

Hydroids of the BANZARE expeditions, 1929 – 1931: the family Haleciidae (Hydrozoa, Leptothecata) from the Australian Antarctic Territory

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Abstract

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The BANZARE Expeditions (British, Australian, New Zealand, Antarctic Research Expeditions) 1929 – 1931 sampled the marine benthos in the Southern Ocean, at the Kerguelen Islands, Heard Island, Macquarie Island, and south-west of Tasmania and along the coast of the Australian Antarctic Territory. Forty six stations at depths of 2 - 640 m were occupied along the Australian Antarctic Territory coast. Eight species of Halecium including five new and Hydrodendron arboreum were found and recorded from eight stations.

Keywords

BANZARE Expeditions (1929-1931), Australian Antarctic Territory, family Haleciidae.

Introduction

The BANZARE Expeditions (British, Australian, New Zealand, Antarctic Research Expeditions) 1929–1931, led by Sir Douglas Mawson, made major collections by dredgings from the research vessel *Discovery* in several geographical localities: the Southern Ocean from South Africa to Western Australia, the Kerguelen Islands, Heard Island, Macquarie Island, south-west of Tasmania and along the coast of the Australian Antarctic Territory.

Forty six stations were occupied along the Australian Antarctic Territory coast and samples collected using various trawls to depths 640 m; some coastal collections to were also made in shallow water 2 m deep. The hydroid collection was originally deposited in the British Museum, Natural History (BMNH), London. There, preserved material was sorted during the 1960s and microslide mounts prepared. A small amount of material left over from the earlier AAE (Australian Antarctic Expedition) 1911-1914 was also incorporated into the BANZARE collection as Station No. 1785 (see Table 1).

The entire BANZARE hydroid collection comprises more than 200 jars and vials of preserved material and some 1500 microslides. For ease of study the collection was divided into the major geographical localities mentioned above. The Antarctic part of the collection comprises some 32 jars of bulk samples, 83 tubes of preserved material and some 250 microslide preparations. Samples were originally provided with a BANZARE field station number (eg. Station 105) by the expedition and later at the BMNH a reference number was added (eg. Station 105, BMNH Hydr. No. 711/6). A few provisional identifications were made at the time by Dr W. J. Rees in the BMNH but no reports were prepared. In 1970s the entire BANZARE hydroid collection was

sent to the National Museum of Victoria (now Museum Victoria) in Melbourne for identification. A difficulty arising from the BMNH reference numbering system has been determining whether several microslides from the same station but labelled with different BMNH reference numbers are from the same, or from different colonies. As no information on allocation of reference numbers was provided by the BMNH, it is assumed in this report that species with consecutive reference numbers but under the same station number relate to the same colony. To reduce confusion the BMNH reference numbers have thus been abandoned and the material described in this report is provided with a Museum Victoria registration number (NMV F).

Some of the preserved material is now fragile; furthermore, many of the microslides prepared by the BMNH were treated with a stain which, over the years, has darkened to almost opaque green. Re-mounting of this opaque material has not been undertaken being too time-consuming and likely to destroy already fragile specimens. For this study descriptions have been made from those BMNH microslides in good condition and from preserved material in temporary glycerol mounts and stained with Bengal Rose.

This paper examines the Antarctic Family Haleciidae collected from the coast of the Australian Antarctic Territory. Eight species of *Halecium* (including five new) and one species of *Hydrodendron* are described. The greatest number of records of the Haleciidae were from stations off Princess Elizabeth Land from 60°–80°E (Figure 1, Table 1). The most abundant species in the collection were *Halecium banzare* sp. nov. and *Hydrodendron arboreum*, each of which occurred at four stations, followed by *Halecium delicatulum*, recorded from three stations. All other species were recovered from only one or two stations.

Table 1. Station Records of Haleciidae

Station No.	Lat. South	Long. East	Depth m	Dredge type	Remarks in <i>Discovery's Log</i>
34	66° 21'	58° 50'	603	DRL	No information
40	66° 12'	49° 37'	300	TML	Good haul
41	65° 48'	53° 16'	209	TML	Abundant haul; heavy pack ice
88	67° 00'	142° 36'	4 - 13	DRS	Commonwealth Bay; among kelp
97	65° 10'	108° 12'	474	DRL	No information
98	65° 07'	107° 29'	502	DRL	No information
103	67° 03'	74° 29'	437	DRL	No information
105	67° 46'	67° 03'	163	DRL	Near glacier, MacRobertson Land
107	66° 45'	62° 03'	210	DRL	Adjacent to large Icebergs
1785 ¹	-	-	45	unknown	No information

Note 1: Station 1785 was occupied in Commonwealth Bay during the Australian Antarctic Expedition, 1911 - 1914. Station 88 was occupied at Cape Denison in Commonwealth Bay during the 1931 part of the BANZARE expedition.

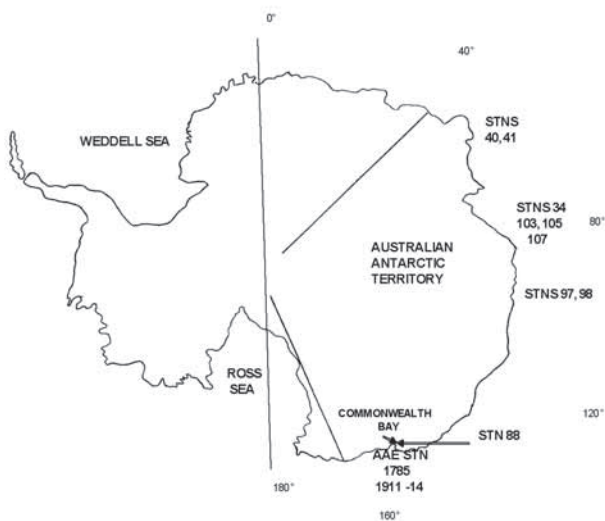


Figure 1. Map of the Antarctic showing BANZARE stations from which *Halecium* is recorded. station 1785, Commonwealth Bay, from the AAE 1911 - 1914 expedition.

Family Haleciidae Hincks, 1868

Thecate hydroids with shallow, saucer- or basin-shaped hydrothecae. Hydrotheca radially symmetrical, usually with diaphragm; margin entire, without operculum. Hydranth large and usually not completely retractable into hydrotheca, with conical hypostome and one cirlet of filiform tentacles. Nematophores present or absent. Gonophores in form of fixed sporosacs or rarely, freed as medusae.

Halecium antarcticum Vanhöffen, 1910

Figure 2A-C

Halecium antarcticum Vanhöffen, 1910: 317, fig. 34.- Billard, 1914: 7, fig. 5.- Totton, 1930: 144, fig. 4.- Broch, 1948, 28: 7.- Naumov and Stepanjants, 1958: 57.- Blanco, 1984: 294, figs 8-13, pls. 4-5.

Material examined. NMV F147447, Station 107, two microslides displaying branch fragments and a preserved fertile colony. NMV F147448, Station 107, one microslide displaying branch fragments. NMV F147449, Station 1785, one microslide displaying two small branch fragments.

