderholm consisted of a single fragment of 20-mm length, belonging to the basal part of a colony. There was no branching and internodes were absent; the stem had only one distinct constriction. The species had a varied arrangement of hydrothecae along the stem: in the basal part the hydrothecae were alternately arranged in one plane, forming two longitudinal rows of hydrothecae, but in the distal part there were two additional hydrothecae, one on each side of the alternate hydrothecae, and placed at a right angle to those hydrothecae. *Antarctoscyphus biformis* is also characterized by the long and narrow, almost cylindrical hydrothecae; the adcauline hydrothecal wall is free over almost its full length.

As the material studied by Jäderholm was unbranched and poorly developed, it is impossible to refer it to *Antarctoscyphus* gen. nov. with sufficient certainty. However, the development from a colony with alternate hydrothecae to one with paired branches has been noticed in several species of *Antarctoscyphus* gen. nov. (e.g. *A. spiralis*). Therefore, the structure observed at the distal part of the colony described by Jäderholm may represent an early stage in the development of a colony with paired branches.

Ecology and distribution. This species has only been recorded from Erebus and Terror Gulf (off Graham Land), at 360-m depth (Jäderholm 1905).

Antarctoscyphus elongatus (Jäderholm, 1904)

Sertularella elongata Jäderholm 1904: p. 10; Totton 1930: p. 199; Broch 1948: p. 10, Fig. 2b–c; Naumov and Stepan'yants 1962: p. 80, Fig. 5; 1972: p. 42, Fig. 5b; Stepan'yants 1979: p. 69, pl. 12, Fig. 3.

Symplectoscyphus elongatus; Vervoort 1972: p. 136, Figs. 43–44a; Millard 1977: p. 28, Fig. 7d–e.; Peña Cantero 1991: pp. 133–137, pls. 22, 53, Figs f–g; Peña Cantero and García Carrascosa 1994: p. 123, Fig. 6d.

Sertularia articulata Allman 1888: p. 61, pl. 29, Fig. 3–3a.

Sertularella articulata; Hartlaub 1901: p. 24, Fig. 14; Jäderholm 1905: p. 29, pl. 11, Fig. 4, pl. 12, Figs 1–3; 1917: p. 9, pl. 1, Fig. 7; Billard 1910: p. 10; 1914: p. 20.

Symplectoscyphus articulatus; Briggs 1938: p. 30; Rees and Thursfield 1965: p. 127.

Not *Sertularella articulata*; Vanhöffen 1910: p. 328, Fig. 42a–d) [= ?*Antarctoscyphus grandis* (Blanco, 1977)].

Material examined. One microslide preparation of *Sertularia articulata* from the Natural History Museum, London, Coel. no. 88.11.13.49, Challenger Expedition, St. 149D, Kerguelen, 28–60 fathoms.

Remarks. *Antarctoscyphus elongatus* is characterized by its monosiphonic colonies, the presence of stem internodes arranged in a strongly marked zig-zag, the cylindrical hydrotheca, which has the adcauline wall adnate for ca. half its length, the alternate arrangement of the hydrothecae, placed approximately in one plane and the more or less equal development of the cusps at the hydrothecal rim.

Vervoort (1972) discussed the complicated synonymy of this species.

We have had the opportunity to examine the type material of *Sertularia articulata* Allman, 1888, which is composed only of a microslide in bad condition, making it impossible to re-describe that species. Therefore, we consider it more useful to sink it into the synonymy of *Antarctoscyphus elongatus*.

Vanhöffen (1910) referred to *Sertularella articulata* two specimens that are quite different from this species in the colonial structure, having an erect, straight stem with paired branches re-branching dichotomously. They also differ in shape and size of the hydrothecae, which are much larger and have almost the whole adcauline wall free. We consider this material to be close to *Antarctoscyphus grandis* (Blanco, 1977) and to be probably conspecific.

