

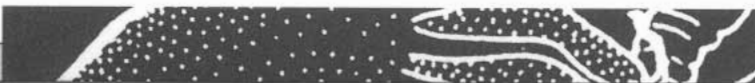
319

# Zoologische Verhandelingen

**D.R. Calder & W. Vervoort**

Some hydroids (Cnidaria: Hydrozoa) from the  
Mid-Atlantic Ridge, in the North Atlantic Ocean

April 1998



nationaal  
natuurhistorisch  
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of natural history

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Leiden: Nationaal Natuurhistorisch Museum.

Zoologische Verhandelingen ISSN 0024-1652; no. 319.

ill., ref. - ISBN 90-73239-64-8.

Subject headings: Cnidaria; Hydrozoa; Hydroida; Mid-Atlantic Ridge; deep water fauna; hydrothermalism.

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# Some hydroids (Cnidaria: Hydrozoa) from the Mid-Atlantic Ridge, in the North Atlantic Ocean

D.R. Calder & W. Vervoort

Calder, D.R. & W. Vervoort. Some hydroids (Cnidaria: Hydrozoa) from the Mid-Atlantic Ridge, in the North Atlantic Ocean.

Zool. Verh. Leiden 319, 29.iv.1998: 1-65, figs 1-25.— ISSN 0024-1652/ISBN 90-73239-64-8.

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**Key words:** Cnidaria; Hydrozoa; Hydroida; Mid-Atlantic Ridge; deep water fauna; hydrothermalism. An account is given of some hydroids from the Mid-Atlantic Ridge, collected during dives of submersibles "Nautilite" (operated by IFREMER, France) and "Alvin" (operated by Woods Hole Oceanographic Institution, U.S.A). The specimens came from three main sectors of the ridge: 15 species from localities near hydrothermal fields (540-1727 m) SW of the Azores, five species from an area (2565-3902 m) west of the Cape Verde Islands near Researcher Ridge, and one species from a site (4529-4578 m) within the Vema Fracture zone west of Guinea Bissau. In all, 21 species were distinguished, comprising two anthoathecates and 19 leptothecates. The families Lafoeidae and Sertulariidae were best represented, with six and four species respectively. *Halecium profundum* spec. nov., from the vicinity of Researcher Ridge, and *Zygophylax echinata* spec. nov., from the Menez Gwen hydrothermal field area south-west of the Azores, are described. *Cladocarpus cartieri* was discovered, for just the second time, at another station near the Menez Gwen field. The fauna was comprised largely of deep-water species. However, some eurybathic boreal species frequent in the neritic zone (e.g. *Grammaria abietina*, *Diphasia margareta*, *Sertularella tenella*, *Nemertesia antennina*, *N. ramosa*) were represented at certain stations near the Azores. Also present at one of these stations was the typically shallow-water boreal athecate, *Ectopleura larynx*. Six of the species (*Eudendrium planum*, *Halecium profundum*, spec. nov., *Acryptolaria longitheca*, *Cryptolarella abyssicola*, *Zygophylax levinseni*, and ?*Opercularella* spec.) were recorded from depths of 3000 m or more. The only species in samples from depths exceeding 4000 m was *Cryptolarella abyssicola*. None of the species is known to have a medusa stage in its life cycle.

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## Introduction

The Mid-Atlantic Ridge constitutes an immense potential habitat in the deep-sea for predominantly epifaunal and generally opportunistic benthic invertebrates, such as hydroids. However, most currently known species of hydroids are neritic or upper bathyal in distribution (e.g., see Fraser, 1944; Naumov, 1960; Millard, 1975; Cornelius, 1995a, b), and the diversity of these cnidarians seems to be low in profundal regions (Kramp, 1951, 1956; Vervoort, 1966, 1972, 1985; Gage & Tyler, 1991; Calder, 1996, 1997).

Information exists on hydroids of several oceanic islands along or near the Mid-Atlantic Ridge range within the North Atlantic Ocean, including Iceland (summarized by Kramp, 1938) and the Azores (summarized by Rees & White, 1966; Cornelius, 1992a). However, virtually nothing is known about the occurrence or diversity of these cnidarians on the ridge itself except for an account of two species of *Candela-brum* (*C. phrygium* and *C. serpentarii*) by Segonzac & Vervoort (1995).

New information is provided here on some hydroid species collected from the Mid-Atlantic Ridge. The specimens available for study were acquired by the Centre de Tri d'Océanographie Biologique (CENTOB, IFREMER, Brest, France), and are now in the collections of the Nationaal Natuurhistorisch Museum (Rijksmuseum van Natuurlijke Historie, RMNH), Leiden (The Netherlands), the Muséum National d'Histoire naturelle (MNHN), Paris (France) and the Royal Ontario Museum (ROMIZ), Toronto (Canada). These materials were obtained largely by submersible "Nautilé" during investigations at three sites near the Azores (the "Lucky Strike" hydrothermal field at ca 37°18'N, the "Menez Gwen" hydrothermal field at ca 37°51'N, and the site at "Zone 38°20'N"), from an area near Researcher Ridge west of the Cape Verde Islands (ca 15°04'N to 15°35'N), and from the Vema Fracture Zone (ca 10°45'N). For a review of the biology of the Mid-Atlantic Ridge hydrothermal systems, see Van Dover (1995).

In the discussion of the species either a full or a restricted bibliography has been given; this has been indicated.

## List of stations

Vema Fracture Zone, Mid-Atlantic Ridge, Vemanaute Dive PL 17, 10°45.43'-10°44.74'N, 40°51.96'-40°52.07'W, 4578 m, 09.ix.1988:

*Cryptolarella abyssicola* (Allman, 1888).

Mid-Atlantic Ridge, Faranaut Dive FR 03, 15°04.27'N 44°56.64'W, 2565 m, 21.iii.1992:

*Halecium profundum* spec. nov.; *Zygophylax levinseni* (Saemundsson, 1911).

Mid-Atlantic Ridge, Faranaut Dive FR 04, 15°04.57'N 45°57.63'W, ca 2600 m, 22.iii.1992:

*Eudendrium planum* Bonnevie, 1898.

Mid-Atlantic Ridge, Faranaut Dive FR 10, 15°35.33'N 46°45.06'W, 3410 m,  
28.iii.1992:

*Halecium profundum* spec. nov.; *Acryptolaria longitheca* (Allman, 1877).

Mid-Atlantic Ridge, Faranaut Dive FR 13, 15°28.56'N 46°34.15'W, 3303 m,  
31.iii.1992:

*Eudendrium planum* Bonnevie, 1898.

Mid-Atlantic Ridge, Faranaut Dive FR 13, 15°28.56'N 46°34.15'W, 3000 m,  
31.iii.1992:

?*Opercularella* spec.; *Acryptolaria longitheca* (Allman, 1877); *Zygophylax levinseni* (Saemundsson, 1911).

Mid-Atlantic Ridge, Faranaut Dive FR 14, 15°28.75'N 46°33.56'W, 3289 m, 01-iv-  
1992:

*Acryptolaria longitheca* (Allman, 1877).

Mid-Atlantic Ridge, Faranaut Dive FR 18, 15°30.85'N 46°38.24'W, 3902 m,  
4.iv.1992:

*Acryptolaria longitheca* (Allman, 1877).

Lucky Strike region, Mid-Atlantic Ridge, Alvin 2603, Station 4, 37°17.70'N  
32°16.27'W, 1574 m, 29.v.1993, from basalt rock:

*Symplectoscyphus bathyalis* Vervoort, 1972.

Lucky Strike hydrothermal field, Mid-Atlantic Ridge, Alvin 2606, Station 9,  
37°17.20'N 32°16.50'W, 1630 m, 01.vi.1993:

*Halecium* spec.

Gravinaut Dive GRN 12-04, 23°19.67'N 45°14.65'W, 2500 m, 23.ix.1993:

*Acryptolaria longitheca* (Allman, 1888).

Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 10, 38°20.50'N  
30°40.30'W, 919 m, 17.v.1994:

*Zygophylax leloupi* Ramil & Vervoort, 1992.

Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 10-1, 38°20.50'N  
30°40.30'W, 913 m, 17.v.1994:

*Sertularella gayi robusta* Allman, 1874.

Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 10-5, 38°20.50'N  
30°40.30'W, 919 m, 17.v.1994:

*Nemertesia ramosa* (Lamarck, 1816).

Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 11-2, 38°18.55'N  
30°40.15'W, 715 m, 19.v.1994:

*Diphasia margareta* (Hassall, 1841).

Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 11-5, 38°18.55'N 30°40.15'W, 788 m, 19.v.1994:

*Nemertesia ramosa* (Lamarck, 1816).

Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 12-1, 37°51.32'N 31°30.53'W, 1062 m, 20.v.1994:

*Lafocina amirantensis* (Millard & Bouillon, 1973); *Nemertesia antennina* (Linnaeus, 1758).

Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 12-5, 37°50.90'N 31°30.64'W, 997 m, 20.v.1994:

*Polyplumaria flabellata* G.O. Sars, 1874; *Cladocarpus cartieri* Bedot, 1921.

Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 13-4, 37°50'N 31°32'W, 832 m, 21.v.1994:

*Zygophylax echinata* spec. nov.

Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 13-5, 37°50'N 31°32'W, 877 m, 21.v.1994:

*Polyplumaria flabellata* G.O. Sars, 1874.

Menez Gwen hydrothermal field, Mid-Atlantic Ridge, DIVA 1, Dive DV 14-2, 37°50.46'N 31°31.35'W, 856 m, 22.v.1994:

*Grammaria abietina* (M. Sars, 1850).

Menez Gwen hydrothermal field, Mid-Atlantic Ridge, DIVA 1, Dive DV 14-6, 37°50.45'N 31°31.35'W, 845 m, 22.v.1994:

*Ectopleura larynx* (Ellis & Solander, 1786); *Grammaria abietina* (M. Sars, 1850).

Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 15-3, 37°49.80'N 31°30.50'W, 1003 m, 23.v.1994:

*Sertularella gayi robusta* Allman, 1874.

Lucky Strike hydrothermal field, Mid-Atlantic Ridge, DIVA 1, Dive DV 19-3, site "Nuno", 37°17.50'N 32°16.93'W, 1727 m, 27.v.1994:

*Stegolaria geniculata* (Allman, 1888).

Lucky Strike hydrothermal field, Mid-Atlantic Ridge, DIVA 2, Dive PL 02, site "Sintra", 37°17.50'N 32°16.47'W, 1600-1622 m, 04.vi.1994:

*Sertularella tenella* (Alder, 1856); *Symplectoscyphus bathyalis* Vervoort, 1972.

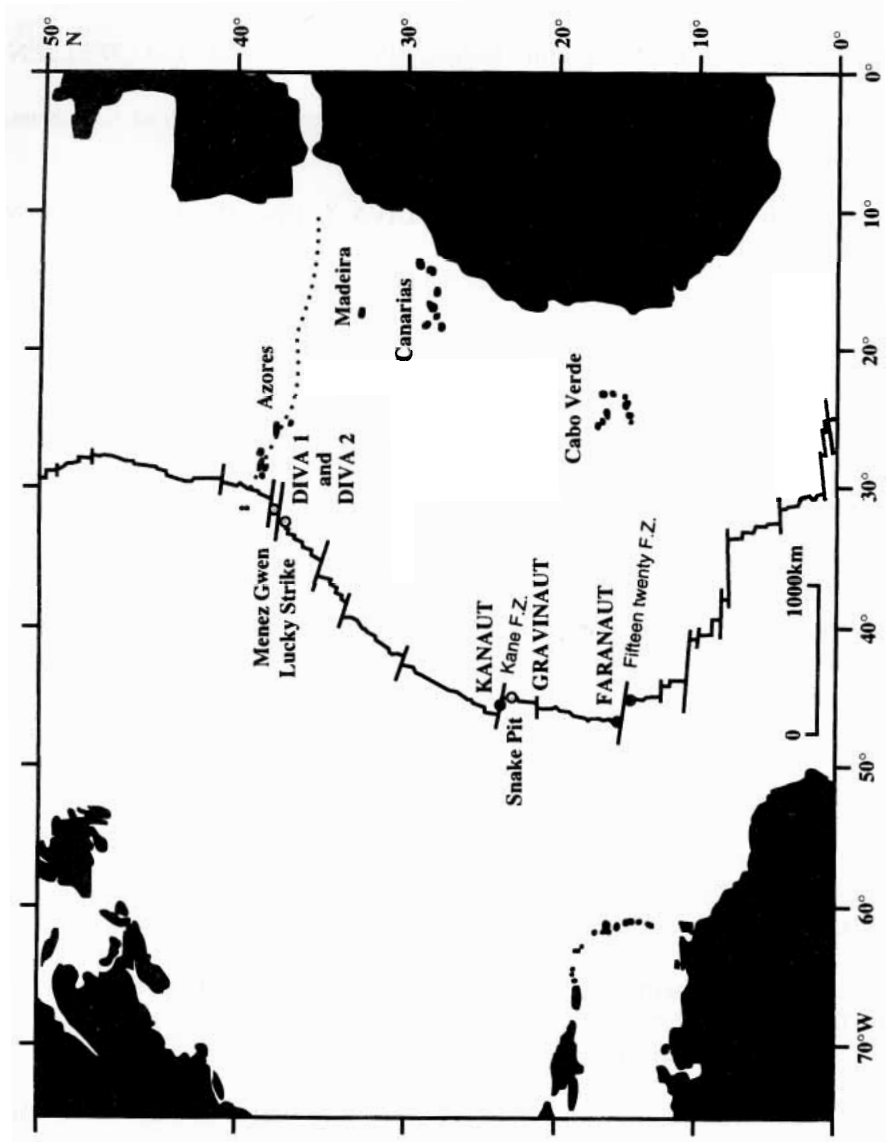


Fig. 1. Map of the Mid-Atlantic Ridge area showing the location of the principal sites. (Courtesy Dr Michel S g c, CENTOB\IFREMER).



### Systematic account

Order Anthoathecatae Cornelius, 1992  
 Superfamily Eudendrioidea L. Agassiz, 1862  
 Family Eudendriidae L. Agassiz, 1862

Genus *Eudendrium* Ehrenberg, 1834

*Eudendrium planum* Bonnevie, 1898  
 (fig. 2a-b)

*Eudendrium planum* Bonnevie, 1898a: 483, pl. 26, figs 28-30; Bonnevie, 1899: 10, 50; Stechow, 1909: 29 (compared with *Eudendrium armstrongi* Stechow, 1909); Bedot, 1918: 129; Bedot, 1925: 186; Kramp, 1932a: 20-22, 68, text-figs 9, 10, 11, 31 (map); Kramp, 1939: 516; Kramp, 1963: 53, 106. (Full bibliography).

Type locality.— Unknown; it was described after material in the Oslo Museum without any locality record, but most probably from the deep Atlantic off Norway.

Material.— Mid-Atlantic Ridge, Faranaut Dive FR 04, one colony, 40 mm high, with one badly preserved hydranth, without gonophores, MNHN-Hy 1217.

Mid-Atlantic Ridge, Faranaut Stn FR 13, one colony, 90 mm high, with male gonophores, RMNH-Coel. 27309; fragment of a colony, 3.6 cm high, with male gonophores, RMNH-Coel. slide 3212.

Description.— Colonies slender, stiff, sparsely branched, up to 9.0 cm high, arising from creeping hydrorhizal stolons; growth monopodial with terminal hydranths. Hydrocaulus upright, polysiphonic basally, monosiphonic distally, giving rise to alternate pedicels and to a few irregularly disposed branches all in one plane; branches resembling hydrocaulus. Perisarc thick basally, becoming progressively thinner distally, terminating at bases of hydranths; annulations present at proximal ends of pedicels, monosiphonic branches, and central tubes of polysiphonic branches, occasional annulations elsewhere but mostly smooth. Pedicels long, each supporting a hydranth at distal end. Hydranths in poor condition, about 0.5 mm long from proximal end to base of hypostome, urn-shaped; hypostome large, flared. Tentacles filiform, number indeterminable.

Gonophores fixed sporosacs. Male gonophores with one or two chambers, borne on entire hydranths.

Nematocysts (in  $\mu\text{m}$ ).—

macrobasic euryteles	12.9-14.1 × 5.5-6.4	(undischarged)
heterotrichous microbasic euryteles	7.5-8.4 × 3.9-4.6	(undischarged)

Remarks.— Identification of these hydroids is somewhat uncertain because female gonophores were lacking. Nevertheless, the specimen from Faranaut Stn FR 13 (RMNH-Coel. 27309) corresponds very closely with descriptions and illustrations of *Eudendrium planum* by Bonnevie (1898a) and Kramp (1932a). The colony from Stn FR 04 was a younger specimen, in poor condition. Both the male gonophores and the cnidome of this species are previously undescribed.

This species has been reported previously from deep waters of the northern North Atlantic. Bonnevie's (1898a) type specimen was of uncertain provenance; additional material has been described by Kramp (1932: 20; 1963: 53, 106) from deep water (1200 m) of Baffin Bay, West Greenland, 74°41'N 70°30'W, collected during the Godthaab Expedition and by Kramp (1939) from unknown depth in the Kara Sea.

Family Tubulariidae Fleming, 1828

Genus *Ectopleura* L. Agassiz, 1862

*Ectopleura larynx* (Ellis & Solander, 1786)  
(fig. 3)

*Tubularia larynx* Ellis & Solander, 1786: 31; Fenchel, 1905: 507 et seq., pls 10-12 (full synonymy); Ralph, 1953: 68, fig. 12; Cornelius & Ryland, 1990: 116, fig. 4.5; Cairns et al., 1991: 16; Boero & Bouillon, 1993: 261; Schönborn, Arndt & Gosselck, 1993: 226-228, pl. 6 fig. 3; Cornelius & Ryland, 1995: 78, fig. 4.5; Östman, Myrdal, Nyvall, Lindström & Aguirre, 1995: 165-178, figs 1-45; Medel & López-González, 1996: 196.

*Ectopleura larynx*; Petersen, 1990: 171-172; Schuchert, 1996: 109-110, fig. 65a, b. (Restricted bibliography).

Type Locality.— Mouth of the river Thames, England, attached to various objects, amongst which were sea shells (Ellis, 1755; Ellis & Solander, 1786).

Material.— Menez Gwen hydrothermal field, Mid-Atlantic Ridge, DIVA 1, Dive DV 14-6, several hydrocauli (8 with hydranths), up to 2.4 cm high, larger ones with gonophores, RMNH-Coel. 27277 and MNHN-Hy 1222.