Description. Fertile colony originally at least 40 mm high. Hydrorhiza reptant on sponge; stolons tubular, rugose, loosely adherent to substrate.

Shorter stems monosiphonic; stems beginning with several broad basal annulations above junction with hydrorhiza; taller stem branched, lightly fascicled with several wide, tangled tubes running almost to tip of colony and along primary branches. Branching irregular and disorderly, branches bent outwards at various angles from main stem, ultimate branches short, straight, monosiphonic. Monosiphonic branch internodes fairly wide, cylindrical, walls smooth, nodes deep, oblique, sloping away from hydrophore, a tumescence and often one or several deep corrugations in perisarc above node.

Primary hydrophores alternate on stem, one distal on each internode, cylindrical, length variable but typically moderately long, abcauline wall curving smoothly away from internode, adcauline wall more or less straight. Hydrotheca bowl-shaped, expanding from diaphragm to margin, rim everted and a little outrolled. Diaphragm fairly distinct, a few desmocytes above.

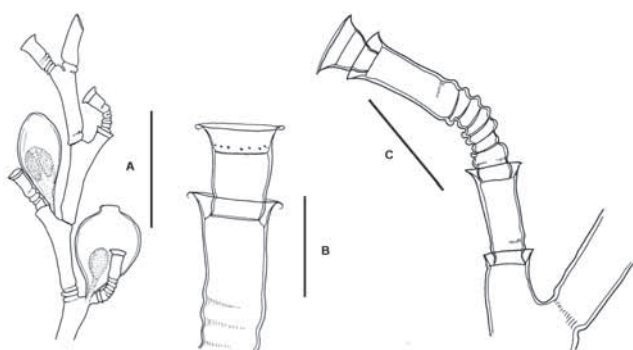


Figure 2. A - C. *Halecium antarcticum* from Station 107. A, fertile branch with well defined internodes and mature and developing gonothecae. B, hydrophores and hydrothecae with desmocytes. C, branch with linear regeneration of hydrophores. Scale bar: A, 2 mm; B, 0.3 mm; C, 0.5 mm.

Hydrophores typically regenerated in linear series of up to five; successive hydrophores variable in length, each arising from diaphragm of preceding hydrotheca; hydrophores with broad basal kinks and up to 10 close corrugations.

Gonothecae probably male, inserted in hydrophore on distal monosiphonic branches; shape variable from flattened clavate to ovoid with a low apical dome with flattened top.

Perisarc of stem, branches and hydrothecae rather thick, very thin on gonothecae.

Colour (preserved material) deep honey brown, paler on monosiphonic branches; gonotheca colourless.

Measurements (μm)

Branch internode	
length	419 – 514
width at node	176 – 216
Hydrophore	
length to diaphragm, adcauline wall	196 – 274
Hydrotheca	
depth, margin to diaphragm	71 – 87
diameter at margin	277 – 316
diameter at diaphragm	174 – 237
Gonotheca	
length	1,176 – 1,568
maximum width	882 – 910

Remarks. The taller stem is notable for its untidy habit of growth and thickening of the polysiphonic tubes at origin of the primary branches. Several short monosiphonic branches are incipiently anastomosed, two showing reversal of growth so that the hydrophores now face backwards towards the stem.

The gonothecal perisarc is very fragile, few being

undamaged, only two showing a flattened apex. As only the spadix and some tissue remains in most gonothecae, sex could not be determined.

As dimensions of the present material fit reasonably well with Vanhöffen's (1910) and Totton's (1930) descriptions of *Halecium antarcticum*, the material is assigned to this species.

Distribution. *Halecium antarcticum* is recorded from depths of 256 m in McMurdo Sound, 290 m in the Ross Sea and 385 m at Gauss Station.

Halecium banzare sp. nov.

Figure 3A-F

Holotype NMV F147450, Station 41, three microslides displaying branch fragments; also preserved male colony. **Paratypes** NMV F147451, Station 34, one microslide displaying one branch. NMV F147452, Station 107, one microslide displaying small branch fragment; preserved fragmented female stem or branch 70 mm long. NMV F147479, Station 107, one microslide displaying small branch fragment. NMV F147455, Station 107, two microslides displaying branch fragments; a small fragmented preserved colony. NMV F147479, one microslide displaying small branch fragment.

Diagnosis. Colonies originally 80 – 140 mm high, the tallest stem arising from a tufted hydrorhiza of thin, tangled, shining stolons. Stem thick, brittle, branched, heavily fascicled; polysiphonic tubes parallel, running almost to top of stem, along primary branches and along some secondary branches. Primary branches long, held out stiffly more or less in plane almost perpendicular to stem, succeeding branches in three or four orders; new branches given off from a hydrophore or from within a hydrotheca, typically long, monosiphonic, thin and flaccid with one to three deep basal annulations. Monosiphonic branch internodes moderately long, cylindrical, walls smooth, widening distally to hydrophore, nodes deeply indented, oblique to transverse, typically one or two constrictions above and below node.

Hydrophores alternate, distal on internode and directed outwards, projecting above level of node, walls cylindrical, smooth, abcauline wall often faintly bulging, adcauline wall slightly concave, often an internal thickening in perisarc about two thirds distance up wall, joining abcauline wall with a faint diagonal line in perisarc. Hydrotheca shallow, expanding a little from diaphragm to margin; rim circular, weakly everted. Diaphragm distinct, transverse, a row of desmocytes just above. Secondary hydrophores common, arising from diaphragm of hydrotheca, a transverse constriction in perisarc of secondary hydrophore just above rim of hydrotheca.

Gonothecae of both sexes inverted conical, compressed, borne prolifically on younger branches, inserted without distinct pedicel in wall of hydrophore or lower down on internode; male gonotheca with a minute apical peak (visible only in side view), female similar in shape to male, gonophore containing large scattered ova; gonophores of both sexes with an apical pad of tissue. No visible aperture in either sex.

Perisarc of fascicled stem and branches firm, thinner on monosiphonic branches, very thin on gonotheca.