Ecology and distribution. *Antarctoscyphus elongatus* is a shelf species, having been found from 10-m (Naumov and Stepan'yants 1972) to 604-m depth (Vervoort 1972) on muddy (Allman 1888; Totton 1930; Broch 1948) and on sandy bottoms (Broch 1948); it has also been observed on bottoms of stones with gravel (Broch 1948;

Stepan'yants 1979). It may occur epizoically on other hydroids and bryozoans and epiphytically on algae (Naumov and Stepan'yants 1972; Stepan'yants 1979). Gonothecae have been found in April (Millard 1977) and December (Stepan'yants 1979).

Antarctoscyphus elongatus has a panantarctic distribution (Stepan'yants 1979). The species was first reported from Kerguelen (Allman 1888 as *Sertularia articulata*) where it was re-discovered by Naumov and Stepan'yants (1962) and Stepan'yants (1979). It has been recorded from several antarctic and subantarctic localities: off Graham Land and South Georgia (Jäderholm 1905), off Deception Island (Billard 1914), off Robertson Island (Jäderholm 1917), off McMurdo Sound (Totton 1930), off Graham Land and Deception and Bouvet Islands (Broch 1948), off Graham Land (Vervoort 1972), off the Adélie Coast (Naumov and Stepan'yants 1972), off Heard and Crozet Islands (Millard 1977), off South Georgia, Lena Bank and the South Shetland Islands (Stepan'yants 1979), and off Elephant Island, South Shetland Islands (Peña Cantero and García Carrascosa 1994).

Antarctoscyphus grandis (Blanco, 1977)

Symplectoscyphus grandis Blanco 1977: p. 6, pl. 4, Figs 14–16, pl. 5, Figs 17–18.

Sertularella biformis; Totton 1930: p. 199, Fig. 45, pl. 2, Fig. 8; Naumov and Stepan'yants 1972: p. 47, Fig. 9; Stepan'yants 1979: p. 66, pl. 11, Fig. 5.

?*Sertularella articulata*; Vanhöffen 1910: p. 328, Fig. 42a–d.

?*Symplectoscyphus mawsoni*; Millard 1977: p. 29, Figs 8–9.

Material examined. Holotype, one microslide preparation, Museo de La Plata, Coel. no. 503, Low Island, 63°22'S, 62°00'–61°55'W, 90–100 m.

Remarks. *Antarctoscyphus grandis* has an erect stem, divided into internodes not arranged in zig-zag fashion. Each paired branch re-branches at the second and at the fourth or fifth internodes, giving rise to two secondary branches; the first one re-branches at the third internode forming a tertiary branch that may re-branch at the fifth internode, originating a branch of the fourth order. Along the branches the length of the internodes decreases from base to apex; the hydrothecae are unilaterally arranged and almost cylindrical, though narrowing towards their base; the adcauline wall is free for almost its full length, and the cusps of the hydrothecal rim are sharp and separated by deep embayments. Blanco (1977) considered her material conspecific with the material referred to *Antarctoscyphus biformis* (Jäderholm, 1905) by Totton (1930) and Naumov and Stepan'yants (1972).

Millard (1977) assigned to *Symplectoscyphus mawsoni* Briggs, 1938 two specimens, which, as it will be

shown below, have such considerable differences with that species that we believe they should be referred to another species, probably *A. grandis*, though they appear to have a different pattern of branching (the first ramification of the paired branches occurs in the fourth internode, while in *A. grandis* it takes place in the second) and they have a wider hydrothecal aperture.

As stated above, the material assigned by Vanhöffen (1910) to *Antarctoscyphus elongatus* (Jäderholm, 1904) may be conspecific with Blanco's species.

Ecology and distribution. *Antarctoscyphus grandis* is a shelf species, recorded from 15-m (Naumov and Stepan'yants 1972) to 170-m depth (Stepan'yants 1979) on a bottom of pebbles (Stepan'yants 1979). It also occurs epizoically on other hydroids (Naumov and Stepan'yants 1972). Fertile colonies were found in January (Stepan'yants 1979).