Description.— Hydroids with upright hydrocauli, arising from a creeping, twisted, wrinkled hydrorhiza; perisarc of hydrorhiza varying in thickness, straw-coloured. Hydrocaulus unbranched, up to 2.4 cm high, 0.4 cm wide, invested with perisarc, each with a terminal hydranth. Perisarc of hydrocaulus

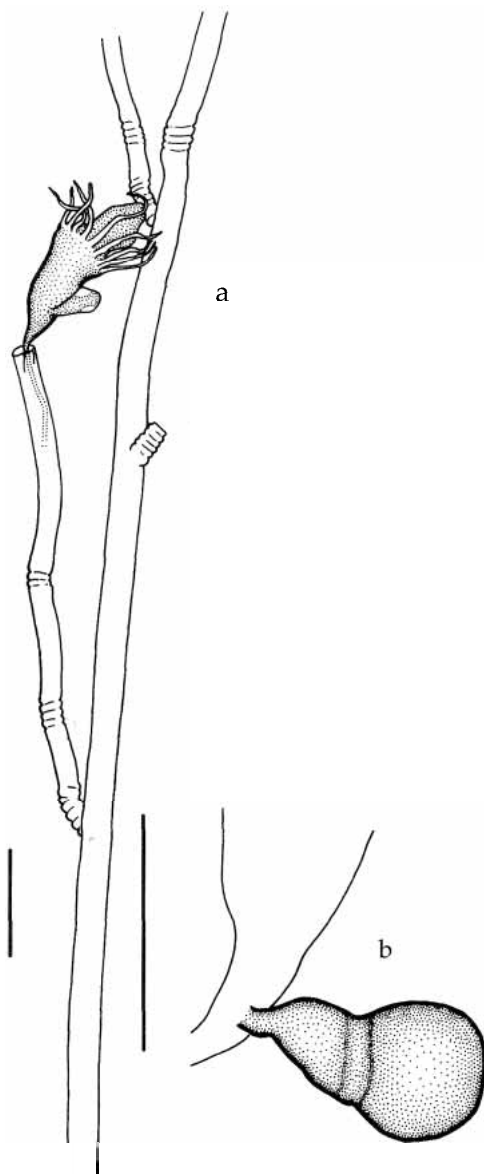


Fig. 2. *Eudendrium planum* Bonnevie, 1898. a, part of hydrocaulus, with pedicel and damaged hydranth; b, male gonophore, near base of hydranth; both slide no. 3212. Scale line for a equals 0.5 mm; scale line for b equals 0.25 mm.

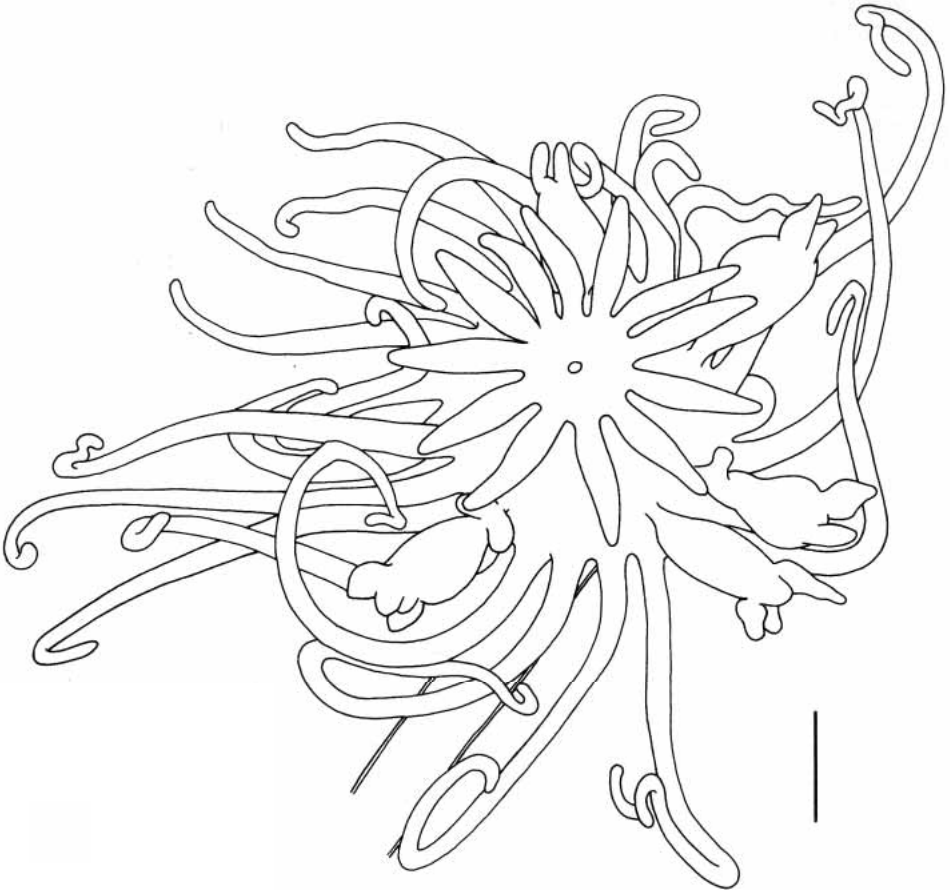


Fig. 3. *Ectopleura larynx* (Ellis & Solander, 1786). Hydranth, oral view, with female gonophores, RMNH-Coel. 27277. Scale line equals 0.5 mm.

with occasional wrinkles but not annulated, relatively thick basally, becoming progressively thinner distally, terminating just below hydranth base, clear to straw-coloured. Hydranth vasiform with a bulbous base, up to 1.7 mm high, 1.2 mm wide, bearing an oral and an aboral whorl of tentacles, mouth region dome-shaped. Aboral tentacles filiform, approximately 20 in mature hydranths, reaching 2.8 mm long. Oral tentacles filiform, about 12 in number, bases adnate to hydranth, forming a series of longitudinal convexities along distal end of hydranth, length free up to 0.75 mm.

Gonophores fixed sporosacs. Female gonophores sac-shaped, arising from short, slender, dichotomously branched blastostyles inserted on hydranth just distal to aboral tentacles; distal end with 3-5 digitate projections. Male gonophores not seen.

Nematocysts (in  $\mu\text{m}$ ).—

desmonemes	3.8-4.6 × 3.0-3.6	(undischarged)
stenoteles (small)	6.7-7.3 × 5.4-5.7	(undischarged)
stenoteles (large)	10.6-21.1 × 9.5-10.1	(undischarged)

mastigophores	8.4-9.6 × 3.5-4.0	(undischarged)
O-isorhizas	9.2-9.4 × 8.4-8.7	(undischarged)

Remarks.— The classification of the family Tubulariidae has been extensively revised at the generic level by Petersen (1979, 1990). A major character widely utilized in earlier works on hydroids to differentiate tubulariid genera had been the presence or absence of a free medusa in the life cycle. Thus, among the better known genera of the family, the genus *Tubularia* had been differentiated from *Ectopleura* and *Hybocodon* in having fixed gonophores instead of free medusae. *Hybocodon* and *Ectopleura* were in turn distinguished from each other by the morphology of their medusae, those of the former having a bilaterally symmetrical umbrella with one large marginal tentacle, and those of the latter having a biradially symmetrical bell with two or four equally developed ones. According to the redefinitions of Petersen, hydroids referable to *Tubularia* are essentially characterized by having: (1) two or more whorls of oral tentacles, (2) aboral tentacles that continue as ridges over the proximal end of the hydranth, (3) hydrocauli arising basally from circular or lobed basal discs, and (4) asymmetrical gonophores. Those of *Ectopleura* have: (1) one whorl of oral tentacles, (2) aboral tentacles that do not continue as ridges over the proximal end of the hydranth, (3) hydrocauli arising basally from filiform stolons, and (4) symmetrical gonophores or free medusae. In *Hybocodon*, the hydroids have: (1) two closely-set whorls of oral tentacles, (2) aboral tentacles that continue as ridges over the proximal end of the hydranth, (3) hydrocauli arising basally from sparsely branched stolonous tubes, and (4) bilaterally symmetrical medusae. This classification of the family, though not adopted by us in earlier work (Calder, 1988; Vervoort, 1993b), has been followed here.

Tubulariid taxonomy has also been unsettled at the species level. As noted by Petersen (1990), descriptions of taxa have seldom focused on critical characters. In addition, the amount of variability within a species has frequently been underestimated, with various morphs of the same species sometimes being given different names. A number of characters, previously accorded little or no significance, were considered important in the taxonomy of the family by Petersen. Among these were the form and arrangement of the oral and aboral tentacles, the area of perisarc secretion, the structure of the stem, the type of attachment to the substrate (whether by basal discs or stolons), and the character of the blastostyles.

Specimens from the Menez Gwen hydrothermal field, examined here, corresponded in their morphology with Petersen's (1990) diagnosis of *Ectopleura*. Moreover, in having about a dozen partially adnate and filiform oral tentacles, some 17-24 aboral tentacles, gonophores with 3-5 digitate projections at the end of each female gonophore, and wrinkled perisarc, they coincided with the account of *Ectopleura larynx* (Ellis & Solander, 1786) provided by Petersen (1990). This species is essentially boreal in distribution, according to Petersen, occurring from subarctic waters southward to Portugal and southern New England (Calder, 1975) in the North Atlantic. *Ectopleura larynx* also occurs in the North Pacific. There are no important recent distribution records that extend the distribution beyond that given by Petersen (1990: 171), but the Mediterranean should be added (Boero & Bouillon, 1993). For occurrence along coasts of the Iberian Peninsula see Medel & López-González (1996). Petersen explains occurrence of this species in the southern hemisphere as being due to transport by ships.

Additional records from that area are given by Schüchert (1996: 100) and are based on Ralph's (1953) record of *Tubularia larynx* from Otago Harbour and Wellington Harbour.

The present record confirms that *E. larynx*, typically considered a neritic species (Broch, 1916), can penetrate to considerable depths in the bathyal zone.

Studies of the nematocyst complement of this species were conducted by Östman et al. (1995). Stenoteles, desmonemes, microbasic b-mastigophores and O-isorhizas were found in hydroids from Scandinavia. Specimens from the northern coast of Spain included euryteles as well as the categories of nematocysts noted above. No euryteles were seen in the Mid-Atlantic Ridge material, although specimens were too few in number to permit a thorough study.

