HYDROIDS FROM SUBMARINE CLIFFS NEAR ARTHUR HARBOUR, PALMER ARCHIPELAGO, ANTARCTICA

by

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With 8 text-figures

At the instigation of Dr. Joel W. Hedgpeth, Resident Director, Marine Science Center, Oregon State University, Newport, Oregon, U.S.A., I studied samples of hydroids, collected by Dr. John C. McCain and Dr. William E. Stout from submarine cliffs in the region around Palmer Station, Antarctica. The hydroids had been obtained during an examination of the zonation of rocky substrates in that area in the austral summer of 1968-1969. During this survey 0.25 m^2 samples were scraped from the rocks at 5 feet intervals down to a depth of 50 feet and at 10 feet intervals from 50 to 100 feet. Dr. McCain and Dr. Stout were able to complete one such transect and a portion of another (Hedgpeth, in litt., see also McCain & Stout, 1969).

The bulk of the material on which the present notes are based, is now in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands; duplicates have been deposited in the U.S. National Museum (Smithsonian Institution), Washington, U.S.A.

I want to express my gratitude to Dr. Joel W. Hedgpeth and Dr. John C. McCain for placing the interesting material at my disposal.

The positions of the two stations from which material has been studied are Sta. 4, 64° 46′ 36″ S, 64° 03′ 29″ W, and Sta. 5, 64° 49′ S, 64° 08′ W; both are in the vicinity of Arthur Harbour, Palmer Archipelago, Antarctica. From each station there are several samples, taken at varying depths (in feet, suffixed with station number).

Sta. 4-15 (about 5 m depth, 25.i.1969):
Unidentifiable hydroid, probably athecate *Eudendrium antarcticum* Totton, one fragment; *Symplectoscyphus glacialis* (Jäderholm), fragment of 4 mm length.

Sta. 4-20 (about 6 m depth, 25.i.1969):
Unidentifiable hydroid, about half sample, consisting of stems and branches of thecate and athecate hydroids, the athecate probably *Eudendrium antarcticum* Totton; *Halecium ovatum* Totton, sterile colonies on *S. glacialis; Phialella chilensis* (Hartlaub), a few colonies on *S. glacialis; Laomedea (Obelia) austrogeorgiae* (Jäderholm), a few hydrocauli on *S. glacialis; Symplectoscyphus glacialis* (Jäderholm), many fragments without gonothecae.

Sta. 4-25 (about 7 m depth, 25.i.1969):
Unidentifiable fragments; *Halecium ovatum* Totton, three sterile fragments; *Symplectoscyphus glacialis* (Jäderholm), one sterile colony and a fragment; *Symplectoscyphus plectilis* (Hickson & Gravely), one sterile colony and a fragment.

Sta. 4-30 (about 9 m depth, 25.i.1969):
Unidentifiable fragments; *Symplectoscyphus glacialis* (Jäderholm), many sterile colonies, forming bulk of sample; *Symplectoscyphus plectilis* (Hickson & Gravely), several sterile fragments.

Sta. 4-35 (about 11 m depth, 25.i.1969):
Symplectoscyphus glacialis (Jäderholm), several sterile colonies; *Symplectoscyphus plectilis* (Hickson & Gravely), two sterile colonies.

Sta. 4-40 (about 12 m, 25.i.1969):
Symplectoscyphus glacialis (Jäderholm), three colonies, one with empty gonothecae; *Symplectoscyphus plectilis* (Hickson & Gravely), one sterile colony.

Sta. 4-50 (about 15 m depth, 25.i.1969):
Halecium ovatum Totton, colonies creeping on *S. glacialis*, and fragments; *Lafoea fruticosa* (M. Sars), one sterile fragment; *Stegella lobata* (Vanhöffen), one sterile fragment; *Symplectoscyphus glacialis* (Jäderholm), many colonies with young hydrothecae, forming bulk of sample.

Sta. 4-70 (about 22 m depth, 25.i.1969):
Halecium delicatulum Coughtrey, many creeping and separate colonies with gonothecae; *Halecium jaederholmi* Vervoort, several sterile colonies and fragments; *Stegella lobata* (Vanhöffen), several sterile fragments; *Phialella chilensis* (Hartlaub), several sterile, creeping colonies; *Laomedea (Obelia) austrogeorgiae* (Jäderholm), sterile colonies on other hydroids; *Symplectoscyphus glacialis* (Jäderholm), many fragments with young gonothecae; *Symplectoscyphus plectilis* (Hickson & Gravely), many sterile colonies. The two species of *Symplectoscyphus* form bulk of sample.

Sta. 4-80 (about 24 m, 26.i.1969):
Halecium jaederholmi Vervoort, one fragment; *Halecium ovatum* Totton, several independently growing colonies and some creeping colonies, all sterile; *Stegella lobata* (Vanhöffen), several colonies and fragments with gonothecae; *Symplectoscyphus glacialis* (Jäderholm), many colonies with young gonothecae, forming bulk of sample; *Symplectoscyphus plectilis* (Hickson & Gravely), one small fragment.

Sta. 5-20 (about 6 m, 25.i.1969):
Eudendrium cf. *antarcticum* Totton, one fragment with single hydranth.

Sta. 5-30 (about 9 m depth, 25.i.1969):
Unidentifiable hydroid, probably *Eudendrium antarcticum* Totton.

Sta. 5-50 (about 17 m, 25.i.1969):
Halecium spec., probably young colony of *H. jaederholmi* Vervoort.

Eudendrium antarcticum Totton, 1930

Eudendrium antarcticum Totton, 1930: 140.

This species has not been recognized with certainty, but it probably occurred at AH 4-15, 5-20 and 5-30. It may also have been present amongst unidentifiable material from other depths as it is unrecognizable when no

hydranths are present. *E. antarcticum*, as far as known at present, is a purely antarctic species.

Halecium ovatum Totton, 1930 (fig. 1)

Halecium ovatum Totton, 1930: 143, fig. 3.

This species occurs at AH 4-20 (one), 4-25 (three), 4-50 (numerous) and 4-80 (numerous); all specimens are sterile. It may also have been present at AH 4-70.