Antarctoscyphus grandis has a circumantarctic distribution. The type locality is Low Island (63°22'S, 62°00'–61°55'W), in the South Shetland area (Blanco, 1977). It has also been found off Cape Adare (Totton 1930), off the Adélie Coast (Naumov and Stepan'yants 1972) and in the Bransfield Strait (Stepan'yants 1979).

Antarctoscyphus gruzovi (Stepan'yants, 1979)

Sertularella gruzovi Stepan'yants 1979: p. 67, pl. 12, Fig. 1, pl. 25, Fig. 5.

Material examined. Holotype, Zoological Institute of Russian Academy of Sciences, Coel. no. 1/9464, Gibbs Island (South Shetland Islands), 350 m.

Remarks. This species is easily distinguishable. It is characterized by the shape of the hydrotheca, which is thin, almost cylindrical and completely free, the polysiphonic stem, the strongly marked geniculation of the stem internodes and the dichotomous ramification of the paired branches that may re-branch up to the fourth order. The first ramification takes place in the second internode of the paired branches, while the branches of third and fourth order spring from the third internode of secondary and tertiary branches, respectively. It has, in addition, a unilateral arrangement of the hydrothecae that diverge at an acute angle and a particular morphology of the gonothecae, which are long and almost cylindrical.

Ecology and distribution. There is only one record of *Antarctoscyphus gruzovi*: South Shetland Islands area at 350-m depth (Stepan'yants 1979). The fertile colony was found in February.

Antarctoscyphus mawsoni (Briggs, 1938)

Symplectoscyphus mawsoni Briggs 1938: p. 35, Fig. 2a–b, pl. 16, Figs 1–2.

?*Sertularella mawsoni*; Naumov and Stepan'yants, 1972: p. 46, Fig. 8; Stepan'yants 1979: p. 67, pl. 11, Fig. 3.

Not *Symplectoscyphus mawsoni*; Millard 1977: p. 29, Figs 8–9 [= ? *Antarctoscyphus grandis* (Blanco, 1977)].

Remarks. The species is characterized by its monosiphonic stem, the presence of unforked, paired branches that arise at almost right angles from the stem, the presence of alternately arranged oblique nodes, delimiting the internodes of the branches, and the shape of the hydrothecae, which strongly widen from their basal part upwards, the maximum diameter being found at the aperture (510–540 µm). The hydrothecae are alternately arranged and almost in one plane.

Naumov and Stepan'yants (1972) and Stepan'yants (1979) assigned to this species a form that, though it agrees in many features, has some differences in the structure of the internodes, showing one to three circular constrictions between two subsequent internodes, and in the smaller diameter of the hydrothecal aperture (370–480 µm).

Millard (1977) referred to this species a form showing considerable differences. The stem is slightly polysiphonic, the paired branches make an angle of ca. 40° with the stem and re-branch dichotomously at the fourth internode and the two secondary branches may re-branch once or twice. The hydrothecae, which are completely free, are unilaterally arranged and diverge at an acute angle; the internodes of the branches have straight nodes and, finally, the diameter of the hydrothecal aperture is much smaller (i.e. 240–320 µm). We believe those differences to be important enough to consider the material described by Millard as belonging to another species. As mentioned above, it comes close to *Antarctoscyphus grandis* (Blanco, 1977).

Ecology and distribution. *Antarctoscyphus mawsoni* has been found from 45- to 108- m depth, in Commonwealth Bay (off George V Coast) by Briggs (1938).

Antarctoscyphus spiralis (Hickson & Gravely, 1907)

Sertularella spiralis Hickson and Gravely 1907: p. 19, pl. 3, Figs 19–20; Totton 1930: p. 197, Fig. 44b–d, pl. 1, Fig. 7, pl. 3, Fig. 5; Broch 1948: p. 10, Fig. 2; Naumov and Stepan'yants 1972: p. 42, Fig. 5c; Stepan'yants 1972: p. 69, Fig. 15; 1979: p. 68, pl. 12, Fig. 2.