Order Leptothecatae Cornelius, 1992  
Superfamily Laodiceoidea L. Agassiz, 1862  
Family Tiārannidae Russell, 1940

Genus *Stegolaria* Stechow, 1913

*Stegolaria geniculata* (Allman, 1888)  
(fig. 4a-b)

*Cryptolaria geniculata* Allman, 1888: 41-42, pl. 20 figs 1, 1a, 1b; Driesch, 1889: 198; Hartlaub, 1904: 13; Nutting, 1905: 948; Billard, 1908: 1356; Bedot, 1916b: 87; Bedot, 1918: 113; Bedot, 1925: 162.

*Cryptolaria geniculatas*; Levinsen, 1893: 173, note (lapsus; reference of the species to Campanulinidae).

*Stegolaria geniculata*; Stechow, 1913a: 137; Stechow, 1913b: 29; Stechow, 1923b: 147; Totton, 1930: 154; Vervoort, 1946: 299-303, figs 2-3; Ralph, 1957: 849; Edwards, 1973: 593; Millard, 1977: 106, 112, fig. 3; Millard, 1978: 198; Gravier-Bonnet, 1979: 16; Millard, 1980: 130; Vervoort, 1985: 281-282; Ramil & Vervoort, 1992a: 32-34, fig. 4c-e; Álvarez-Claudio & Anadón, 1995: 238; Medel & López-González, 1996: 197.

*Lafœa geniculata*; Billard, 1910: 5. (Full bibliography).

Type locality.— Challenger Stn 173, "off Matuku, Fiji Islands; depth, 315 fathoms" (576 m) (Allman, 1888).

Material.— Lucky Strike hydrothermal field, Mid-Atlantic Ridge, DIVA 1, Dive DV 19-3, site "Nuno", on rock fragment, two colonies, 2.0 and 2.4 cm high, with gonothecae, RMNH-Coel. 27276; one specimen, 2.5 cm high, with gonothecae, on RMNH-Coel. slide 3127.

Description.— Colonies erect, up to 2.5 cm high, anchored to substrate by hydro-rhiza. Hydrocaulus geniculate, strongly polysiphonic basally with axial tube overgrown by accessory tubules, becoming monosiphonic at extreme distal end; nodes oblique, readily apparent only in monosiphonic parts. Branching irregular, in one plane; branches unbranched or secondarily branched, resembling hydrocaulus. Perisarc of moderate thickness. Hydrothecae alternately arranged, oriented in one plane on hydrocaulus and branches, adnate to axial tube, immersed to a varying degree in accessory tubes over proximal part, curving outwards and frontwards and becoming free distally; bore of hydrotheca narrowest at base, becoming gradually wider toward

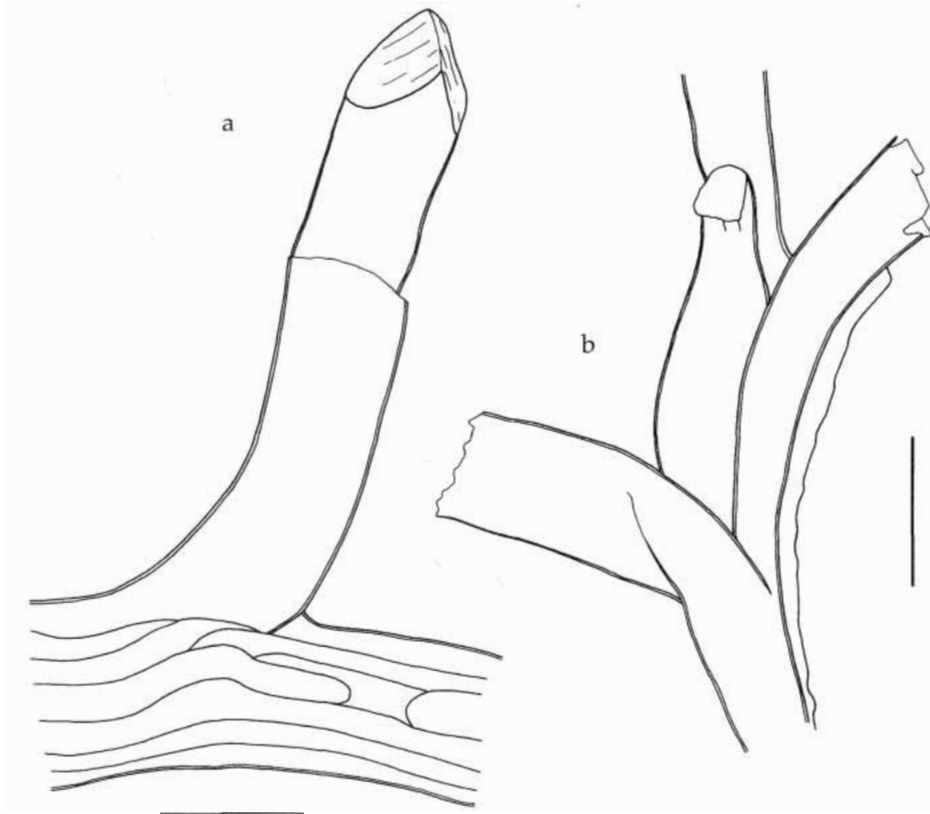


Fig. 4. *Stegolaria geniculata* (Allman, 1888). a, part of branch with regenerated hydrotheca; b, branch with two damaged hydrothecae and a gonotheca; both slide no. 3127. Scale line for a equals 0.25 mm; scale line for b equals 0.5 mm.

distal end; walls smooth; abcauline wall generally concave, free part of adcauline wall convex to nearly straight; no diaphragm apparent; perisarc of moderate thickness basally, thinning out distally; abcauline wall of axillary hydrothecae adnate to adjacent branch. Operculum damaged in present specimens, but comprising a roof-shaped enclosure with two longitudinally pleated valves seated within U-shaped embayments of margin. Fragments of hydranths only remaining.

Gonothecae elongate, widest in mid-region, narrowing towards either end, arising from and adnate to hydrocaulus and branches; distal end curving abruptly outwards and with a small part free; aperture distal, round, entire; perisarc of moderate thickness; operculum and gonophores lacking.

Remarks.— *Stegolaria geniculata* (Allman, 1888) is a deep-sea species, reported from areas in lower to middle latitudes of the Atlantic and Pacific Oceans (Vervoort, 1985; Ramil & Vervoort, 1992a). In the North Atlantic, it has been collected from bathyal and abyssal bottoms in the Bay of Biscay and vicinity (Vervoort, 1985; Álvarez-Claudio & Anadón, 1995), off the coast of Morocco (Vervoort, 1985; Ramil & Ver-

voort, 1992a), and in the Gulf of Guinea (Vervoort, 1985). *Stegolaria operculata* (Nutting, 1905), regarded as conspecific or likely so with *S. geniculata* (Millard, 1977b; Vervoort, 1985; Ramil & Vervoort, 1992a), has been reported from the Pacific and Indian Oceans.

Gonothecae of specimens from the "Lucky Strike" site resemble those described by Vervoort (1946) and Millard (1977b). No gonophores remained in them.

Family-group Incertae Sedis  
Genus *Lafoeina* M. Sars, 1874

*Lafoeina amirantensis* (Millard & Bouillon, 1973)  
(fig. 5a-c)

*Egmundella amirantensis* Millard & Bouillon, 1973: 40-42, fig. 5A-D; Millard & Bouillon, 1974: 4; Millard, 1975: 133, fig. 43G; Millard, 1978: 191; García Corrales, Buencuerpo Arcas & Peinado de Diego, 1979: 14; Millard, 1979: 137; Millard, 1980: 130; Roca, 1986: 9; Gibbons & Ryland, 1989: 389-390, fig. 7; Boero & Bouillon, 1993: 262.

*Lafoeina amirantensis*; Calder, 1991a: 10, fig. 3; Calder, 1991b: 223; Calder, 1991c: 2068 et seq.; Watson, 1994a: 66; Watson, 1994b: 147-149, fig. 1A. (Full bibliography).

Type Locality.—Amirantes, Seychelles (Millard & Bouillon, 1973).

Material examined.—Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 12-1, one colony, without gonothecae, on *Nemertesia antennina* (Linnaeus, 1758), RMNH-Coel. 27278.

Description.—Colony stolonial, with a hydrorhiza creeping over base of hydrocaulus of *Nemertesia antennina*. Hydrorhiza slender, branched, occasionally wrinkled, otherwise mostly smooth, attached side flattened, lacking internal septa, 36-49  $\mu\text{m}$  wide, giving rise to hydrothecae and nematophores. Hydrothecae essentially sessile, cylindrical with smooth walls, constricted at base, flaring slightly to margin, 202-244  $\mu\text{m}$  long, 81-124  $\mu\text{m}$  wide, one hydrotheca with another regenerated at its distal end; no diaphragm could be clearly discerned. Operculum a folded and cone-shaped continuation of hydrothecal wall, with about 12 facets when closed, not distinctly marked at base from wall of hydrotheca. Nematophores tubular with distal end slightly enlarged, bearing a small terminal opening, 36-101  $\mu\text{m}$  high, 16-20  $\mu\text{m}$  wide at terminal bulb; each nematophore usually with one to several large nematocysts, oriented vertically, at distal end.

Gonophores not seen.