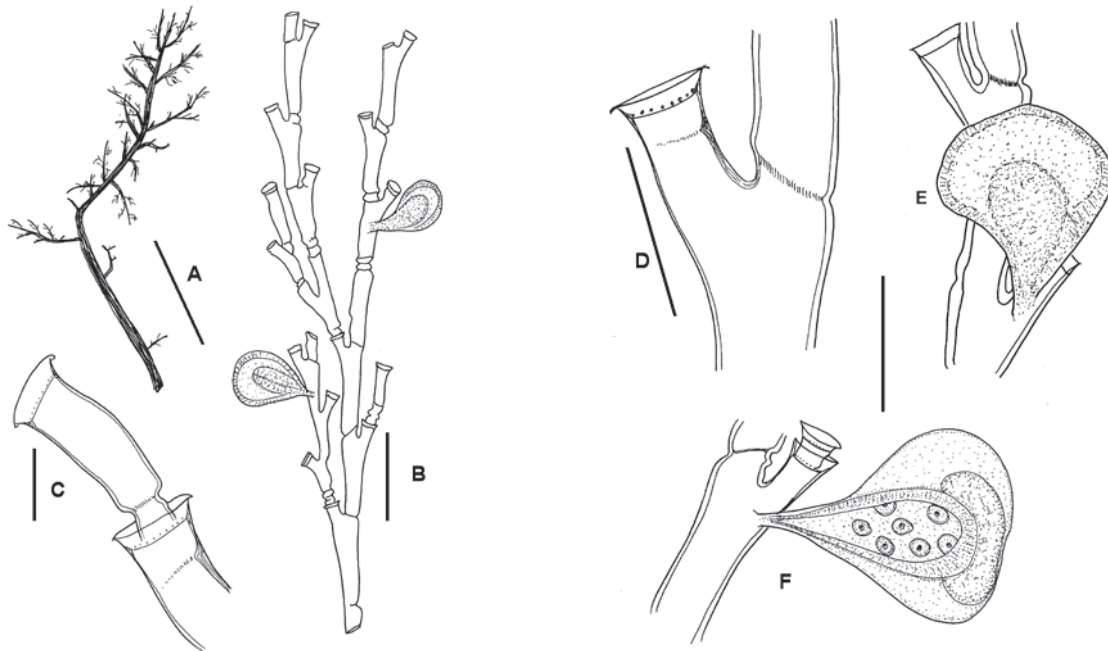


Figure 3. A - F. *Halecium banzare* sp. nov. A, branch from holotype. B, part of branch from holotype. C, D, hydrophores from paratype. E, male gonotheca from holotype. F, (NMVF 147452) female gonotheca. Scale bar: A, 50 mm. B, 1 mm. C, 0.3 mm. D-F, 0.5 mm.

Colour of lower stem pale honey-brown, becoming paler distally, apex of stem and monosiphonic branches colourless.

Measurements (μm)

Branch internode	
length	706 – 882
width at node	113 – 176
Hydrophore	
length of adcauline wall of primary to diaphragm	150 – 183
Hydrotheca	
depth, diaphragm to margin	39 – 47
diameter at rim	137 – 164
width at diaphragm	125 – 140
Gonotheca	
length	1,027
maximum width	948

Remarks. Although now much fragmented, the colonies were probably tall and sparsely branched, arising from a thick, matted hydrorhiza. Internal thickening of the perisarc is present in many hydrophores. The ova are scattered, not clustered around the spadix of the gonophore. Both sexes appear to be near maturity but as none of the gonothecae show any sign of an aperture it seems likely that reproductive material is released by rupture of the very thin perisarc.

The outwardly directed hydrophores and hydrothecae are structurally similar to those of *Halecium antarcticum* Vanhöffen (1910). However, according to Totton (1930), colonies of that species from McMurdo Sound were only 30 mm high, straggling, lightly fascicled, and with anastomoses, unlike the robust habit of *H. banzare*. A further important distinction is the much shallower hydrotheca in *H. banzare* which is only half as deep as that of *H. antarcticum*.

Etymology. The species name commemorates the BANZARE expedition.

***Halecium brevithecum* sp. nov.**

Figure 4A-C

Holotype NMV F147457, Station 41, one microslide displaying three branch fragments. *Paratypes*, NMV F147458, Station 40, one microslide displaying two branch fragments. NMV F147478, Station 98, one microslide displaying one branch fragment; some preserved material.

Diagnosis. Infertile stem or branch fragments of a presumably larger colony. Stem (branch) fascicled, polysiphonic tubes varying from knotted to parallel. Branching irregular, ultimate branches monosiphonic, given off from side of a hydrophore; branches beginning with three to five deeply indented transverse nodes, internodes thereafter moderately long, walls smooth, abaxial wall expanding smoothly into hydrophore; nodes transverse to weakly oblique, deeply incised into perisarc, a faint tumescence in internode above and below node.

Hydrophores indistinct, adcaudal wall adnate to internode, becoming free (although this scarcely visible) just below hydrotheca. Hydrotheca distal on internode, adcaudal wall adnate to internode; margin tilted at an obtuse angle away from internode; hydrotheca very shallow, expanding imperceptibly to rim; rim not quite reaching node, walls of hydrotheca thin; diaphragm transverse, strong. No marginal replications or linear series of hydrophores.

Gonotheca absent.

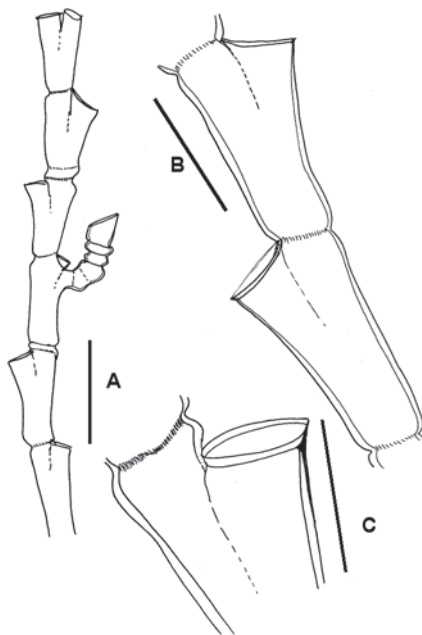


Figure 4. A - C. *Halecium brevithecum* sp. nov. Holotype. A, branch. B, branch internodes. C, hydrophore and shallow hydrotheca. Scale bar: A, 1 mm, B, 0.5 mm. C, 0.3 mm.

Measurements (μm)

Monosiphonic branch internode	
length	520 - 800
width at node	200 - 240
Hydrophore, length	220 - 240
Hydrotheca	
diameter at margin	220 - 240
depth, diaphragm to margin	20 - 32

Remarks. Unfortunately the material is meagre and infertile and the permanently mounted specimens poorly displayed. The species is remarkable for the shallowness of the hydrotheca which provides minimal support for the hydranth. There is indication of desmocytes above the diaphragm but the interior of most hydrothecae is obscured by tissue and adventitious material. There is an indication of incipient anastomosing of the ultimate branches.

Species with very shallow adnate hydrothecae considered were: *Halecium beanii* (Johnston, 1838), *Halecium sessile* Norman, 1866, *Halecium ralphae* Watson and Vervoort, 2001 and *Halecium* sp. 1 Vervoort and Watson, 2003. The diameter of the hydrotheca of *Halecium brevithecum* is, however, greater than in these species.

Etymology. The species is named for the remarkably short hydrotheca.