Symplectoscyphus spiralis; Briggs 1938: p. 34; Blanco 1967: p. 270, pl. 3, Figs 3–5, 9; 1968: p. 41, Figs 1–23; 1984: p. 31, pl. 27, Fig. 62, pl. 28, Fig. 63; Vervoort 1972: p. 139; Peña Cantero 1991: pp. 143–147, pls 24, 53, Figs a–e, 67, Fig. b; Peña Cantero and García Carrascosa 1994: p. 124, Fig. 6g.

Sertularella bifurca Billard 1914: p. 22, Fig. 13.

Remarks. This is a well characterized species. The colonies have a monosiphonic stem divided into internodes

arranged in a strongly marked zig-zag fashion. However, as remarked above, colonies of this species begin with several straight internodes carrying alternate hydrothecae. *Antarctoscyphus spiralis* is furthermore characterized by the hydrothecal morphology, with the adcauline wall being adnate for at least one-third of its length. The abcauline wall is concave because the hydrotheca is directed outwards from the point where the adcauline wall becomes free. The hydrothecae have a moderate tendency towards unilateral disposition, being arranged in two planes that meet at an obtuse angle. Finally, *A. spiralis* can be easily distinguished from other species of the genus by the presence of three internal cusps situated at the embayments between the cusps of the hydrothecal rim.

Ecology and distribution. This is a eurybathic species found from 6-m (Naumov and Stepan'yants 1972) to 720-m depth (Briggs 1938) on bottoms of mud (Totton 1930; Briggs 1938; Broch 1948; Naumov and Stepan'yants 1972), mud and gravel (Naumov and Stepan'yants 1972), detritus (Totton 1930), gravel (Naumov and Stepan'yants 1972), rocks (Stepan'yants 1979) and on bottoms composed of hydroids and sponges (Naumov and Stepan'yants 1972). *Antarctoscyphus spiralis* also grows epizoically on other hydroids, bryozoans, molluscs, tubes of polychaetes and epiphytically on algae (Naumov and Stepan'yants 1972; Stepan'yants 1979). It has an extended fertile period, having been found with gonothecae in December (Blanco 1984), from December to February (Stepan'yants 1979), in June (Stepan'yants 1979) and in July (Hickson and Gravely 1907).

Antarctoscyphus spiralis has a circumantarctic distribution (Stepan'yants 1979). The type locality is McMurdo Sound, in the Ross Sea (Hickson and Gravely, 1907). Later on Totton (1930) found it at the same locality and off Oates Coast, then Briggs (1938) off George V Coast, Broch (1948) off Deception Island, Blanco (1967) in the Weddell Sea, Naumov and Stepan'yants (1972) off the Adélie Coast, Stepan'yants (1979) in the Davis Sea, Cosmonauts Sea and at the South Shetland Islands, Blanco (1984) off Low Island, and Peña Cantero and García Carrascosa (1994) off Powell Island in the South Orkney Islands and off Robert and Bristol Islands in the South Shetland Islands area.

Antarctoscyphus asymmetricus sp. nov.

Symplectoscyphus sp. 1 Peña Cantero 1991: pp. 153–156, pls. 26, 54, 67, Fig. c; Peña Cantero and García Carrascosa 1994: p. 125, Fig. 7e–g.

Material examined. ANT 133, one colony ca. 70-mm high, without gonothecae (Coel. no. 5/ANT 133); ANT 256, two colonies ca. 90- and 180-mm high, without gonothecae (Coel. no. 6/ANT 256); ANT 446, one