Halecium ovatum has a great general resemblance with *H. delicatulum* Coughtrey, from which it mainly differs in the mode of ramification. I have been able to compare my specimens with the holo- and paratypes in the British Museum (Natural History). The holotype (BM no. 29.10.10.1) and the paratypes (BM nos 29.10.28.25 and 29.10.28.26) originate from the same locality (Terra Nova Exped., Sta. 220, off Cape Adare, mouth of Robertson's Bay, Ross Sea, 45-50 fms (= 82-92 m)) and are entirely comparable. The following description, supplementing Totton's short diagnosis, has been taken from the paratypes.

The specimens at my disposal are about 25 mm high; the basal part of the hydrocaulus is distinctly polysiphonic, though the number of tubes is only three or four. The shape of the branched hydrocaulus is described by Totton (1930: 143) as a "scorpioid cyme". The stems are repeatedly branched; the internodes are long and slender, usually with several ring-shaped corrugations of the fairly thick periderm. The internodes end in a short hydrophore supporting the hydrotheca. At the base of the hydrophore there are usually two diverging internodes, one of which invariably ends in a hydrophore and two diverging internodes; the remaining internode may directly give rise to the hydrotheca or, more rarely, it may branch in the same fashion as the other internode from the pair (fig. 1 a, b). This pattern of ramification is repeated throughout the colony, though occasionally it is obscured by the presence of three (instead of two) internodes or the presence of only a single internode.

Hydrotheca and hydrophore form a fairly deep, cup-shaped structure; usually they are separated from each other by a distinct, convex septum, rarely represented by a row of fine puncta; in the majority of both primary and renovated hydrothecae there is a very distinct septum at the bottom. The hydrothecal margin flares very distinctly. Renovations of the (primary) hydrotheca are quite common, resulting in trumpet-shaped structures, the hydrotheca being supported by a number of short internodes. The polyps have about 26 tentacles arranged in two rows.

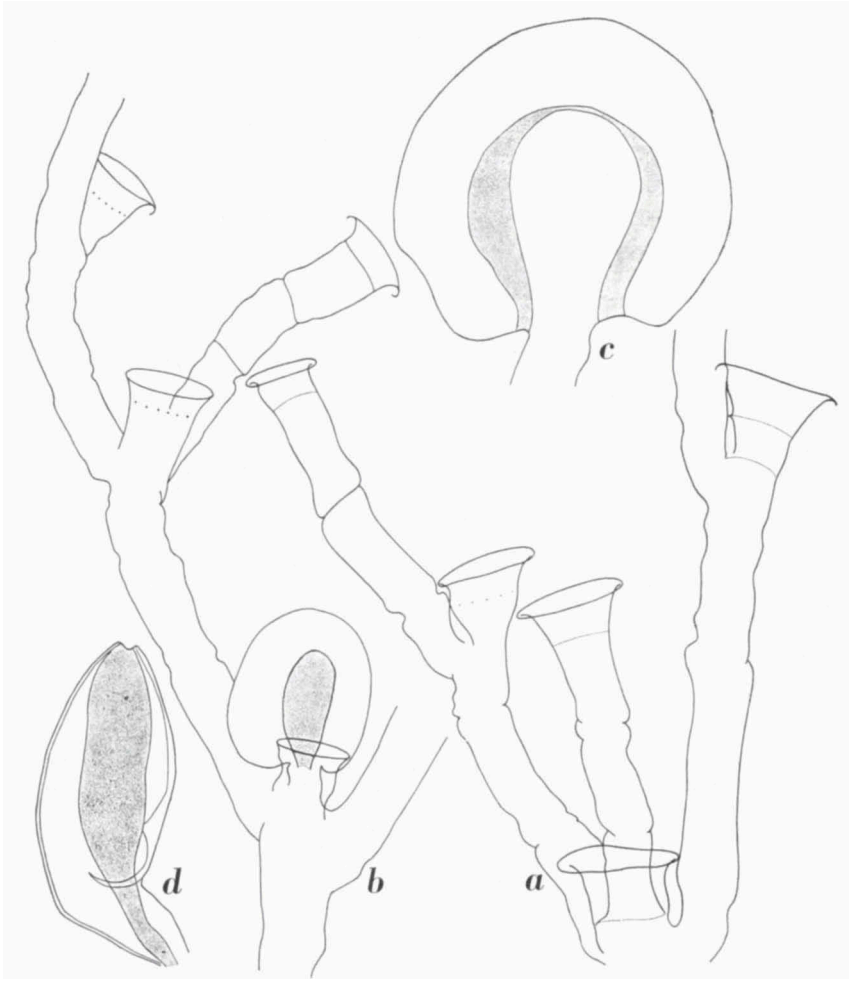

Fig. 1. *Halecium ovatum* Totton. a, Sta. AH 4-20, fragment of a colony. b-d, paratype, Terra Nova Exped., Sta. 220, BM no. 29.10.28.26; b, fragment of a colony with male(?) gonotheca; c, male(?) gonotheca, frontal view; d, the same, lateral view. a, b, × 55; c, d, × 90.

Gonothecae are abundantly present in both paratypes, developing from the hydrothecae at the base of a bifurcation. They are compressed, kidney-shaped bodies, consisting of a central mass of developing spermatocytes (fig. 1 c) surrounded by a ring-shaped belt of tissue. Seen from the sides they are compressed-ovoid, with a slit at the apex (fig. 1 d). The gonothecae are evidently young and probably male.

In the paratypes the maximal diameter of the hydrocaulus is 300 microns; the hydrothecae there have a diameter of 285 microns. At each bifurcation

the diameter of the internodes diminishes slightly, in the finest ramifications being 125 microns. The hydrothecae there have a diameter of 215 microns. The gonothecae are 590 microns broad, 435 microns high and 205 microns thick.

The Arthur Harbour specimens are identical with the paratypes but have badly preserved hydranths and are only 15 mm high (fig. 1 a).

H. ovatum seems to be restricted to the Antarctic continent, the only previous record being that by Totton from off Cape Adare, Ross Sea.

This species is very near to *Halecium cymiforme* Allman (1888: 15, pl. 7), which it resembles in the mode of ramification and the shape of the young male gonothecae. Of this species I have not (yet) inspected the holotype which, according to Totton's information (Totton, 1930: 144) is "imperfect". The material originates from Port Famine, Patagonia, 53°37'30"S, 70°56'00"W, 9 fms (= 16.5 m).

Halecium delicatulum Coughtrey, 1876 (fig. 2a)

Halecium delicatulum Coughtrey, 1876: 299; Ralph, 1958: 334, figs. 11e, h-n, 12 a-p; Naumov & Stepan'yants, 1962: 94, fig. 16; Vervoort, 1972: 27, figs. 4, 5.