Halecium delicatulum Coughtrey, 1876

Figure 5A-B

Halecium delicatulum Coughtrey, 1876a: 299.- Coughtrey 1876b: 26, pl. 3, figs 4-5.- Stechow, 1913a: 144.- Stechow, 1913b: 9, 79.- Stechow, 1923b: 5.- Bale, 1924: 235.- Ralph, 1958: 334, figs 11e, h-n, 12 a-p.- Pennycuik, 1959: 173.- Yamada, 1959: 31.- Leloup, 1960: 218, fig. 1.- Naumov and Stepanjants, 1962: 94, figs 16-17.- Rees and Thursfield, 1965: 106.- Millard, 1966a: 464, fig. 10L.- Ralph, 1966: 158.- Blanco, 1968: 203, pl. 1, figs 14-18, pl. 2, figs 1-3.- Millard, 1968: 253, 256.- Day *et al.*, 1970: 12.- Patrity, 1970: 23, fig. 21.- Blanco and Bellusci de Miralles, 1972: 7, figs 3-5.- Naumov and Stepanjants, 1972: 34, 52.- Stepanjants, 1972: 72.- Vervoort, 1972a: 27, figs 4-5.- Vervoort, 1972b: 341, fig. 2a.- Morton and Miller, 1973: 152, fig. 54.10.- Watson, 1973: 166.- Leloup, 1974: 10.- Millard, 1975: 145, fig. 47F-L.- Watson, 1975: 159.- Gordon and Ballantine, 1977: 100.- Millard, 1977a: 7, fig. 1C-D.- Stepanjants, 1979: 105, pl. 20, fig. 4A-V.- Watson, 1979: 234.- Hirohito, 1983: 5, 11.- Rho and Park, 1983: 41, pl. 2, figs 1-3.- Blanco, 1984c: 262, figs 1-6.- Blanco 1984d: 271, figs 3-5.- Rees and Vervoort, 1987: 25, fig. 5.- Staples and Watson, 1987: 218.- Ramil, Blanco and Iglesias Diaz, 1988: 72, fig. 2.- Gili *et al.*, 1989: 78, fig. 7B.- Altuna and García Carrascosa, 1990: 54 *et seq.*- Genzano, 1990: 38, figs 2-5.- El Beshbeeshy, 1991: 32, figs 4a, 4b.- Park, 1991: 544.- Roca *et al.*, 1991: 70.- Genzano and Zamponi, 1992: 40, fig. 17.- Park, 1992: 286.- Ramil and Vervoort, 1992a: 82, fig. 20a-c.- Branch and Williams, 1993: 11.- Watson, 1994a: 66.- Altuna Prados, 1995: 54.- Bouillon *et al.*, 1995: 45.- Hirohito, 1995: 20, text-fig. 5a-c, pl. 1, fig. C.- Park, 1995: 10.- Genzano, 1996a: 290 *et seq.*- Medel and Vervoort, 2000: 12 (*cum syn.*)- Vervoort and Watson, 2003: 88, fig.16 A-E.

Halecium flexile Allman, 1888: 11, pl. 5, figs 2, 2a.

Halecium gracile Bale, 1888: 759, pl. 14, figs 1–3 (not *Halecium gracile* Verrill, 1873: 729).

Halecium parvulum Bale, 1888: 760, pl. 14, figs 4–5.

Material examined. NMV F147459, Station 97, one microslide displaying a branch fragment; some preserved material. NMV F147460 Station 98, one microslide displaying two branches. NMV F147461, Station 103, eleven microslides displaying branches from male colony; some preserved material. NMV F14762, Station 107, one microslide displaying a branch. NMV F147477, two microslides displaying branch fragments.

Description. Stems to 10 mm long, taller stems fascicled, arising from tangled tubular hydrorhizal stolons. Younger stems monosiphonic, flexuous. Basal cauline internodes with several deep proximal corrugations, internodes thereafter smoother, long, cylindrical, tending to become sympodial in older stems; nodes distinct, oblique to transverse, one to three shallow annulations in perisarc above and below node. Hydrophores alternate, one distal on each primary cauline internode sloping outwards from node, contiguous with direction of internode; hydrophores variable in length, walls cylindrical, smooth; branches when present, given off from below primary hydrophore.

Hydrothecae moderately deep, walls outwardly curved, margin circular, wide, rim strongly outrolled; margins not replicated. Diaphragm distinct, transverse to shallow funnel-shaped, usually a distinct row of desmocytes above.

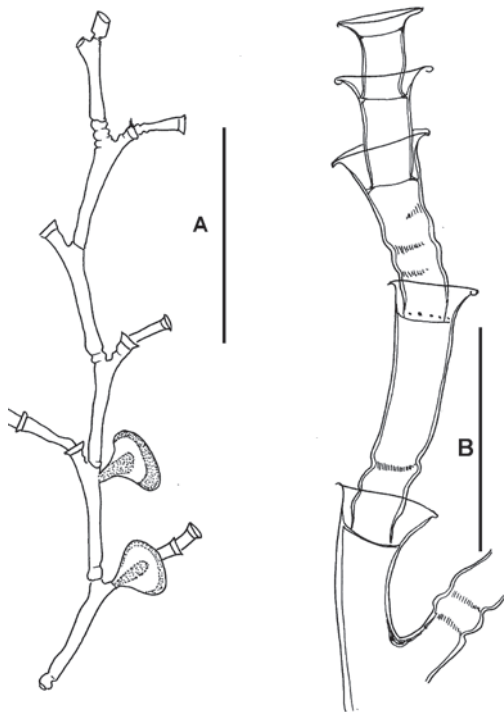


Figure 5. A - B. *Halecium delicatulum*. A, fertile branch with developing gonothecae. B, hydrophores in linear series. Scale bar: A, 2 mm. B, 0.3 mm.

Hydrophores arising up to five linear in series; variable in length, each arising from diaphragm of preceding hydrotheca, typically becoming shorter along the series; proximal walls of younger hydrophores often weakly undulated.

Colonies dioecious; gonotheca inserted without distinct pedicel in internode or hydrophore; immature gonothecae of both sexes balloon-shaped, compressed, developing gonophores in all samples immature, surmounted by an apical pad of tissue.

Hydranth with c. 24 tentacles.

Perisarc of stems moderately thick, thinner on gonothecae.

Measurements (μm)

Internode	
length	941 – 1,078
width at node	74 – 111
Hydrophore	
length (abcauline) of primary	198 – 988
length of succeeding hydrophores	78 – 387
Hydrotheca	
depth, margin to diaphragm	43 – 82
diameter at margin	179 – 211
diameter of diaphragm	94 – 129
Gonotheca	
Length	537 – 672
Apical (maximum) width	435 – 577

Remarks. The gonophores in most samples are immature, those on only one stem showing developing ova.

Distribution. Circumglobal in tropical, subtropical, and boreal waters. Recorded at all depths to 2,250 m. It is sometimes considered conspecific with *Halecium antarcticum* Vanhöffen, 1910, and with *H. mediterraneum* Weismann, 1883, the former reported from isolated Antarctic localities and the latter from many Mediterranean Sea localities (Vervoort and Watson 2003). Such wide latitudinal and bathymetric distribution may indicate that several morphologically similar species are possibly lumped together as *H. delicatulum*.

Halecium elegantulum sp. nov.