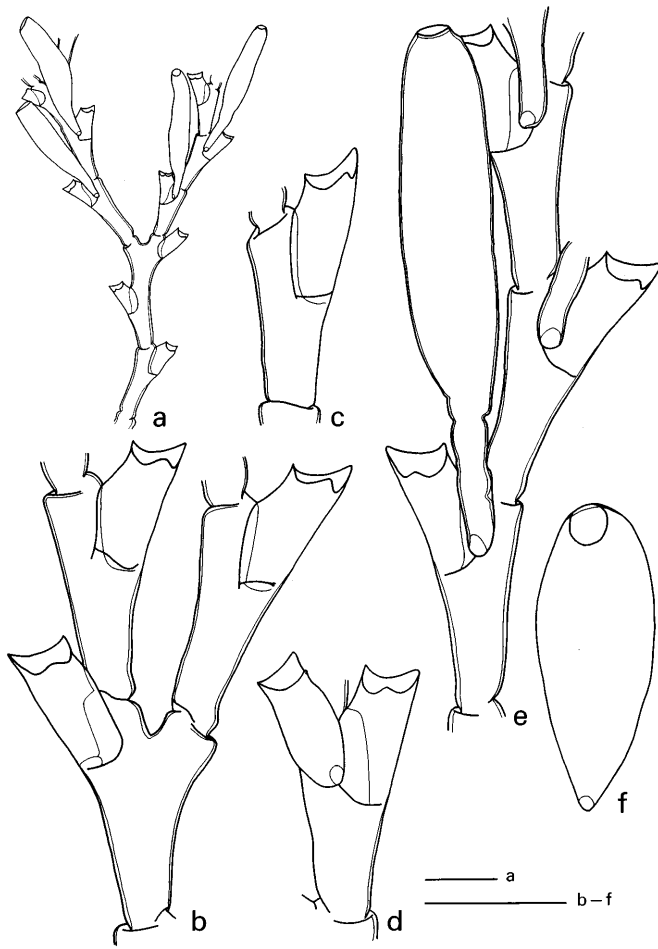


Fig. 1a-f *Antarctoscyphus asymmetricus* sp. nov. **a** Fragment of a lateral branch showing the branching, the arrangement of the hydrothecae and male gonothecae; **b-e** several hydrothecae (in **b** with branching and in **d** with additional hydrotheca); **e** hydrothecae and male gonotheca; **f** female gonotheca (**a-e** from ANT 446, holotype; **f** from ANT 476). Scale bars: 1 mm (**a**); 500 μ m (**b-f**)

colony ca. 140-mm high, with male gonothecae (holotype, Coel. no. 7/ANT 446; schizoholotype, two microslides, RMNH Coel. no. 27723); ANT 476, one colony ca. 100-mm high, with female gonothecae (Coel. no. 8/ANT 476); Nuevo Alcocero, St. 173, one colony ca. 50-mm high, without gonothecae (Coel. no. 9/NA 173).

Description. Colonies monosiphonic, up to 180-mm high and of a brown colour. Stem divided into internodes arranged in marked zig-zag fashion (Fig. 3b). Apophysis near end of each cauline internode supports two lateral branches and one hydrotheca situated in axil between both branches. Lateral branches rebranching several times alternately in one plane; branch inserted opposite hydrotheca which, therefore, is not in axil of ramification (Fig. 1a-b). Branches divided into internodes by strong, oblique and alternately arranged constrictions of perisarc. One hydrotheca per internode, alternately arranged in two planes meeting at an obtuse

angle; hydrothecae in two longitudinal series (Fig. 1a-b, e).

Hydrothecae greatly variable with regards to free portion of adcauline wall: in some hydrothecae adcauline wall almost completely adnate, with only small free part, in others adcauline wall free for almost half its length. Hydrotheca nearly straight; abcauline wall almost a continuation of internodal wall (Fig. 1a-e). Hydrothecal aperture triangular, rim with one small and blunt adcauline cusp and two abcauline cusps: one as large as adcauline cusp, third strongly developed (Fig. 1a-e). Internal cusps absent. Additional hydrothecae frequent, completely free, springing from base of "normal" hydrothecae. Only one hydrotheca for each "normal" one has been observed (Fig. 1d).

Gonotheca springing from one side of base of hydrotheca (Fig. 1e). Female gonotheca club-shaped (Fig. 1f), without distinct pedicel and with small and circular aperture situated at distal part. Male gonotheca (Fig. 1e) fusiform, provided with long peduncle; small and circular aperture at distal end.