Halecium pallens Jäderholm, 1904: 4; Jäderholm, 1905: 12, pl. 5 figs. 1-3; Broch, 1948: 7, fig. 1.

Halecium antarcticum Vanhöffen, 1910: 317, fig. 34; Billard, 1914: 7, fig. 5; Totton, 1930: 144, fig. 4; Broch, 1948: 7.

At AH 4-70 this species occurs in profusion, possibly mixed with *H. ovatum* Totton.

All colonies are slender and monosiphonic, the hydrocauli are composed of slender internodes arranged in zig-zag fashion, with the hydrophore projecting far above the level of the apophysis bearing the next internode. The hydrothecae are shallow, placed at the end of fairly long hydrophores of variable length; all hydrothecae, primaries as well as renovated hydrothecae, have strongly flexed margins. A distinct diaphragm is invariably present; the base of the (renovated) hydrophore is attached to the preceding hydrotheca at the level of the diaphragm. No puncta have been observed, but in the material at my disposal the hydranths are badly preserved.

The material richly bears gonothecae, placed on the primary hydrophores just above their insertion on the internode. The gonothecae are flattened, triangular structures, narrowing at the base and opening along an irregular slit at the apex. These gonothecae are apparently spent, as no contents could be observed (fig. 2a).

I agree with Naumov & Stepan'yants (1962) that *H. pallens* Jäderholm, 1904, and *H. antarcticum* Vanhöffen, 1910, are no more than synonyms of *H. delicatulum* Coughtrey; the synonymy of the latter has been discussed

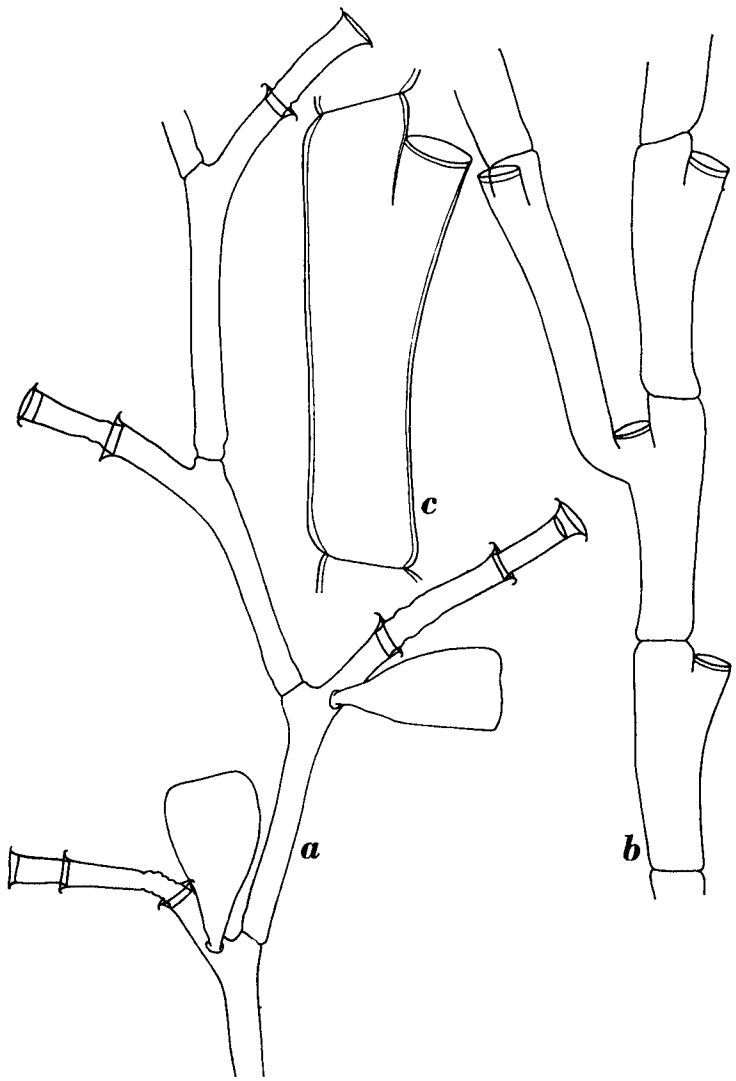

Fig. 2. a, *Halecium delicatulum* Coughtrey, Sta. AH 4-70, monosiphonic fragment with gonotheca. b, c, *Halecium jaederholmi* Vervoort, Sta. AH 4-70; b, monosiphonic fragment; c, internode. a, b, × 30; c, × 55.

by Ralph (1958: 334). Upon comparison of my material with monosiphonic specimens of *H. delicatulum* from the south-western Atlantic I find them to be conspecific.

Measurements (in microns):

	AH 4-70
Internode, total length	1,080-1,215
diameter at node	105-115
Primary hydrotheca, length diaphragma-margin	48-55
maximal diameter at margin	215-245
Gonotheca, maximal length	675-745
maximal diameter	510-530

The distribution of *H. delicatulum* has been discussed by Ralph (1958); it may be characterized as circumpolar on the southern hemisphere. There are a number of antarctic records: several localities in the South Georgia area (Jäderholm, 1905, as *H. pallens*); Marguerite Bay, Graham Land region (Billard, 1914, as *H. antarcticum*); Peter Ist Island, Bellinghausen Sea, Antarctica (Broch, 1948, as *H. pallens*); Gauss Station, 60°02'S, 89°38'E, Antarctica (Vanhöffen, 1910, as *H. antarcticum),* and two localities not specified by Naumov and Stepan'yants (1962) but in the vicinity of Cape Poinsett, and Cape Mose, Wilkes Coast, both Antarctica.

The present locality is in the area where the species may be expected to occur.

Halecium jaederholmi Vervoort, 1972 (fig. 2 b, c)

Halecium arboreum Jäderholm, 1905: 11, pl. 5 fig. 4; Naumov & Stepan'yants, 1962: 97.
Halecium robustum Ritchie, 1907: 524.
Halecium macrocephalum Ritchie, 1913: 18, fig. 5; Stechow, 1925: 402; Rees & Thursfield, 1965: 108.
Halecium jaederholmi Vervoort, 1972: 21, fig. 2.

This species occurs in fair numbers at AH4-70; a single small colony was obtained at AH4-80 and a fragment at AH5-50.