Remarks.—Hydroids described here closely correspond with the original description by Millard & Bouillon (1973) of *Egmundella amirantensis* from the Seychelles, and with later descriptions of the species from the Atlantic Ocean (e.g., Calder, 1991; Ramil & Vervoort, 1992). In having sessile instead of pedicellate hydrothecae, and in apparently lacking a true diaphragm, this species has been assigned to *Lafoeina* M. Sars, 1874, instead of *Egmundella* Stechow, 1921. Hydroids of *L. amirantensis* resemble *L. tenuis* M. Sars, 1874, type species of *Lafoeina*, but differ in having occasional instead of abundant nematophores that are also comparatively short instead of very long. Due to inadequate knowledge of the life cycles of species of *Lafoeina*, it is pres-

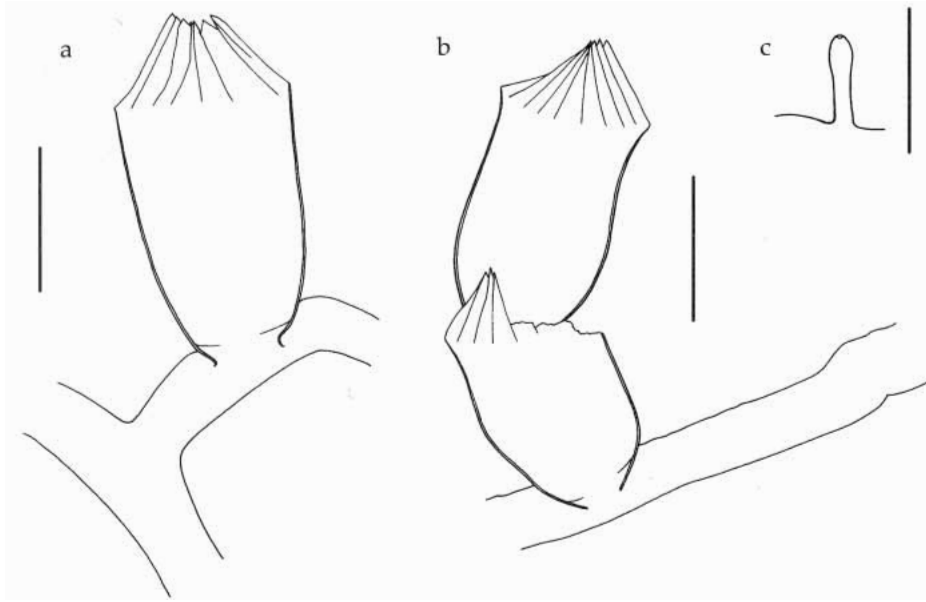


Fig. 5. *Lafoeina amirantensis* (Millard & Bouillon, 1973). a, hydrotheca; b, hydrotheca arising from an older one; c, nematotheca; all RMNH-Coel. 27278. Scale lines equal 0.10 mm.

ently impossible to determine the familial affinities of the genus. Besides its type locality in the Indian Ocean (Millard & Bouillon, 1973), this minute species has now been reported from the Mediterranean (García Corrales, Buencuerpo Arcas & Peinado de Diego, 1979; Roca, 1986), Bermuda (Calder, 1991a), and the eastern Atlantic off Cape Spartel and Casablanca (Ramil & Vervoort, 1992). In the Pacific it has been found at the Fiji Islands (Gibbons & Ryland, 1989) while Watson (1994a, b) records the species from the Bass Strait area. The small size of the species and the rather hidden habitat (frequently in the axil between hydrotheca and stem or branch) probably account for this scattered pattern.

Bathymetrically, it has been found from shallow subtidal regions to a depth of 890 m. The present record extends its known range both northward in the Atlantic, and somewhat deeper into the bathyal zone (1062 m).

?*Opercularella* spec.  
(fig. 6)

Material.— Mid-Atlantic Ridge, Faranaut Dive FR 13, on *Acryptolaria longitheca* (Allman, 1877), several pedicels with hydranths, together reaching 2 mm high, without gonothecae, RMNH slide 3266.

Description.— Colony stolonal, up to 2.1 mm high, arising from hydrorhiza growing over another hydroid. Hydrorhiza generally smooth but with occasional wrinkles and bulges, 37-46  $\mu\text{m}$  wide, giving rise to hydrothecal pedicels; internal septa lacking. Hydrothecal pedicels of varied length but quite long (up to 2 mm), 36-56  $\mu\text{m}$  wide,



annulated basally, mostly smooth but with a few scattered wrinkles or annulations elsewhere, merging imperceptibly with hydrothecal base; perisarc thin. Hydrotheca deep, radially symmetrical, widest at margin, tapering gradually to base; thin diaphragm present; hydrothecal walls smooth, about 335  $\mu\text{m}$  long from diaphragm to base of operculum, 150  $\mu\text{m}$  wide at margin. Operculum a longitudinally folded continuation of hydrothecal wall, not demarcated basally from wall of hydrotheca, cone-shaped when closed, number of pleats about 10. Vestiges of hydranths only remaining. Nematophores lacking.

Gonothecae not seen.

Remarks.— These hydroids lacked gonophores and could not be identified to species. However, they resemble and are considered possibly conspecific with specimens identified as “*?Opercularella* sp.” by Calder (1996) from abyssal depths off Bermuda. The lack of gonophores in material from both Bermuda and the Mid-Atlantic Ridge precludes a more definite identification.

Superfamily Halecioidea Hincks, 1868  
Family Haleciidae Hincks, 1868

Genus *Halecium* Oken, 1815

Type [by subsequent designation (Naumov, 1960, cf. ICZN, 1962)]: *Sertularia halecina* Linnaeus, 1758. In this genus the following taxa have been considered:

*Halecium amphibolum* Watson, 1993; *H. annulatum* Torrey, 1902; *H. antarcticum* Vanhöffen, 1910; *H. argenteum* Clarke, 1894; *H. banyulense* Motz-Kossowska, 1911 [= *H. muricatum* var. *banyulense* Motz-Kossowska, 1911]; *H. beanii* (Johnston, 1838) [= *H. edwardsianum* (D'Orbigny, 1846)]; *H. scutum* Clark, 1876a; *H. boreale* Von Lorenz, 1886; *H. beringi* Naumov, 1960; *H. bermudense* Congdon, 1907; *H. birulai* Spasskii, 1929; *H. brashnikovi* Linko, 1911; *H. brunniense* Watson, 1975; *H. buchananae* Blackburn, 1937; *H. capillare* (De Pourtalès, 1869); *H. conicum* Stechow, 1919; *H. corrugatissimum* Trebilcock, 1928; *H. corrugatum* Nutting, 1899; *H. crenulatum* Hincks, 1874; *H. crinis* Stechow, 1913a; *H. curvicaule* Von Lorenz, 1886; *H. cymiforme* Allman, 1888; *H. cymosum* Fraser, 1935a; *H. delicatulum* Coughtrey, 1876 [= *H. flexile* Allman, 1888; *H. gracile* Bale, 1888; *H. parvulum* Bale, 1888; *H. balei* Fraser, 1911; *H. flexile* var. *japonica* Leloup, 1938b; *H. parvulum* var. *magnum* Millard, 1957]; *H. delicatulum* var. *macrothecum* Leloup, 1960; *H. densum* Calkins, 1899; *H. dichotomum* Allman, 1888; *H. diminutivum*

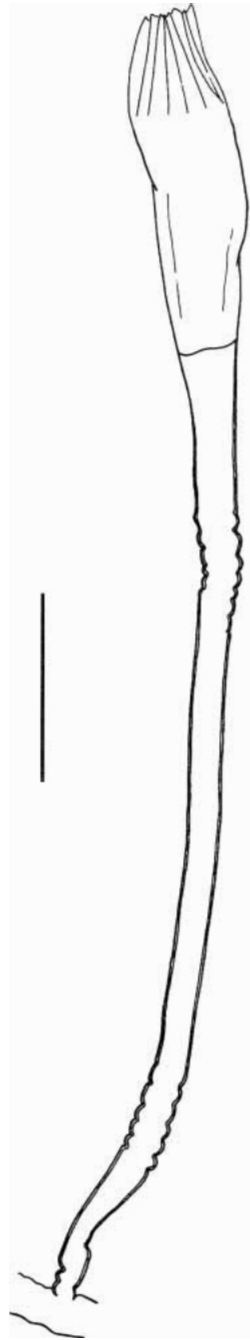


Fig. 6. *?Opercularella* spec. Hydrotheca and pedicel, RMNH-Coel. slide 3266. Scale line equals 0.25 mm.