Figure 6A-C

Holotype NMV F147463, Station 103, two microslides displaying several infertile stems. **Paratypes** NMV F147464, Station 103, two microslides displaying stems. NMV F147476, Station 103, one microslide displaying a small colony. All material probably from same colony on sertulariid hydroid.

Diagnosis. Stems arising from a creeping hydrorhiza; stolons tubular, smooth to crumpled. Hydrocaulus minute, variable in length, simple, unbranched, walls cylindrical, narrow, smooth, without nodes but with occasional shallow constrictions

marking zones of regrowth after breakage. Hydrocaulus with either a single terminal hydrotheca or a linear series of up to six hydrophores each arising from diaphragm of preceding hydrotheca; base of hydrophore swollen above supporting diaphragm.

Hydrotheca moderately deep, trumpet-shaped, expanding strongly from diaphragm to margin; rim circular, weakly outrolled; no replication of margin. Diaphragm delicate, transverse to concave, no desmocytes visible.

Perisarc thickest in proximal stem region, thinning distally; very thin on hydrotheca.

Gonotheca absent.

Measurements (μm)

Hydrocaulus	
length overall	1,764 – 4,840
length of basal segment to node	1,372 – 4,840
length of succeeding hydrophores	95 – 593
diameter of hydrophore	43 – 70
Hydrotheca	
diameter at diaphragm	59 – 78
depth rim to diaphragm	20 – 28
diameter at margin	113 – 117

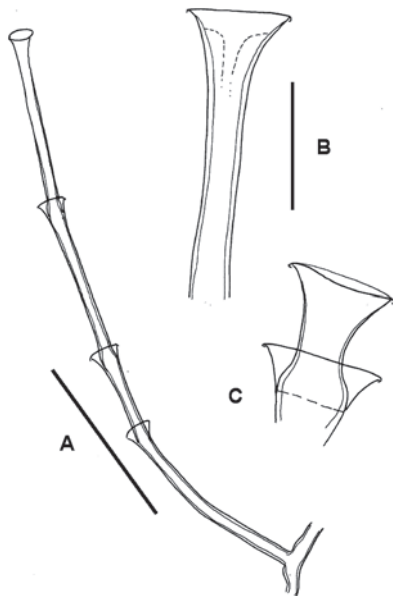


Figure 6. A - C. *Halecium elegantulum* sp. nov. NMV F147463, holotype. A, whole stem. B, hydrophore. C, replicated hydrothecae. Scale bar: A, 0.5 mm. B, C, 0.1 mm.

Remarks. As there are few clearly visible diaphragms and concave pseudo-diaphragms are visible in some hydrothecae. In most instances the depth from rim to diaphragm has been estimated as the distance from the base of secondary hydrophores to the rim of the supporting hydrotheca.

The few remaining hydranths are too decomposed for description but seem to have been very long and extensile. No desmocytes were seen but the interior of most hydrothecae is obscured by adventitious matter.

Two small, closely related species were considered: *Halecium tenellum* Hincks, 1861 and *Halecium fragile* Hodgson, 1950. Although most measurements of *Halecium elegantulum* fall within the range given by Cornelius (1995) for *H. tenellum* from the North Atlantic and by Watson (2003) for *H. tenellum* from the subantarctic, both of these species are branched whereas all material of *H. elegantulum* is unbranched showing no evidence of branching. Furthermore, the hydrotheca of *H. elegantulum* is elongated, not shallow as in *H. fragile*.

Etymology. The name refers to the elegantly simple hydrocaulus.

Halecium interpolatum Ritchie, 1907

Figure 7A, B

Halecium interpolatum Ritchie, 1907: 526, pl. 1, fig 3, pl. 2, fig. 3.- Rees and Thursfield, 1965: 107, 197.- Smaldon *et al.*, 1976: 17.- Stepanjants, 1979: 103, pl. 16, fig. 7.- Blanco, 1994a:156.- Blanco, 1994b: 186.

Material examined. NMV F147466, Station 88, two microslides displaying small branch fragments; a preserved male colony.

Description. Colonies branched, reaching a height of 30 mm. Hydrotheca a mass of corrugated tubular stolons. Stems fascicled, lower stem region a loose aggregation of, stolons becoming polysiphonic tubes, passing along lower branches to mid-region of colony; stems thereafter profusely and irregularly branched.

Younger branches monosiphonic, typically a single branch given off from a geniculation of hydrophore below a hydrotheca, sometimes a second branch given off on opposite side of hydrophore; branches rugose to deeply corrugated and jointed but lacking true nodes; joints transverse to weakly oblique. Hydrophores variable in length, often corrugated, typically a short more or less smooth segment below hydrotheca.

Hydrotheca deep bowl-shaped, expanding strongly from diaphragm to margin; margin circular, rim strongly outrolled. Diaphragm distinct, some secondary and succeeding hydrophores arising in a linear series from diaphragm of preceding hydrotheca; hydrophores fairly short, typically deeply corrugated.

Hydranths with c. 20 – 24 rather stubby tentacles, not well preserved.

Male gonotheca ovoid to balloon-shaped, flattened, inserted on a very short narrow pedicel in an axil or in a hydrotheca, a minute apical protuberance visible in some gonothecae. Gonophores near maturity, almost filling cavity of gonotheca.

Perisarc of stems and branches very thick, thinner on hydrotheca and gonotheca.

Colour (preserved material), pale honey brown, youngest branches yellowish, gonophores darker brown.

Measurements (μm)

Branch	
distance between hydrothecae on branch	745 – 1470
width of smooth section of branch	134 – 158
Hydrotheca	
diameter at diaphragm	134 – 150
diameter at margin	269 – 300
depth, margin to diaphragm	95 – 134
Gonotheca	
length, including pedicel	869 – 909
maximum width	474 – 553

Remarks. Ritchie's material of *H. interpolatum* was infertile, his description was general and lacked important dimensions.

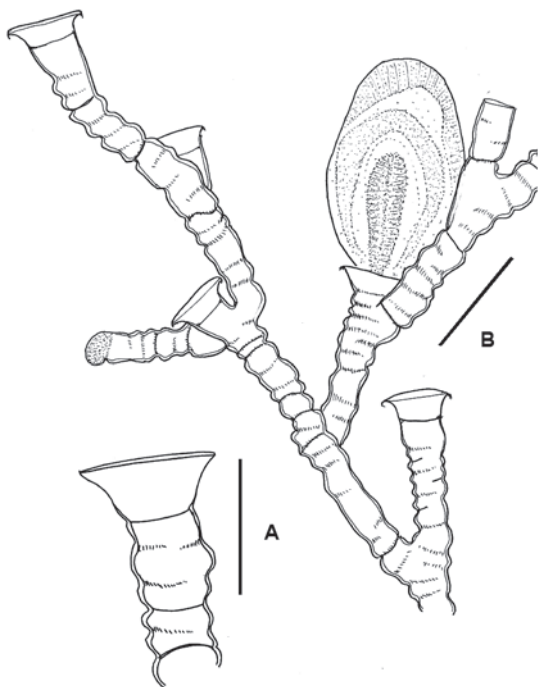


Figure 7. A, B. *Halecium interpolatum*. A, fertile monosiphonic branch with nearly mature male gonotheca. B, hydrotheca. Scale bar: A, 0.3 mm. B, 0.5 mm.