The synonymy of this species has recently been discussed (Vervoort, 1972); the present material differs from that described in the aforementioned paper by completely monosiphonic colonies. It has, however, every appearance of being quite young; the monosiphonic hydrocauli rise from a creeping hydrorhiza and have yellowish periderm. Both hydrocauli and branches are divided into slender internodes, separated by slightly oblique septa. The distal part of the internode bears the apophysis supporting the next internode and the laterally placed hydrophore. The apophysis projects slightly above the level of the hydrotheca. The widening of the internode towards the apical part goes very gradually. The (primary) hydrotheca is

very low, separated from the hydrophore by a distinct diaphragma. The plane of the aperture is almost perpendicular to the length axis of the internode, or slightly tilted in abcauline direction (fig. 2 b, c). No renovations have been observed. Hydranths are only present in the well preserved colony from AH4-80; they are very large. Their place of attachment to the hydrotheca is marked by a row of exceedingly fine puncta, invisible in the other material.

Side-branches originate from the stem internodes directly under a hydrophore; the branches curve upwards.

No gonothecae have been observed.

Measurements (in microns):

	AH 4-70
Internode, total length	1,055-1,150
diameter at node	175-205
Primary hydrotheca, height diaphragma-margin	20-33
diameter	160-190

This species is exclusively antarctic and sub-antarctic, being recorded from: off Coats Land (Ritchie, 1907) and off Enderby Land (Naumov & Stepan'yants, 1962); from the Falkland Islands and from South Georgia (Jäderholm, 1905), from off Peninsula Valdès, Argentina (Vervoort, 1972) and from the Atlantic entrance to the Estrecho de Magellanes (Vervoort, 1972).

Phialella chilensis (Hartlaub, 1905) (fig. 3)

Campanulina chilensis Hartlaub, 1905: 589, figs. L^2, M^2b, N^2; Jäderholm, 1905: 20, pl. 7 figs. 11, 12; Billard, 1906: 12; Ritchie, 1909: 74; Naumov & Stepan'yants, 1962: 76, fig. 3.

Operculariella chilensis, Rees, 1939: 444.

Phialella chilensis, Vervoort, 1972: 38, fig. 10.

Specimens of this species were found creeping on *Symplectoscyphus glacialis* (Jäderholm) at AH4-20; a single detached colony occurs at AH4-70.

The present specimens generally agree with the description given previously (Vervoort, 1972). The specimens from AH4-20 consist of separate hydrothecae, rising from a creeping stolon; the pedicels are of variable length but unbranched. The periderm is firm, irregularly ringed or wrinkled; there are no smooth portions. The hydrothecae widen very gradually from the base onwards; the closing apparatus consists of 8 to 10 triangular flaps, folding to form a well fitting, conical roof. The closing membrane is well marked from the rest of the hydrotheca though no ring

is present. Nearly all hydrothecae have remnants of hydrants, attached to a very thin diaphragma or membrane, invisible in the empty thecae (fig. 3 a, b).

The specimen from AH4-70 consists of one primary pedicel and some secondary pedicels rising from the primary pedicel some distance under the hydrotheca.

As appears also from the measurements the present material is larger than that recorded from the Estrecho de Magellanes (Vervoort, 1972).

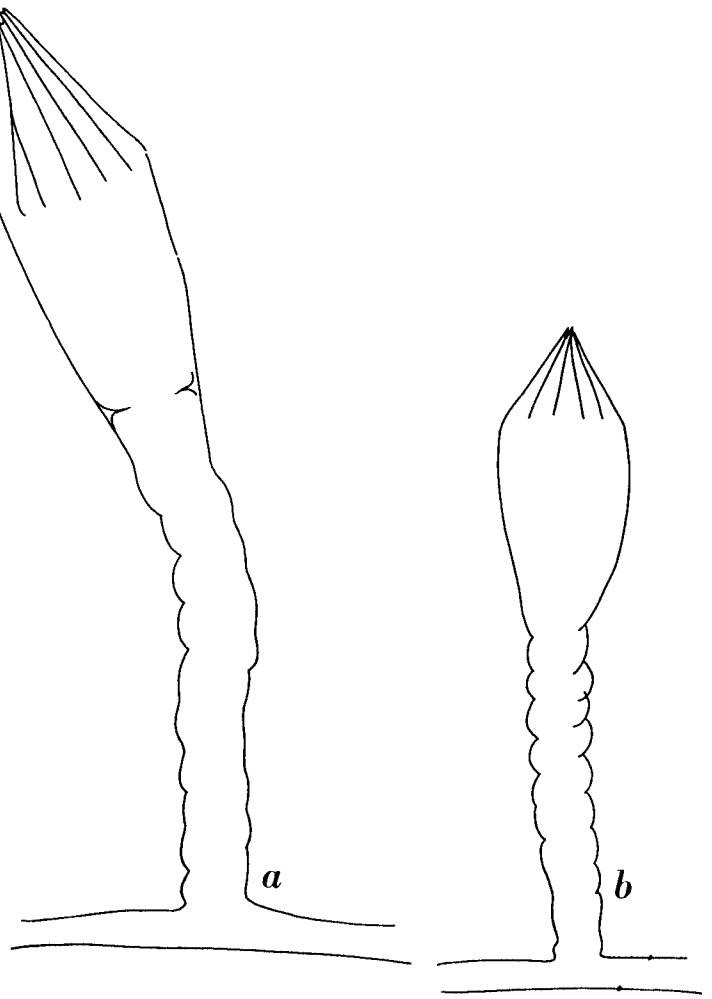

Fig. 3. *Phialella chilensis* (Hartlaub), Sta. AH 4-20. a, b, hydrothecae from a specimen creeping on *Symplectoscyphus glacialis* (Jäderholm). a, b, × 70.

Measurements (in microns):

	AH 4-20
Pedicel, maximal length (base-diaphragma)	475-675
maximal diameter	68-80
Hydrotheca, length (diaphragma-apex)	285-340
maximal diameter	110-150

For a discussion of the relationship of this species to *Phialella quadrata* Forbes, 1848, I refer to Vervoort, 1972. The distribution of the species may be summarized as follows: Calbuco, Chile (Hartlaub, 1905); Burdwood Bank (Jäderholm, 1905; Ritchie, 1909); Graham Land region (Billard, 1906); south of New Zealand (Naumov & Stepan'yants, 1962), and Estrecho de Magellanes (Vervoort, 1972).