Fraser, 1940a; *H. dubium* Fraser, 1941; *H. dufresnae* Millard, 1977a; *H. dyssymetrum* Billard, 1929; *H. exiguum* Fraser, 1948; *H. expansum* Trebilcock, 1928; *H. fasciculatum* Fraser, 1938a; *H. fastigiatum* Allman, 1888; *H. filicula* Allman, 1877; *H. flabellatum* Fraser, 1935; *H. flexum* Fraser, 1948; *H. fragile* Hodgson, 1950; *H. fraseri* Ralph, 1958; *H. fruticosum* Fraser, 1943; *H. galeatum* Billard, 1937; *H. gracile* Verrill, 1873; *H. groenlandicum* Kramp, 1911 [= *H. polytheca* Linko, 1911]; *H. halecinum* (Linnaeus, 1758) [= *H. geniculatum* Norman, 1867]; *H. halecinum* var. *minor* Leloup, 1932; *H. harrmani* Nutting, 1901a [= *H. robustum* Nutting, 1901]; *H. humile* Pictet, 1893; *H. incertum* Naumov & Stepan'yants, 1962; *H. inhacae* Millard, 1958; *H. insolens* Fraser, 1938a; *H. interpolatum* Ritchie, 1907; *H. irregulare* Bonnevie, 1899; *H. jaederholmi* Vervoort, 1972; *H. kofoidi* Torrey, 1902; *H. kueken-thali* Marktanner-Turneretscher, 1895; *H. labiatum* Billard, 1933; *H. labrosum* Alder, 1859 [= *H. annulatum* Stechow, 1919; *H. reflexum* Stechow, 1919; *H. undulatum* Billard, 1922]; *H. laeve* Kramp, 1932b; *H. lamourouxianum* (D'Orbigny, 1846); *H. lankesteri* (Bourne, 1890) [= *H. robustum* Pieper, 1884]; *H. lenticulare* Trebilcock, 1928; *H. lightbourni* Calder, 1991; *H. linkoi* Antsulevich, 1980; *H. liouvillei* Billard, 1924; *H. lucium* Antsulevich, 1979; *H. luteum* Watson, 1975; *H. macrocephalum* Allman, 1877; *H. magellanicum* Hartlaub, 1905; *H. marsupiale* Bergh, 1887; *H. mediterraneum* Weismann, 1883; *H. minor* Fraser, 1935; *H. minutum* Broch, 1903; *H. mirabile* Shidlovskii, 1902; *H. mirandum* Antsulevich & Regel', 1986; *H. muricatum* (Ellis & Solander, 1786) [= *H. filiforme* Alder, 1862]; *H. muricatum* f. *abyssale* Broch, 1918; *H. mutilum* Allman, 1876; *H. nanum* Alder, 1859 [= *H. marki* Congdon, 1907]; *H. nanum* var. *alta* Stechow, 1921a; *H. nullinodum* Fraser, 1935; *H. ochotense* Linko, 1911; *H. ornatum* Nutting, 1901; *H. ovatum* Totton, 1930; *H. pallens* Jäderholm, 1904; *H. patagonicum* (D'Orbigny, 1846); *H. perexiguum* Hirohito, 1995; *H. petrosum* Stechow, 1919; *H. planum* Bonnevie, 1899; *H. pulchellum* (De Pourtalès, 1869); *H. pusillum* M. Sars, 1857; *H. pygmaeum* Fraser, 1911; *H. pyriforme* Hirohito, 1995; *H. regulare* Fraser, 1938a; *H. repens* Jäderholm, 1907; *H. reversum* Nutting, 1901; *H. scalariforme* Billard, 1929; *H. scandens* Nutting, 1905; *H. schneideri* Bonnevie, 1899; *H. secundum* Jäderholm, 1904; *H. septentrionale* Marktanner-Turneretscher, 1895; *H. sessile* Norman, 1867 [= *H. plumosum* Hincks, 1868; *H. articulatum* Clark, 1875]; *H. sibogae* Billard, 1929; *H. sibogae* var. *marocanum* Billard, 1934; *H. simplex* Pictet, 1893; *H. siphonatum* (De Pourtalès, 1869); *H. speciosum* Nutting, 1901; *H. tehuelchum* (D'Orbigny, 1846); *H. telescopium* Allman, 1888; *H. tenellum* Hincks, 1861 [= *H. geniculatum* Nutting, 1889; *H. washingtoni* Nutting, 1901]; *H. tensum* Fraser, 1941; *H. tenue* Fraser, 1938c; *H. textum* Kramp, 1911; *H. tortile* Bonnevie, 1898b; *H. tortum* Fraser, 1938a; *H. vagans* Fraser, 1938a; *H. vasiforme* Fraser, 1935a, and *H. wilsoni* Calkins, 1899.

A new species, *Halecium profundum*, is described below.

*Halecium profundum* spec. nov.  
(fig. 8a-e)

*Halecium* spec. Vervoort, 1972: 34, fig. 8a, b.

Material.—Mid-Atlantic Ridge, Faranaut Dive FR 03, on dead coral, up to 20 mm high colonies, with male and female gonothecae, type series [RMNH-Coel 27310; seven colonies or fragments, 6-20 mm high, three with female gonothecae and one with male (paratypes), two RMNH-Coel. slides 3213; four slides as MNHN-Hy 1218 (holotype)].

Mid-Atlantic Ridge, Faranaut Dive FR 10, on rock no. 11, one colony, 10 mm high, without gonothecae, MNHN-Hy 1151.

Description of female specimen from the type series.—Colony erect, 1.7 cm high, arising from a creeping hydrorhiza. Hydrocaulus weakly polysiphonic for a short distance at base, monosiphonic elsewhere, branched dichotomously; branches essentially in one plane, dichotomously branched like hydrocaulus; perisarc moderately thick basally, thin distally. Internodes very long and slender, length of those beyond basal

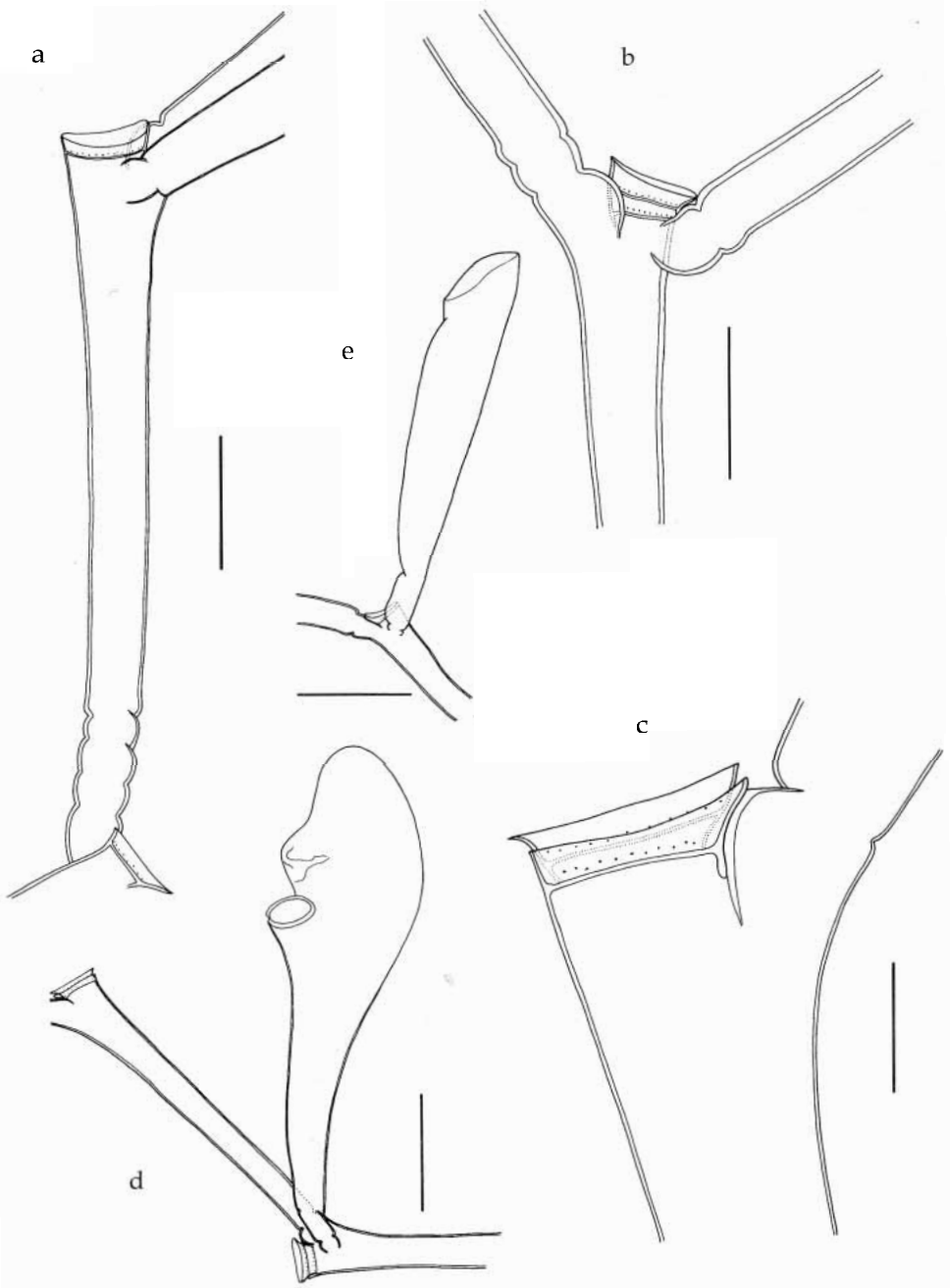


Fig. 8. *Halecium profundum* spec. nov. a, internode of hydrocaulus, RMNH-Coel. slide 3213, paratype; b, axillary hydrotheca at juncture of hydrocaulus and branch, slide 3213, paratype; c, hydrotheca, with one renovation, slide 3213, paratype; d, female gonotheca, slide 3213, paratype; e, male gonotheca, paratype, slide 3213. Scale lines for a and b equal 0.25 mm; scale line for c equals 0.10 mm; scale lines for d and e equal 0.5 mm.

ones 1.1-1.6 mm, width at nodes 80-140  $\mu\text{m}$ ; proximal end of each internode with a single node or with from 1-9 annulations, smooth elsewhere; distal end of internode slightly expanded, with a primary hydrotheca and an internode-bearing primary apophysis lateral to it, frequently with a secondary apophysis given off from opposite side, hydrotheca thus becoming axillary and growth form appearing dichotomous. Primary hydrothecae sessile, very shallow, widening from base to margin but rim not everted, commonly regenerated, as many as eight times; margin entire, sloping downward from higher adcauline to lower abcauline side; abcauline wall straight, not flaring, 26-33  $\mu\text{m}$  long from margin to diaphragm; adcauline wall concave, adherent to adjacent apophysis, length from diaphragm to margin 55-72  $\mu\text{m}$ ; margin entire, 185-205  $\mu\text{m}$  in diameter, adcauline side with a rounded bulge along wall of apophysis; diaphragm distinct, 117-163  $\mu\text{m}$  wide, situated beneath a ring of small desmocytes; supplemental hydrothecae sessile, abcauline margins longer and more flaring than in primary hydrotheca, rim sometimes everted. Hydranths missing or badly mutilated, morphology indeterminable.

Gonophores fixed sporosacs; colony female. Gonothecae reniform distally with rounded apex, base long, slender, tapered; gonothecal pedicel essentially an annulation inserting on front side of internode lateral to a hydrotheca; walls smooth throughout, perisarc thin; total length of gonotheca excluding pedicel 2.3-2.4 mm, maximum width in side view 0.7 mm, weakly compressed laterally; gonothecal aperture lateral, with a pair of short, confluent tubes each occupied by a hydrotheca.