In many respects the present material falls within the range of dimensions of *H. ovatum* Totton, 1930 and measurements deduced from Ritchie's description. Although the hydrocauli of the two species are superficially alike, the ovoid to quadrangular gonotheca of *H. ovatum* is considerably smaller than the lenticular gonotheca of *H. interpolatum*. I therefore assign the present material to *H. interpolatum*.

Distribution. South Orkneys. This is the first record of the species from Antarctica.

***Halecium ovatum* Totton, 1930**

Figure 8A, B

Halecium ovatum Totton, 1930: 143, fig. 3.- Vervoort, 1972: 339, fig. 1.- Stepanjants, 1979: 103, pl. 20 fig. 1a-g.- Peña Cantero, 1991: 48, pl. 2, figs g-h.- Blanco, 1994: 160: 156.- Blanco, 1994: 187.- Peña Cantero and García Carrascosa, 1996: 12, fig. 2G-H.- Peña Cantero and García Carrascosa, 1999: 63: 212 *et seq.*- Watson, 2003: 166, fig. 15 D,E.- Vervoort and Watson, 2003: 86.

Notes and supplementary description from holotype. To establish the identity of *Halecium interpolatum* it became necessary to examine type material of *Halecium ovatum*. Although Totton provided an adequate description and dimensions of *Halecium ovatum* his figures were poor, and the gonotheca was not figured. I have compared the BANZARE material with the holotype (alcohol-preserved colony) and four paratype microslide preparations of *Halecium ovatum* loaned by the Natural History Museum, London. A brief supplementary description of the important diagnostic characters from the holotype (glycerol-mounted) of *Halecium ovatum* is given.

The holotype colony (BMNH No.29.10.10.1) comprises a dense tuft of long and short stems growing on another hydroid. Hydrocauli arise from a tangled adherent meshwork of tubular stolons entwined with hydrorhizae of the other hydroid.

Shorter stems monosiphonic, taller stems fascicled with up to 10 polysiphonic tubes; stems arborescently branched in all directions up to two thirds of their length, ultimate branches monosiphonic.

Mature female gonothecae small, borne abundantly on all but distalmost branches, inserted on a short pedicel in a hydrotheca typically situated in a fork between two or three branches but hydrotheca often overgrown by polysiphonic tubes; body of gonotheca ovoid to subquadrangular with a very thin, smooth perisarc; aperture terminal, small, circular, surrounded by a very low fragile collar; immature gonotheca kidney-shaped as described by Totton.

Nematocysts in tentacles undischarged ?anisorhizas capsule oval, 11–12 x 6–7 μm .

Measurements (μm) of gonotheca of *Halecium ovatum*

Length of pedicel of gonotheca	80
Length of gonotheca	784 – 1176
Width of gonotheca	588 – 901
Diameter of orifice	80

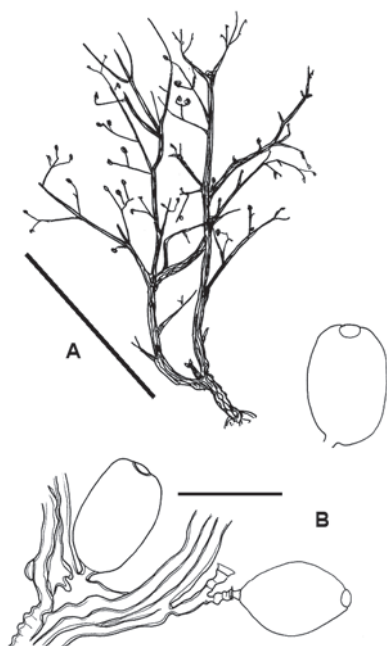


Figure 8. A, B. *Halecium ovatum*, holotype colony, BMNH Reg. No. 29.10.10.1. A, part of stem. B, empty female ovoid and subquadrangular gonothecae. Scale bar: A, 10 mm. B, 1 mm.

Halecium macrocaulus sp. nov.

Figure 9A-F

Holotype NMV F147467, Station 107, one microslide displaying a branch; also a large preserved fragmented colony. *Paratypes* NMV F147468, Station 107, one microslide displaying two branch fragments. NMV F147469, Station 107, two microslides displaying branch fragments.

Diagnosis. Thickest fragments (stem or major branches) 6 mm wide at base and 200 mm long; branching profuse and irregular, originally all around stem. Stem and branches heavily fascicled by numerous thin, almost parallel tubes; tubes becoming fewer on younger branches, ultimate branches (hydrocladia) monosiphonic; several monosiphonic branches also given off from lower fascicled stem region. Branching sub-dichotomous, forks arising from within a hydrotheca; base of branch typically heavily corrugated, walls becoming smooth distally.

Ultimate branches straight, flaccid, internodes fairly short, walls smooth, nodes oblique, tilted away from hydrotheca, wall of internode expanding distally to accommodate hydrophore; hydrophore short, cylindrical, very close but not adnate to internode.

Hydrotheca shallow, adcauline wall closely adpressed to internode; walls expanding only slightly from diaphragm to margin; rim circular, tilted at 50 – 55° to axis of internode, very weakly everted. Diaphragm distinct, a row of minute thorn-shaped desmocytes closely above; a septum (false

diaphragm) of perisarc passing diagonally through hydrophore from near junction of diaphragm with abcauline wall to adcauline wall.

Hydranths large with c. 24 tentacles, poorly preserved.

Secondary hydrophores rare but when present, arising from diaphragm of hydrotheca; hydrophore typically becoming a new branch beginning with two to four deep irregular twists, increasing in number with age to 10 deep corrugations.

Gonothecae abundant on monosiphonic branches, inserted without distinct pedicel on hydrophore or in hydrotheca; gonotheca sub-ovoid to almost triangular, strongly compressed, apex with minute twin peaks and no apparent aperture; gonophore oval, with clearly defined central spadix and apical pad of tissue armed with an array of large nematocysts.

Nematocysts of two morphological categories, none discharged:

- large bean-shaped isorhizas, 19-24 x 7-9 μm , abundant in apical pad of gonophore and throughout coenosarc of branches.
- leaf-shaped nematocysts (category indeterminate) in tentacles, 8 x 2 μm .

Perisarc of hydrocladia, hydrothecae and gonothecae very thin; thicker and robust in older parts of colony.

Colour of thickest branches (preserved material) dark brown fading to honey brown in younger parts, monosiphonic branches pale creamy white to transparent, gonophores brown.