Remarks. This species has affinities with *Antarctoscyphus elongatus* (Jäderholm, 1904) and *A. spiralis* (Hickson & Gravely, 1907) with which it shares the colonial structure, with a stem divided into internodes arranged in a distinct zig-zag fashion. In all these species the paired branches repeatedly re-branch, typically in the same plane and at each third internode. Sometimes branches of lower order become secondary stems, forming long internodes that carry apophyses, again giving rise to paired branches. However, *A. asymmetricus* sp. nov. can easily be distinguished from those species by hydrothecal morphology, especially the considerable development of one of the abcauline cusps of the hydrothecal rim. With regards to *A. elongatus*, authors that previously recorded material of that species never reported the presence of a strongly developed abcauline cusp. Moreover, in *A. asymmetricus* sp. nov. the hydrothecae are adnate for a much longer portion of the adcauline wall and the free part is correspondingly shorter. It differs from *A. spiralis* because, in this species, there are three internal cusps and the hydrothecae are directed outwards, the abcauline wall being concave. In *A. asymmetricus* sp. nov. the abcauline wall is straight, being almost a continuation of the internodal wall. *Antarctoscyphus asymmetricus* sp. nov. also shows differences with *A. elongatus* in the hydrothecal disposition, because in Jäderholm's species the hydrothecae are alternately arranged and fall more or less in one plane, while in *A. asymmetricus* they are alternately arranged in two planes, making an obtuse angle.

Ecology and distribution. Colonies of *Antarctoscyphus asymmetricus* sp. nov. originate from 100- to 261-m depth off South Georgia, Elephant Island and Bristol and King George Islands, in the South Shetland Islands. Fertile colonies were collected in January.

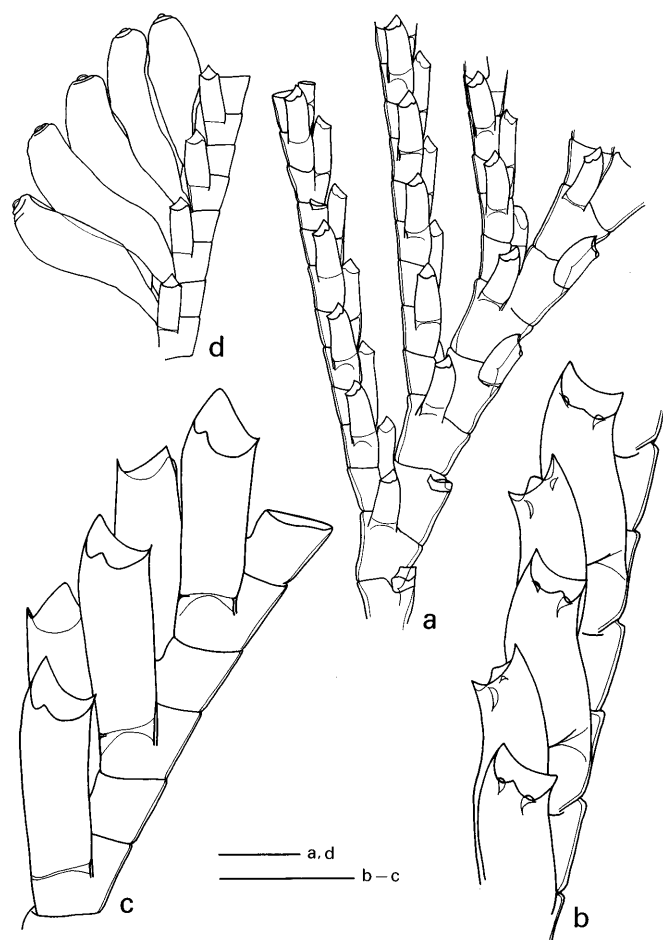


Fig. 2a-d *Antarctoscyphus encarnae* sp. nov. **a** Lateral branch showing three secondary branches and the arrangement of the hydrothecae; **b** arrangement of the hydrothecae in the middle of a secondary branch (note the presence of internal cusps in the hydrothecae); **c** arrangement of the hydrothecae at the distal part of a secondary branch; **d** gonothecae. (All drawings from ANT 477, holotype). Scale bars: 1 mm (a, d); 500 µm (b-c)

Etymology. The specific name *asymmetricus* refers to the unequal development of the cusps at the hydrothecal rim.