Stegella lobata (Vanhöffen, 1910) (fig. 4)

Campanularia verticillata var. *grandis* Hickson & Gravely, 1907: 23, pl. 4 fig. 25.
Campanularia lobata Vanhöffen, 1910: 294, fig. 15; Ritchie, 1913: 21.
Stegella grandis, Stechow, 1923a: 119, fig. P; Jäderholm, 1926: 3; Totton, 1930: 153, fig. 10; Naumov & Stepan'yants, 1962: 77.
Stegella lobata, Briggs, 1939: 21.

Of this species some fragments were obtained at AH4-50; one fragment occurred at AH4-70, whilst numerous fertile specimens were obtained at AH4-80.

S. lobata is a characteristic antarctic species of intermediate and deep waters; it has repeatedly been described and is easily recognized by its curious hydrothecae and gonothecae. The opercular flaps in the present specimen are very hyaline; invariably four are present. The gonothecae, occurring on the colonies from AH4-80, have the characteristic flattened, funnel-shaped aperture.

I agree with Briggs (1939: 21) that the specific name *Stegella grandis* is not available for this species. It was originally described as *Campanularia verticillata* var. *grandis* Hickson & Gravely, 1907; as it has nothing whatsoever to do with *Campanularia verticillata* Linnaeus, 1758, it should stand as *Campanularia grandis* Hickson & Gravely, 1907, preoccupied however by *Campanularia grandis* Allman, 1874. The available name for this species is *Campanularia lobata* Vanhöffen, 1910; after removal from *Campanularia* and inclusion in *Stegella* Stechow, 1919, it should stand as *Stegella lobata* (Vanhöffen, 1910).

The distribution of this purely antarctic species may be summarized as follows (fig. 4): McMurdo Sound, Ross Sea, various localities, 20 fms (= 36.5 m) (Hickson & Gravely, 1907, as *Campanularia verticillata* var.

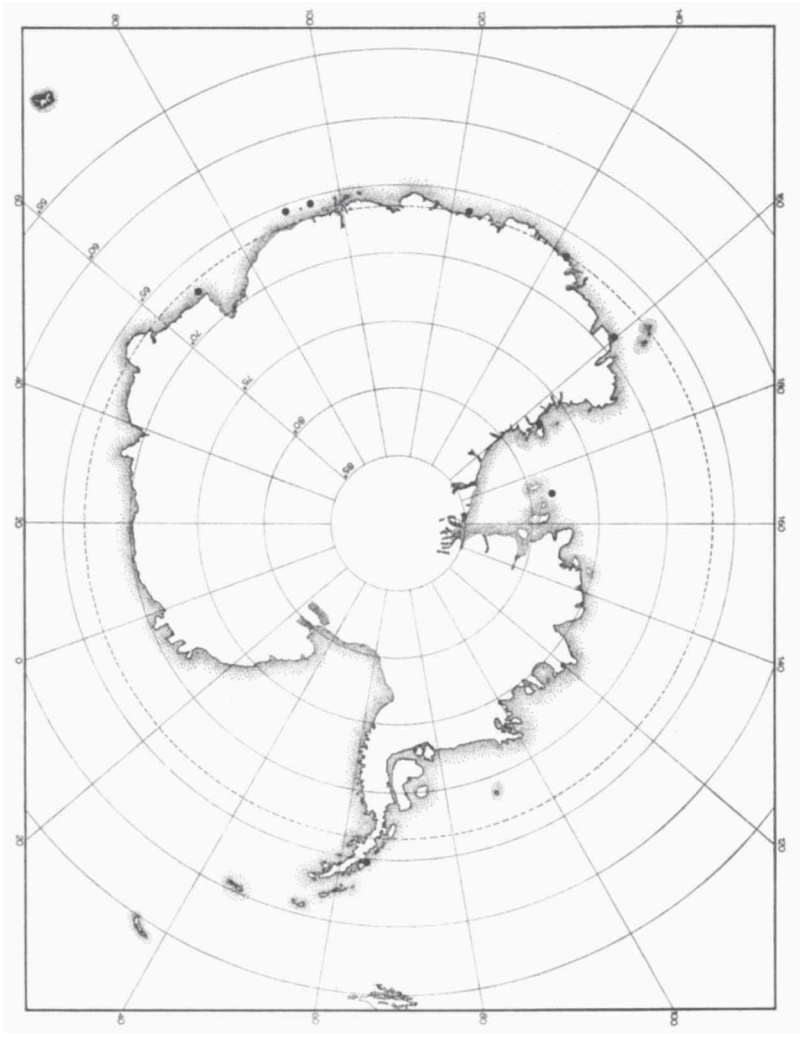

Fig. 4. Map of the antarctic continent showing the distribution of *Stegella lobata* (Vanhöffen) in the seas bordering the continent. The localities are indicated by means of a black dot.

grandis), 7-30 fms (= 13-55 m) (Ritchie, 1913, as *Campanularia lobata*); 76°56′S, 164°12′E, 160 fms (= 293 m) (Totton, 1930, as *S. grandis*); Gauss Station, 66°02′S, 89°38′E, off Kaiser Wilhelm II Land, 385 m (Vanhöffen, 1910, as *Campanularia lobata*); Discovery Inlet, Ross Sea, 550 m (Jäderholm, 1926, as *S. grandis*); Commonwealth Bay, King George V Land, 55-60 fms (= 100.5-110 m) (Briggs, 1939); off Queen

Mary Land, 66°08'S, 94°17'E, 120 fms (= 219 m) (Briggs, 1939); off Banzare coast, 289 m; near Cape Fletcher, 130-190 m, and off Oates Land, 650-700 m (Naumov & Stepan'yants, 1962, all three localities are approximative as no exact positions of the stations are given).

The presence of fertile specimens at AH4-70, 24 m depths, shows that this species is not restricted to deeper water of the Antarctic.

Lafoea fruticosa (M. Sars, 1851) (fig. 5)

Campanularia fruticosa M. Sars, 1851: 138.
Lafoea fruticosa, Naumov & Stepan'yants, 1962: 76; Vervoort, 1972: 66, figs. 19-21.
Campanularia gracillima Alder, 1856: 361, pl. 14 figs. 5, 6.
Lafoea gracillima, Vanhöffen, 1910: 312; Billard, 1914: 10; Briggs, 1939: 25.
Lafoea capillaris G. O. Sars, 1874: 115, pl. 4 figs. 22-24.
Calycella obliqua Hincks, 1874: 149, pl. 6 figs. 4, 5.