Measurements (μm)

Monosiphonic branch	
length of apophysis, abcauline side	237 – 395
length of proximal (corrugated) internode	882 – 1,568
length of succeeding (hydrophorate) internodes	703 – 798
width at node	182 – 237
Hydrotheca	
diameter at diaphragm	198 – 221
depth, margin to diaphragm	59 – 66
diameter at margin	215 – 254
Gonotheca	
length overall	882 – 1,431
maximum width	588 – 1,078

Remarks. It is uncertain whether the material originally consisted of a large colony, now broken, or several smaller colonies. Despite the apparent robustness of the colony the hydrocladial perisarc is very thin, possibly having deteriorated during preservation.

The adcauline wall of the hydrotheca is so closely adpressed to the internode that the gap is only obvious on close

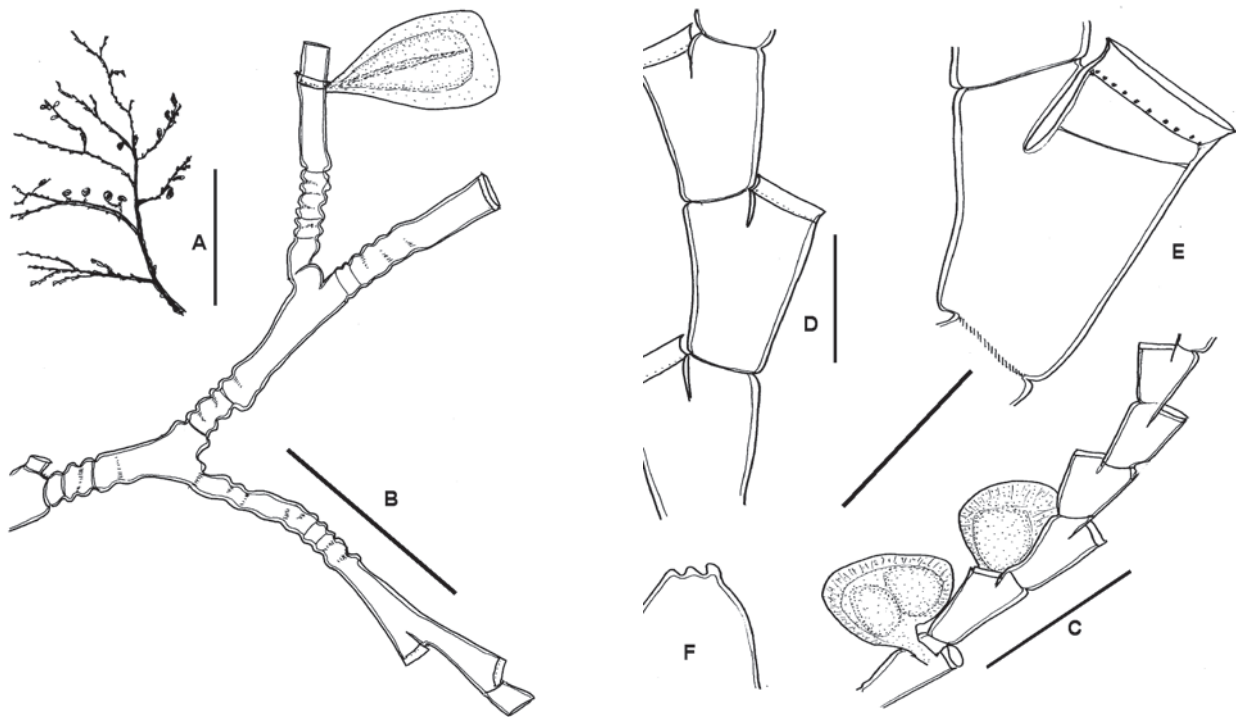


Figure 9. A – F. *Halecium macrocaulus* sp. nov. from holotype and paratype. A. fertile branch. B. monosiphonic part of branch with gonotheca. C, D. branch internodes. E, hydrotheca with false diaphragm and desmocytes. F, view of gonotheca showing apical protuberances. Scale bar: A, 15 mm. B, 2 mm. C, D, 0.5 mm. E, F. 0.3 mm.

examination. A diagonal septum (false diaphragm) below the transverse diaphragm occurs in many hydrothecae; it is usually obscured by tissue and visible only in cleared mounts. The desmocytes are also difficult to see, being very small and set close to the diaphragm. No replication of hydrothecae was found.

The numerous gonothecae are quite small compared with the size of the colonies. The gonophore almost fills the gonotheca, suggesting near-maturity. As there is no evidence of an aperture, the contents are probably released by rupture of the very thin perisarc. The nematocysts are abundant in the apical pad above the gonophore and in the coenosarc of the colony; they are very large and visible even at low magnification.

Large arborescent species of *Halecium* with closely adpressed hydrophores considered were: *Halecium beanii* (Johnston, 1838), *Halecium halecinum* (Linnaeus, 1758), *Halecium sessile* Norman, 1867 and *Halecium jaederholmi* Vervoort, 1972. *H. beanii* was rejected because the colonies and hydrothecal dimensions are smaller than those of *Halecium macrocaulus*; *H. halecinum* and *H. sessile* were discounted because of differences in colony morphology. Vervoort's (1972) description of *H. jaederholmi* is of a much smaller species with completely adnate and deeper hydrothecae.

Etymology. The species is named for the large size of the colony.

Halecium tubatum sp. nov.

Figure 10A, B

Holotype, NMV F147470, Station 105, three microslides displaying several stems. *Paratypes* NMV F147471, Station 105, four microslides displaying colony. NMV F147472, one microslide displaying colony. NMV F 147477, Station 98, one microslide displaying colony. NMV F147480, Station 90, one microslide displaying colony. NMV F147481, Station 107, one microslide displaying colony.

Diagnosis. Hydrorhiza reptant on hydroid host, stolons thin, tubular, rugose to smooth. Hydrocauli fragile, variable in length, to 4 mm, unbranched; hydrocaulus above hydrorhiza weakly rugose or with up to four deep annulations; hydrocaulus (pedicel) thereafter cylindrical, straight or weakly curved, walls smooth.

Pedicel bearing a single terminal hydrotheca; hydrotheca wide, bowl-shaped, walls flaring markedly from diaphragm to rim; rim circular, smooth, strongly outrolled, a row of desmocytes about halfway between diaphragm and rim. A few secondary and succeeding hydrophores in linear row from

diaphragm of hydrothecae; hydrophores widening to hydrotheca, a tumescence in perisarc above base.

Hydranths too few and too poorly preserved for description but possibly c. 20 tentacles.

Perisarc moderately thin throughout.

Gonotheca absent.

Measurements (µm)

Hydrorhiza	
width	72 – 82
Hydrocaulus	
length	900 – 2,200
diameter	68 – 80
Hydrotheca	
depth, margin to diaphragm	80 – 88
diameter at diaphragm	72 – 92
diameter at rim	220 – 300

Remarks. Although the sample is infertile, and most of the microslide preparations heavily stained green, *Halecium tubatum* can nevertheless be seen to differ widely from all other known species of *Halecium*. It somewhat resembles

Halecium tenellum Hincks, 1861 but that species is branched and the critical dimensions of the hydrotheca given by authors (Ritchie 1907, Cornelius 1995, Vervoort 1966, Millard 1975) are much smaller than those of *H. tubatum*.