Remaining colonies in type series reaching a maximum colony height of 2.0 cm. Male gonothecae elongate, slender, fusiform, narrowing basally, distal end tapered asymmetrically to a point, about 1.9 mm long, maximum diameter 325-361  $\mu\text{m}$ , walls smooth.

Remarks.— Of the descriptions of more than 100 nominal species assigned to the genus *Halecium* worldwide, the Mid-Atlantic Ridge specimens most closely fit that of *H. vagans* Fraser, 1938a, a poorly characterized hydroid from neritic waters of the eastern North Pacific (Fraser, 1938a, 1948). However, the hydrothecae of *H. profundum* are flared, occasionally everted, and often renovated, while those of *H. vagans* are scarcely flaring and apparently not renovated. Gonothecae were lacking in Fraser's material of *H. vagans*.

*Halecium profundum* is also similar to *H. dubium* Fraser, 1941, an abyssal species described from material collected at a depth of 1769 fathoms (3235 m) in the western North Atlantic (40°29'N 66°04'W). Fraser's (1941) original account of *H. dubium* differs from *H. profundum* in having: (1) a slightly bushy instead of a dichotomous colony form, (2) less distinct nodes, (3) pedicellate and relatively long hydrophores, including renovated ones, instead of sessile hydrophores, and (4) broadly ovate and flat instead of cylindrical male gonothecae. The female gonothecae of *H. dubium* are currently unknown.

A hydroid described and illustrated by Vervoort (1972) as *Halecium* spec., from abyssal depths (4532-4097 m) in the eastern South Pacific Ocean off Chile, is inseparable morphologically from *H. profundum*. This material (RMNH-Coel. 27405, slide) was re-inspected; it is sterile and its identification therefore remained uncertain. It is here referred to *H. profundum*.

Etymology.— The specific name *profundum*, from Latin, refers to the abyssal provenance of this species.

*Halecium* spec.  
(fig. 7)

Material examined.— Lucky Strike hydrothermal field, Mid-Atlantic Ridge, Alvin 2606, Station 9, one specimen, 3.2 cm high, without gonothecae, RMNH-Coel. slide 2359.

Description.— Colony erect, 3.2 cm high, pinnately branched. Hydrocaulus nearly straight where strongly polysiphonic, geniculate elsewhere; perisarc moderately thick except in young parts of colony; branches monosiphonic or polysiphonic, resembling distal end of hydrocaulus. Central tubes of hydrocaulus and branches divided into internodes by more or less distinct nodes. Internodes 0.8-1.3 mm long, 110-160  $\mu\text{m}$  wide at nodes, with a bulge just distal to node but otherwise smooth; distal end of each internode with two apophyses, one directed upwards and supporting internode above, and another directed outwards and supporting a hydrothecal pedicel; branches, when present, inserting at base and from front side of apophysis supporting hydrothecal pedicel. Youngest pedicels appearing slightly swollen basally, separated from apophysis by a node, gradually increasing in diameter to base of hydrotheca; older pedicels sometimes appearing renovated, frequently with one or more nodes or irregular annulations between base and apophysis of each; pedicel and hydrotheca together trumpet-shaped. Hydrothecae shallow, with a diaphragm below an irregular ring of small desmocytes, widening distally, margin flaring; somewhat more strongly concave on adcauline than abcauline side; primary hydrothecae occasionally renovated to form 1-2 secondary hydrothecae; hydrothecal depth 47-64  $\mu\text{m}$  from margin to diaphragm; diameter at diaphragm 103-123  $\mu\text{m}$ , 157-182  $\mu\text{m}$  at margin. Hydranths large with a conical hypostome; tentacles about 14-17, filiform, in one whorl, basal web absent.

Gonothecae not seen.

Remarks.— This specimen fits accounts of several species assigned to the genus *Halecium* Oken, 1815, especially those of *H. filicula* Allman, 1877, and *H. muricatum* forma *abyssale* Broch, 1918. They bear some resemblance, too, to *H. marsupiale* Bergh, 1887, and *H. groenlandicum* Kramp,

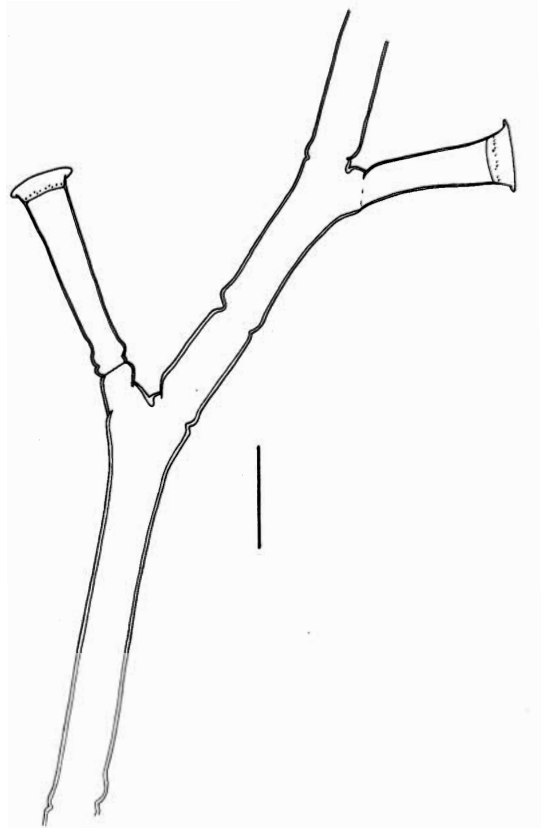


Fig. 7. *Halecium* spec. Hydrocaulus with two hydrothecal pedicels and hydrothecae, RMNH-Coel. slide 2359. Scale line equals 0.25 mm.

1911. However, the specimen clearly differs from *H. groenlandicum* in having deeper hydrothecae with distinctly flaring margins. Unlike in *H. marsupiale*, the proximal ends of the cauline internodes are not annulated or spirally twisted. No evidence of a pseudodiaphragm proximal to the hydrotheca, typically found in *H. muricatum* and its form *abyssale*, described by Broch (1918), could be observed. The "Lucky Strike" specimen, in lacking gonothecae, could not be identified with certainty, although it closely tallies with Allman's (1877) account of *H. filicula*. Gonothecae are as yet unknown in *H. filicula*, a species described from deep water in the Gulf of Mexico. Other material identified as *H. filicula* has been reported from bathyal depths off the southeastern United States by Nutting (1895) and Fraser (1944).

Superfamily Lafoeioidea A. Agassiz, 1865  
 Family Lafoeidae A. Agassiz, 1865  
 Subfamily Lafoeinae A. Agassiz, 1865

Genus *Acryptolaria* Norman, 1875

*Acryptolaria longitheca* (Allman, 1877)  
 (figs 9-11)

*Cryptolaria longitheca* Allman, 1877: 19, pl. 13, figs 4-5; Clarke, 1879: 240, 244, pl. 2 figs 7-13; Fewkes, 1881: 128; Bedot, 1912: 281; Stechow, 1913b: 30; Bedot, 1916: 88; Bedot, 1918: 114; Bedot, 1925: 162.

*Lafoea* (*Cryptolaria*) *longitheca*; Bonnevie, 1899: 63; Billard, 1906b: 178.

*Oswaldaria longitheca*; Stechow, 1923b: 147.

*Acryptolaria longitheca*; Fraser, 1943: 78, pl. 16 fig. 5a, pl. 17 fig. 5b; Fraser, 1944: 212, pl. 41 fig. 192; Deevey, 1954: 270; Vervoort, 1968: 99; Vervoort, 1972: 45, fig. 12b-c; Cairns et al., 1991: 24; Calder, 1996: 1723, fig. 2d-f. (Full bibliography).

*Cryptolaria crassicaulis* Allman, 1888: 41, pl. 19 figs 3, 3a; Driesch, 1889: 198; Pictet & Bedot, 1900: 17, 18; Browne, 1907: 29; Ritchie, 1911: 833, pl. 87 fig. 4; Stechow, 1913a: 144; Stechow, 1913b: 11, 113, figs 86-87; Jäderholm, 1917: 7, pl. 1 fig.; Jäderholm, 1919: 8, pl. 2 fig. 2; Leloup, 1932: 146, fig. 16, pl. 16 fig. 3; Stranks, 1993: 7.

*Acryptolaria crassicaulis*; Yamada, 1959: 49; Rees & White, 1966: 273; Millard, 1967: 172, fig. 2A; Leloup, 1974: 8; Millard, 1978: 188 et seq.; Gravier-Bonnet, 1979: 18, fig. 34B-C; Vervoort, 1985: 283-285, fig. 1; Ramil & Vervoort, 1992: 48-49, fig. 9d; Altuna Prados, 1994, 134-136, pl. 17 figs A-E; Altuna Prados, 1995: 54; Blanco, 1994a: 162; Blanco, 1994b: 188; Blanco, Zamponi & Genzano, 1994: 9-10, fig. 6; Bouillon, Massin & Kresevic, 1995: 51; Medel & López-González, 1996: 198.

*Oswaldaria crassicaulis*; Stechow, 1921a: 256; Stechow, 1923b: 147; Leloup, 1940: 15.

*Cryptolaria crassicaulis* var. *dimorpha* Ritchie, 1911: 830, fig. 126, pl. 87 figs 5-6; Jarvis, 1922: 335.

*Acryptolaria crassicaulis* var. *dimorpha* - Smaldon, Heppell & Watt, 1976: 14; Gravier-Bonnet, 1979: 20. (Full bibliography).