A single 18 mm long fragment occurs at AH4-50.

The polysiphonic stem is snapped off at the base, it consists of three partly fused tubules. The hydrothecae occur on all three tubules on fairly long, irregularly twisted pedicels with 3 to 5 twists. The shape of the hydrotheca can best be seen in fig. 5; they are nearly straight, with almost parallel walls or are very slightly curved downwards. The margin is very slightly everted; no renovations have been observed. The presence of hydranths shows that this was a living specimen when collected; the polyps are basally attached to the interior of the hydrotheca at a place marked by a ring of very small, hyaline puncta.

Measurements (in microns):

	AH 4-50
Pedicel, total length (base-puncta)	270-405
maximal diameter	80-110
Hydrotheca, total length (puncta-margin)	595-675
maximal diameter	150-160

For a discussion of the synonymy and distribution of *Lafoea fruticosa* s.l. I refer to my 1972 paper. Though the species is well distributed in subantarctic waters, purely antarctic records are scarce. It has been obtained off Kaiser Wilhelm II Land, Gauss Station, 66°02'S, 89°38'E (Vanhöffen, 1910, as *L. gracillima*); in Commonwealth Bay, King George V Land, 45-60 fms (= 82-110 m) (Briggs, 1939, as *L. gracillima*); off Cape Adare, Ross Sea, 45-50 fms (= 82-92 m) (Totton, 1930, as *L. gracillima*), and Granite Harbour, McMurdo Sound, Ross Sea, 50 fms (= 92 m) (Totton, 1930, as *L. gracillima*).

Laomedea (Obelia) austrogeorgiae (Jäderholm, 1904) (fig. 6a)

Obelia austro-georgiae Jäderholm, 1904: 7; Jäderholm, 1905: 17, pl. 7 figs. 1, 2; Blanco, 1964: 165.

Several sterile colonies were obtained at AH4-20 and AH4-70.

The monosiphonic colonies are 10-12 mm high; the hydrocauli have a sympodial structure; the new pedicels arise close to the hydrothecae and run parallel with the pedicel from which they originate. They are either completely ringed or ringed basally and apically, with a smooth intermediate portion. The hydrothecae are fairly long and slender, with a thin diaphragma, usually in oblique position. The firm periderm of the pedicel thins out considerably on the hydrotheca, which as a result is very thin and collapses

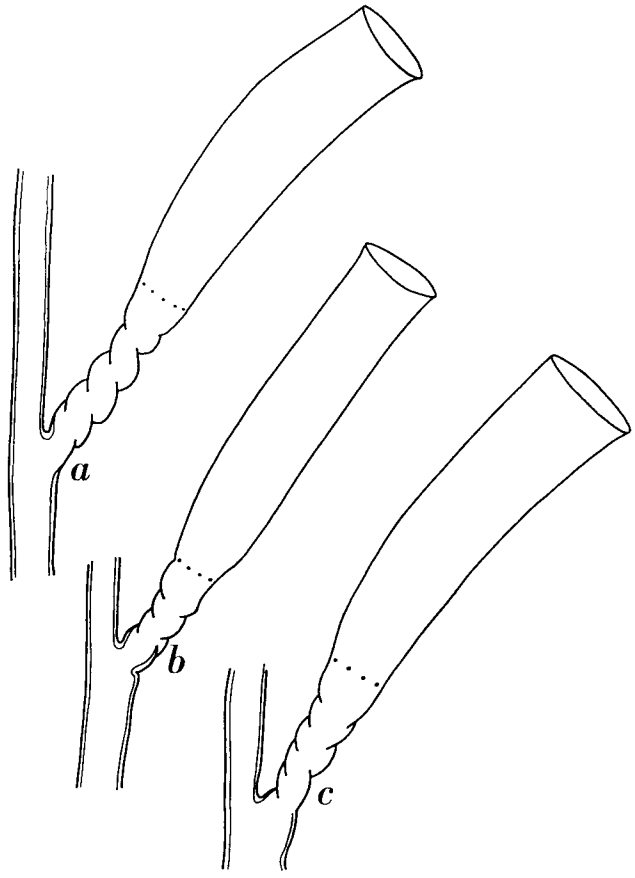

Fig. 5. *Lafoea fruticosa* (M. Sars), Sta. AH 4-50. a-c, three different hydrothecae to show the variability in shape and curvature. a-c, × 70.

very easily. In the few well preserved hydrothecae the hydrothecal margin has 10 to 12 large teeth, separated by rounded embayments. The rounded basal part of each embayment curves slightly outwards, so that as a result the hydrothecal cross-section just under the marginal teeth is undulated. Each