Etymology. The species is named for the trumpet-like hydrotheca

Hydrodendron arboreum (Allman, 1888)

Figure 11A–C

Halecium robustum Allman, 1888: 10, pl. 4, figs 1-3.- Stranks, 1993: 7.

Halecium arboreum Allman, 1888: 89 (= *Halecium robustum*).

Hydrodendron arboreum - Rees and Vervoort, 1987: 20. - Vervoort, 1987: 88, fig. 10.2.- Peña Cantero, 1991: 50, pl. 2, figs a-f, pl. 63, fig. a.- Branch and Williams, 1993: 11, fig. - Peña Cantero and García Carrascosa, 1996: 13, figs 2A-F, 63E.- Peña Cantero and García Carrascosa, 1999: 212 *et seq.*

Hydrodendron arborea - Rees and Thursfield, 1965: 110.- Millard, 1977: 11, fig. 2E-G.

Ophiodissa arborea - Stechow, 1923a: 5.- Stechow, 1923b: 92.- Totton, 1930: 142, fig. 2a.- Briggs, 1939: 11.- Yamada, 1959: 35.- Vervoort, 1972: 25.- Blanco, 1994a: 156. - Blanco, 1994b: 188.

Ophiodes arboreus - Ritchie, 1913: 10, 15, figs 2-3.- Stechow, 1913a: 144. - Stechow, 1913b: 9, 87.- Billard, 1914: 8.- Jäderholm, 1919: 6, pl. 1, fig. 6. - Stepanjants, 1979: 110, pl. 21, fig. 1A-V. - Naumov, 1956: 464, 647.

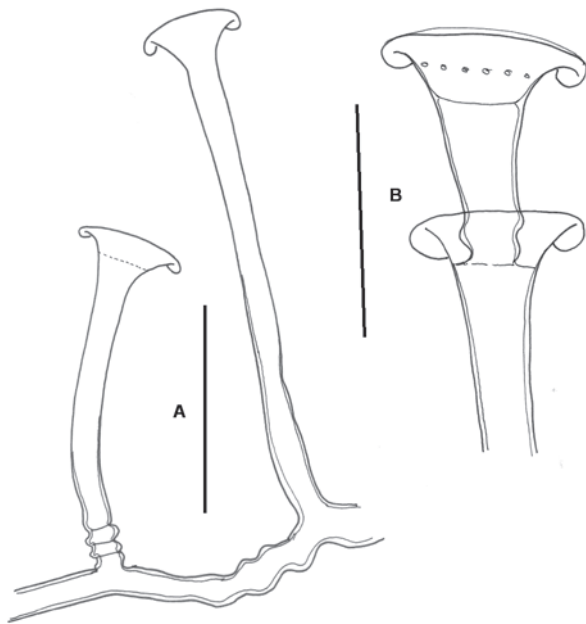


Figure 10. A, B. *Halecium tubatum*. A, hydrorhiza and two hydrothecae from holotype. B, hydrothecae enlarged. Scale bar: A, 0.5 mm. B, 0.3 mm.

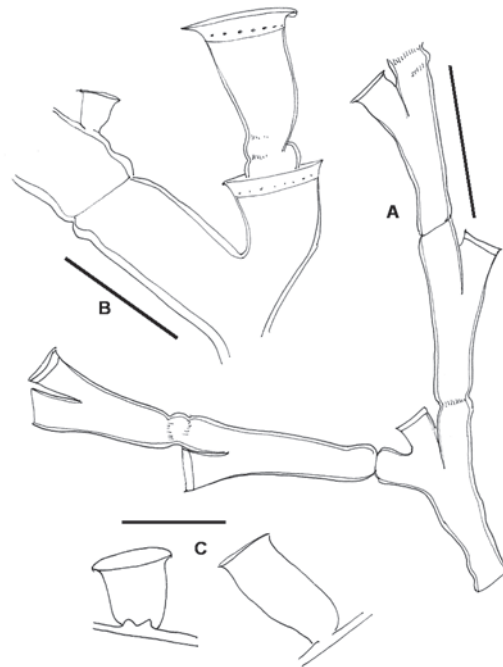


Figure 11. A – C. *Hydrodendron arboreum*. A, monosiphonic branch. B, hydrophores and nematotheca on branch. C, nematothecae. Scale bar: A, 1 mm. B, 0.5 mm. C, 0.3 mm.

Material examined. NMV F147474, Station 105, five microslides displaying branch fragments; some preserved infertile fragments. NMV F147475, Station 107, one microslide of two branch fragments; some preserved fragmental material.

Description. Hydrorhiza a tangle of thin, tubular, rugose stolons Stem (or branch) fragments 10 - 20 mm long, thick and woody, irregularly fascicled; ultimate branches monosiphonic; each new branch arising from side of a hydrophore; basal internode of some branches very long with several proximal constrictions, succeeding branch Internodes moderately long but variable, walls smooth, increasing slightly in diameter distally to hydrophore, nodes oblique to transverse, sloping away from hydrotheca, varying from a deep septum to a mere narrowing in perisarc, a tumescence above and often below node; longer internodes often with several weak proximal twists.

Hydrophores alternate, one on internode about two thirds distance up internode, length variable, hydrophore typically curving outwards at variable angles from internode, diameter about same internode; adnate to internode by a thick web of perisarc for three quarters of length then becoming free below hydrotheca; free part of hydrophore cylindrical, adcauline wall weakly convex, abcauline wall straight to weakly concave; hydrophores typically in linear series, each arising from diaphragm of preceding hydrotheca.

Hydrotheca shallow saucer-shaped, expanding from diaphragm to margin; margin circular, rim everted in a flange; diaphragm transverse, strong, a row of desmocytes above; occasional replications of margin.

Nematophores sparse, randomly scattered on internodes, small, goblet-shaped with outrolled rim.

Perisarc of branches thick, thinner and fragile on younger hydrophores and hydrotheca.

Colour (preserved material) of older stems honey brown, younger branches pale yellowish to colourless.

Measurements (μm)

Internode	
length	1,078 – 1,960
width at node	237 – 277
Hydrophore	
length of primary (adcauline wall to base of hydrotheca)	363 – 560
length of succeeding hydrophores	300 – 711
Hydrotheca	
depth, margin to diaphragm	79 – 81
diameter at margin	300 – 387
diameter of diaphragm	253 – 300
Nematophore	
length	195
Diameter of margin	137

Remarks. Many hydrothecae are damaged and reduced to a short collar just above the diaphragm. The few undamaged nematophores confirm the identity of the material as *Hydrodendron arboreum* Allman (1888). Allman (1888) and Totton (1930) describe large colonies to 25 cm high; the present fragmentary material may be branches of a similarly large colony.

Distribution. Exclusively Antarctic – Kerguelens, 192 m, McMurdo Sound 18–550 m, Gauss Station, Palmer Archipelago 92 m and Commonwealth Bay 100 – 545 m.

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