Antarctoscyphus encarnae sp. nov.

Symplectoscyphus sp. 2 Peña Cantero 1991: pp. 156–160, pls. 27, 55, 67, Fig. d; Peña Cantero and García Carrascosa 1994: p. 125, Fig. 7a–d.

Material examined. ANT 469, one colony ca. 65-mm high, without gonothecae (Coel. no. 10/ANT 469); ANT 477, one colony ca. 250-mm high, basally broken and with gonothecae (holotype, Coel. no. 11/ANT 477; schizoholotype, two microslides, RMNH Coel. no. 27724).

Description. Holotype (Fig. 3a) composed of one colony consisting of basally broken, yellowish, geniculate and erect stem, slightly polysiphonic with a few stolons along basal centimetre. Stem strong, with thick perisarc, and divided into heteromorous internodes limited by little marked constrictions of perisarc and roughly arranged in zig-zag fashion. Most cauline internodes with lateral branches, mixed with occasional, short internodes without branches (up to three consecutive internodes without branches have been noticed). Near distal end of each “normal” internode one apophysis gives rise to two lateral branches and one hydrotheca, placed in axil of both branches. Cauline apophyses alternately arranged and almost in one plane, though with slight tendency towards arrangement in spiral; apophyses change position 90° over 170-mm length, covering 23 apophyses.

Lateral branches divided into short thecate internodes; at basal part, even internodes giving rise to branches of second order, also divided into short internodes (Fig. 2a). Usually six or seven secondary branches, though eight have also been noticed.

Hydrothecae unilaterally arranged, forming two longitudinal rows of hydrothecae placed on same side of branches, though hydrothecae are alternately directed outwards (Fig. 2a–c). Hydrotheca situated at distal part of internode, spreading over next internode. As hydrothecae are longer than internodes they overlap, consequently distal part of hydrotheca covering basal part of succeeding hydrotheca (Fig. 2a–c).

Disposition of hydrothecae along branches varied in connection with degree of inclination over internode and length of free portion of adcauline wall. Basal part of branches with longer internodes (Fig. 2a), hydrothecae not touching, covering internode; adcauline wall adnate for ca. one-third of length. At distal end of branches, with shorter internodes, hydrothecae more elevated and making contact (Fig. 2b), being free for longer portion of adcauline wall. At tip of each branch internodes even shorter and hydrothecae totally elevated with adcauline wall fully free; hydrothecae completely in contact (Fig. 2c).

Hydrotheca almost cylindrical, curved outwards at distal end (Fig. 2b–c). Hydrothecal rim with three unequally developed cusps; adcauline cusp largest. In some parts of colony hydrothecae have two internal cusps (Fig. 2b). Opercular apparatus composed of three triangular valves.

Presumed male gonothecae present on paired branches as well as on secondary branches, occurring in great number at basal part of branches, between two rows of hydrothecae (Fig. 2d). Gonothecae occur from first internode of branch onward, one gonothecae per internode, inserted on one side at base of hydrotheca. They are fusiform (Fig. 2d), neither with distinct peduncle nor with neck. Gonothecal aperture circular and situated at distal end; closed by hat-shaped lid.

Table 1 Measurements of *Antarctoscyphus asymmetricus* sp. nov. (μm)

	Interval between minimum and maximum values	Mean \pm SD
Hydrothecae		
Length of abcauline wall	423–533	(485.6 \pm 31.8)
Length of adnate part of adcauline wall	234–397	(306.4 \pm 45.5)
Length of free part of adcauline wall	111–208	(179.2 \pm 27.5)
Diameter at rim	182–208	(195.9 \pm 9.1)
Internodes		
Length	672–1099	(777.1 \pm 106.4)
Diameter at the base of the hydrotheca	247–377	(291.1 \pm 38)
Gonothecae		
Length of male gonotheca	1640–2017	(1846.2 \pm 138.8)
Maximal diameter of male gonotheca	230–328	(276.5 \pm 45.8)
Diameter of aperture of male gonotheca	91–130	(108.6 \pm 14.4)