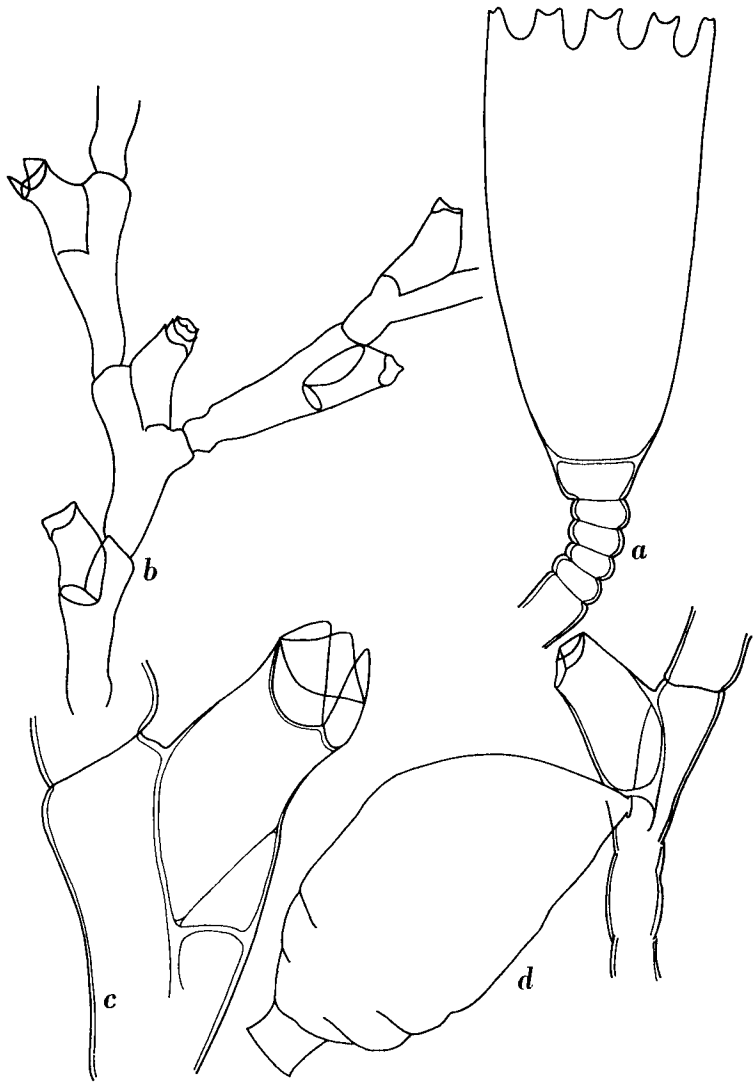

Fig. 6. a, *Laomedea (Obelia) austrogeorgiae* (Jäderholm), Sta. AH 4-70, single hydrotheca. b-d, *Symplectoscyphus glacialis* (Jäderholm); b, Sta. AH 4-20, fragment of a colony; c, Sta. AH 4-20, single hydrotheca; c, Sta. AH 4-40, empty gonotheca. a, × 230; b, × 30; c, × 90; d, × 60.

of the large marginal teeth has a rounded apical incision, splitting up the tooth into two smaller teeth with rounded apices. There are no striae on the hydrotheca. The length of the hydrothecae varies between 660 and 945 microns. Badly preserved hydranths are present. No gonothecae have been observed.

This species has originally been described from Cumberland Bay, South Georgia, on algae in the littoral zone (Jäderholm, 1905). I have been unable to find other references to this species, but Blanco (1964: 165) enumerates this species in an identification key for the Argentine species of *Obelia*. I have recently seen additional material from Port Lockroy, Graham Land region, collected by Dr. William E. Stout, Department of Oceanography, Oregon State University. This material, obtained in the intertidal zone, is also sterile.

Symplectoscyphus glacialis (Jäderholm, 1904) (figs. 6 b-d, 7, 8a)

Sertularella glacialis Jäderholm, 1904: 9; Jäderholm, 1905: 26, pl. 10 figs. 3-7; Billard, 1906: 3; Ritchie, 1913: 29, fig. 10; Billard, 1914: 23; Jäderholm, 1916-1917: 11, pl. 1 fig. 9; Jäderholm, 1926: 5; Naumov & Stepan'yants, 1962: 82.

Symplectoscyphus glacialis, Stechow, 1923a: 174; Stechow, 1925: 403; Totton, 1930: 188, fig. 39, pl. 1 figs. 8, 9, pl. 2 fig. 7; Briggs, 1939: 32; Broch, 1948: 11, figs. 2d, e, 3a; Vervoort, 1972: 171, figs. 56, 57 b, c.

A fragment of this species occurs at AH4-15; at the remaining stations, 4-20, 4-25, 4-30, 4-35, 4-40, 4-50, 4-70 and 4-80 it occurs plentifully. The material from AH4-40 has one empty gonotheca; young gonothecae occur in profusion at AH4-50, 4-70 and 4-80.

This species has recently (Vervoort, 1972: 171, figs. 56, 57 b, c) been redescribed after a fragment from the Terra Nova Expedition. The present material is much more copious and allows me to extend the description in various details. The most striking peculiarity is the great variability exhibited. The ramification of the colony is usually quite lax and loose; long and slender side-branches occur in abundance, originating from apophyses on stems or other branches, either found under a hydrotheca or in the middle of an internode. The pattern of branching may be alternate, with long intervals between the side-branches, or the side-branches occur in profusion along a stretch of stem or branch. In the first instance loosely branched colonies result, in the second case the resulting colonies are of a bushy type. Both stems and side-branches are divided into internodes (fig. 6 b), the septa are always distinctly indicated, usually marked by deep constrictions followed by one or a few wrinkles or peridermal rings, but not always complete. Basal parts of certain colonies are remarkable by the presence of

slender internodes, with many basal rings. In other parts of the colonies the internodes are very short. The arrangement of the hydrothecae is always alternate and usually in one plane, the successive hydrothecae facing the left or right side of stem or branch. On many branches, however, the hydrothecae also point obliquely forward, sometimes to such a degree that they approach the condition observed in the Terra Nova specimen, viz., arranged in two planes meeting at an almost acute angle. Such branches may occur in a colony where the remaining hydrothecae are arranged in one plane. Close inspection of the hydrothecae also shows a fair amount of variability. Normally the free part of the abcauline border is about as long as the adnate part (fig. 6 c), but hydrothecae with a longer free part are not rare. The free abcauline part may be straight, concave or convex, all within the same colony. The adcauline wall usually has a distinct bend about halfway that border, but it may also be uniformly concave. The hydrothecal margin has three rounded teeth, one abcauline and slightly recurved, and two lateral. Renovations are quite common, but usually restricted to two or three, though larger numbers may be found. The closing apparatus is composed of three triangular flaps; it may participate in the renovations of the hydrothecal border, resulting in the presence of a complex closing apparatus with many non-functioning plates. When closed the three plates form a low roof. The periderm of the internode is quite firm and yellowish-brown, becoming darker brown on some of the older stems. It thins out along the hydrothecal wall, but forms a weakly developed ring around the thecal aperture. The hydranth is attached into the hydrotheca by means of an oblique membrane, running from the bend in the adcauline margin to the internal, abcauline corner. This membrane is visible in some thecae without polyps, but it is no constant feature. In the older internodes there usually is a distinct fenestra under the hydrotheca.

One empty gonotheca occurs at AH4-40. This gonotheca confirms to the description and figure presented by Totton (1930: fig. 39 a). It is ovoid, with the indication of three ribs or rings on the apical portion and a short funnel with slightly recurved margin (fig. 6 d).

Immature gonothecae occur in profusion on the material from deeper strata. They differ markedly from those described previously (Vervoort, 1972: 174, fig. 56) by the presence of six circular ribs or frills with thickened margin (figs. 7, 8 a). They are quite distinctly immature and their sex could not be ascertained. As I find no differences between the colonies bearing the empty gonotheca and those bearing the young, frilled gonothecae I am forced to believe that either the sexual dimorphism is great in this species, or the hydrotheca changes drastically during further development.