Table 2 Measurements of *Antarctoscyphus encarnae* sp. nov. (μm)

	Interval between minimum and maximum values	Mean \pm SD
Hydrothecae		
Length	683–813	(751 \pm 40.4)
Diameter at rim	195–254	(227.5 \pm 18.6)
Maximal diameter	260–325	(276.7 \pm 24)
Diameter at the base of the hydrotheca	208–319	(250 \pm 44.9)
Internodes of branches		
Length at the basal part of the branches	715–767	
Diameter at the basal part of the branches	748–761	
Length at the distal part of the branches	254–280	
Diameter at the distal part of the branches	286–306	
Cauline internodes		
Length	3500–8000	
Diameter	1000–2000	
Gonothecae		
Length	2427–2673	(2532.2 \pm 96)
Maximal diameter	656–902	(770.8 \pm 96.3)
Diameter of aperture	213–262	

Remarks. *Antarctoscyphus encarnae* sp. nov. is remarkable because of the peculiar colony structure, which makes it easily distinguishable from the other species of the genus. It only resembles *Antarctoscyphus grandis* (Blanco, 1977): however, there are great differences. In Blanco's species, though it also has a straight stem, the paired branches re-branch repeatedly, giving rise to branches up to the fourth order, while in *A. encarnae* sp. nov. the paired branches give rise to secondary branches only (up to eight secondary branches have been noticed), always originating at the even basal internodes. The two species also differ in the shape of the internodes of the branches – in *A. grandis* the internodes are longer than wide, while in *A. encarnae* sp. nov. they are more or less as long as wide – and in the size – in *A. grandis* they are longer. There is also difference in the shape of the hydrothecae: while in *A. grandis* the diameter of the hydrotheca distinctly narrows towards the base, the hydrotheca either has a more or less constant diameter along the whole length in *A. encarnae* sp. nov. with a slight widening at the distal third, or it increases

in diameter towards the base. Also, in *A. grandis* the rim of the hydrotheca has three equally developed cusps, separated by deep embayments; in *A. encarnae* sp. nov. the cusps are unequal, the adcauline one being much more developed than the other two, and they are separated by shallow embayments.

Ecology and distribution. Colonies of *Antarctoscyphus encarnae* sp. nov. were collected from 100- to 220-m depth on muddy bottoms off King George Island, in the South Shetland Islands. The fertile colony was found in January.

Etymology. This species is dedicated to Mrs. Encarna Sancho, wife of the first author, who has contributed to our study of antarctic hydroids in several ways.

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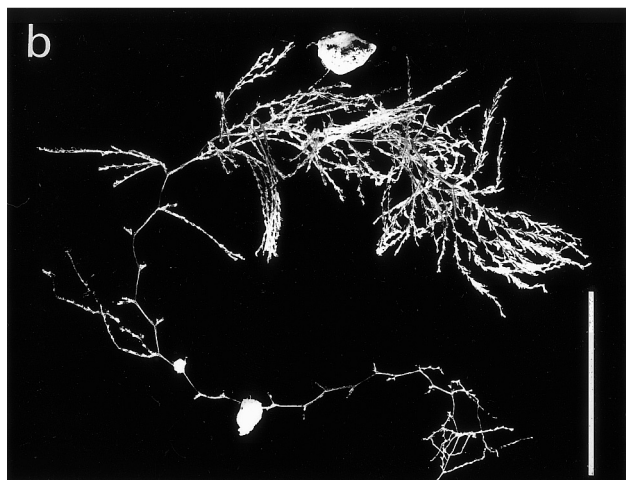


Fig. 3 a *Antarctoscyphus encarnae* sp. nov. **b** *Antarctoscyphus asymmetricus* sp. nov. (All the photographs from the holotypes). Scale bars: 20 mm

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