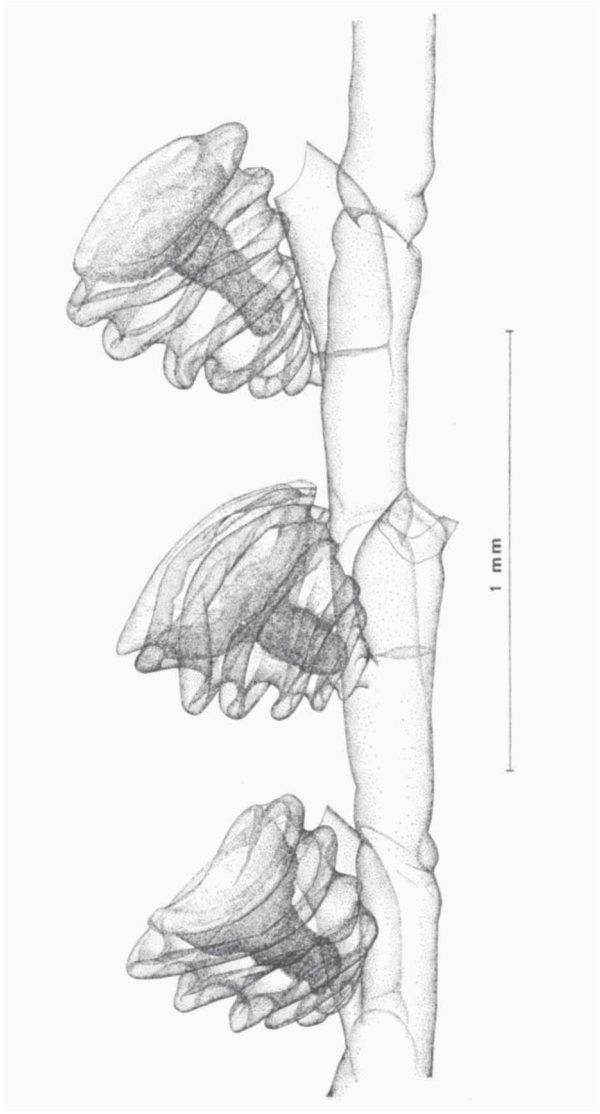

Fig. 7. *Symplectoscyphus glacialis* (Jäderholm), Sta. AH 4-80, fragment of a colony bearing three young gonothecae. × 55.

Difference in appearance between the gonothecae of both sexes seems the more likely solution, since smooth, conical gonothecae also occur in the Terra Nova material and have every appearance of developing into the mature type observed both by Totton and by me.

Measurements (in microns):

	AH 4-20	AH 4-40	AH 4-80
Stem internode, total length	470-880	580-745	675-880
diameter at node	120-160	120-175	160-165
Hydrotheca, length abcauline wall	310-315	295-300	285-300
idem, free part adcauline wall	215-270	240-250	190-230
idem, adnate part adcauline wall	200-230	230-240	190-270
total depth	390-420	370-380	350-380
maximal diameter	185-190	160-165	190-205
diameter at aperture	150-155	135-150	135-160
Gonotheca, total length		945	475-540
diameter at apex			580-610
maximal diameter		490	

S. glacialis is exclusively know from antarctic localities (vide Vervoort, 1972), where it preferably lives at protected, rocky areas in the littoral and sub-littoral zone. The best developed colonies and those with gonothecae are from the deeper littoral strata.

Symplectoscyphus plectilis (Hickson & Gravely, 1907) (fig. 8 b, c)

Sertularella plectilis Hickson & Gravely, 1907: 20, pl. 3 fig. 21; Ritchie, 1913: 30, figs. 8, 9; Jäderholm, 1916-1917: 10, pl. 1 fig. 8; Jäderholm, 1926: 5.

Symplectoscyphus plectilis, Totton, 1930: 193, fig. 41, pl. 2 figs. 4, 5; Vervoort, 1972: 133, fig. 42.

Sertularella glacialis Vanhöffen, 1910: 325, fig. 40 a-c.

Colonies of this species occur at AH4-25, 4-30, 4-35, 4-40, 4-70 and 4-80. It is abundant only at AH4-30 and AH4-70.

All colonies are monosiphonic, with a limited number of side-branches, reaching a maximal height of about 20 mm. Stems and side-branches are divided into long and slender internodes, following each other in a straight line or slightly curved in zig-zag fashion. The internodes are not sharply separated by means of septa, but indicated by constrictions of the periderm. The side-branches originate from a small apophysis opposite the hydrothecal base. The hydrothecae are long and more or less tubular, slightly curved, usually with the abcauline wall slightly concave and the adcauline wall slightly convex, thus curving away from the internode. Only a small portion of the abcauline wall is adnate with the internode; the free portion is more than twice as long. The hydrotheca narrows very slightly towards the aperture, which is provided with three prominent teeth with rounded apices separated by fairly deep, rounded embayments. In (few) undamaged hydrothecae the closing apparatus is still present and composed of three triangular plates forming, when closed, a high, roof-like structure. Renovations of the hydrotheca are common, considerably lengthening and narrowing the hydrothecal aperture. No hydranths or gonothecae have been observed.

Fig. 8. a, *Symplectoscyphus glacialis* (Jäderholm), Sta. AH 4-80, young gonotheca. b, c, *Symplectoscyphus plectilis* (Hickson & Gravely), Sta. AH 4-25; b, fragment of a colony; c, single hydrotheca. a, b, × 70; c, × 135.

Measurements (in microns):

	AH 4-25
Internode, length	540-1,215
diameter at node	65-95
Hydrotheca, length abcauline wall	370-380
length free part adcauline wall	335-350
length adnate part adcauline wall	120-125
total depth	430-460
maximal diameter	150-165
diameter at aperture	135-140

The condition of the material and the absence of gonothecae suggests that the species, though occurring at the present locality between 7 and 24 m depth, has its preferential habitat somewhere else, probably in much deeper water. The geographical distribution of this species is mainly antarctic (Vervoort, 1972): it has been observed at several localities along the antarctic continent and in the Palmer Island region, Graham Land, and South Georgia, the latter localities just north of the antarctic circle.

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