Type locality.— *Cryptolaria longitheca* Allman, 1877: "Dredged off Double-Headed Shot Key from a depth of 315 fathoms" (576 m); *Cryptolaria crassicaulis* Allman, 1888: Challenger Stn 344, 07°54'20"N 14°28'20"W, off Ascension Island, 420 fms (768 m); *Cryptolaria crassicaulis* var. *dimorpha* Ritchie, 1911: Thetis Stn 48, off Wollongong, Australia, seven to eight miles offshore, 55-56 fms (100-102 m).

Material.— Mid-Atlantic Ridge, Faranaut Dive FR 10, on rock no. 11, 3 colonies, 30-45 mm high, without coppinae, MNHN-Hy. 1150.

Mid-Atlantic Ridge, Faranaut Dive FR 13, on sponge no. 2, colony 30 × 40 mm, with a coppinia,

RMNH-Coel. 27307; three colonies, 5-39 mm high, without coppiniae, three RMNH-Coel. slides 3155. Mid-Atlantic Ridge, Faranaut Dive FR 14, on rock no. 3, 2 colonies, up to 100 mm high, without coppiniae, one as MNHN-Hy. 1148, one ROMIZ B3002.

Mid-Atlantic Ridge, Faranaut Dive FR 18, on rock no. 14, about 40 colonies, 20-30 mm high, without coppiniae, MNHN-Hy. 1149; two colonies, 22-26 mm high, without coppiniae, two RMNH-Coel. slides 3211.

Gravinaut Dive GRN 12-04, about 16 colonies, without coppiniae, of which majority as MNHN-Hy. 1219, four as ROMIZ B3003.

Description.— Colonies erect, flabellate, up to 10.0 cm high, arising from a dense, creeping hydrorhizal mat; occasional stolonial hydrothecae also given off from hydro-rhiza. Hydrocaulus geniculate, polysiphonic except at extreme distal end, with an axial tube overgrown by accessory tubes, irregularly branched; nodes indistinct; branches mostly in one plane, resembling hydrocaulus, sometimes secondarily branched. Perisarc fairly thick, especially in older parts of colony. Hydrothecae very long, slender, total length excluding renovations of margin 1660-1968  $\mu\text{m}$ , occurring on hydrocaulus and branches, given off alternately in one plane, each adnate to axial

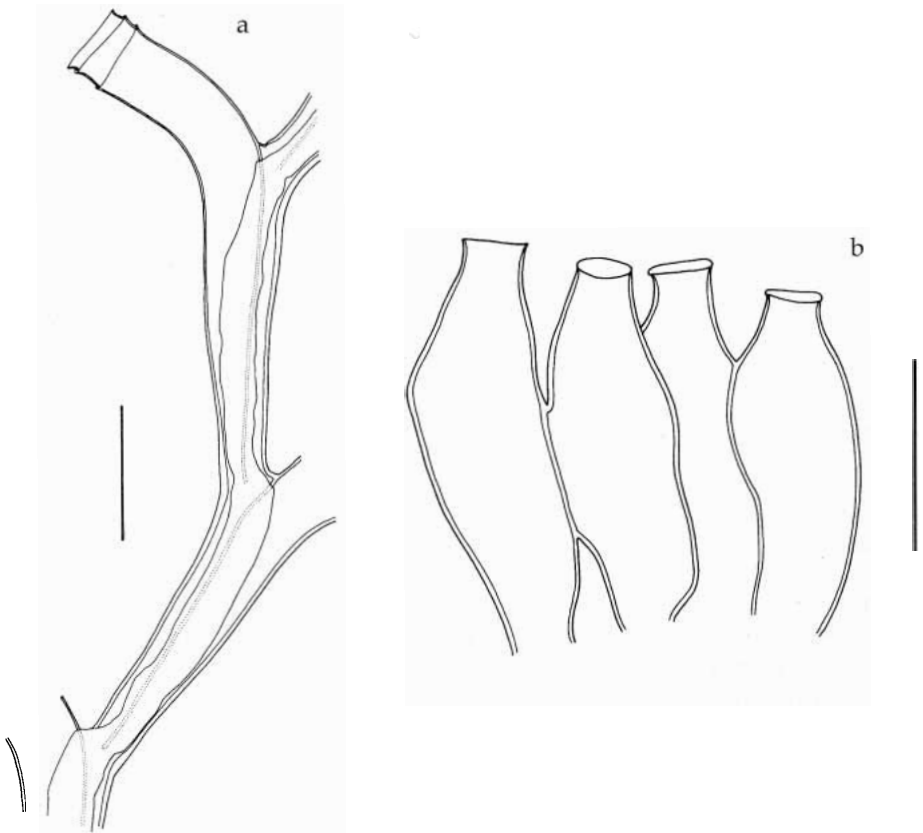


Fig. 9. *Acryptolaria longitheca* (Allman, 1877). a, part of hydrocaulus with hydrothecae, slide 3155; b, four gonothecae from coppinia, RMNH-Coel. 27307. Scale line for a equals 0.5 mm; scale line for b equals 0.25 mm.

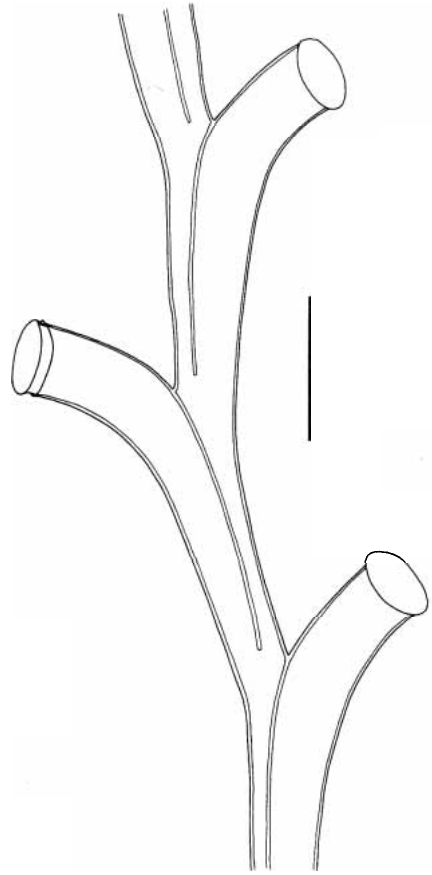
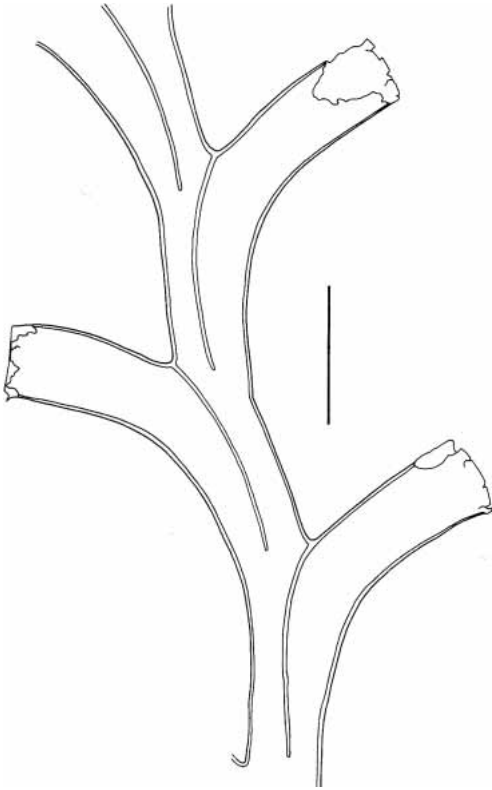


Fig. 10. *Acryptolaria longithecata* (Allman, 1877). Part of holotype colony, with damaged hydrothecae, from Double Headed Shot Key, Florida, 315 fathoms, Museum of Comparative Zoology, Harvard University, no catalog number. Scale line equals 0.5 mm.

Fig. 11. *Acryptolaria crassicaulis* (Allman, 1888). Part of holotype colony, from Ascension Island, 420 fathoms, BMNH 88.11.13.29. Scale line equals 0.5 mm.

tube for most of its length and immersed to a greater or lesser degree depending upon degree of stem and branch fasciculation, curving outwards and slightly frontwards, becoming free distally; narrowest at base, gradually widening distally, free part nearly cylindrical. Hydrothecal walls smooth; perisarc of abcauline wall thicker basally than distally, more uniformly thin along adcauline wall; adnate part of adcauline wall nearly straight, free part convex; abcauline wall straight to slightly convex proximally, concave distally. Margin entire, slightly flaring, usually with several renovations; orifice round, diameter 272-340  $\mu\text{m}$ . Operculum, diaphragm, desmocytes, and nematothecae absent.

Gonothecae densely aggregated into an elongate, vermiform coppinia surrounding hydrocaulus, lacking modified hydrothecae and nematothecae; gonothecae



adnate to one another over much of their height, flask-shaped, abruptly tapering distally to a short, free neck; orifice round, 80-103  $\mu\text{m}$  in diameter. Gonophores fixed sporosacs, extruded as an acrocyst.

Remarks.— Mid-Atlantic Ridge material above was assigned to *Acryptolaria longitheca* (Allman, 1877) because of its close resemblance to hydroids, from the abyssal Northwest Atlantic Basin, that were attributed to that species by Vervoort (1972). Similar material was reported, as *A. longitheca*, from abyssal bottoms off Bermuda by Calder (1996). All of these hydroids are noteworthy for their extremely long hydrothecae, which taper to a decidedly slender base. The species is well distributed in deep water of the western Atlantic: off Double-Headed Shot Key, Florida, 315 fms (= 576 m) (Allman, 1877); Gulf of Mexico, 25°33'N 84°21'W, 101 fms (= 185 m) (Clarke, 1879); Dominica, Martinique and Barbados, 76-334 fms (= 139-611 m); South of Florida Keys, 24°18'N 80°58.5'W, 324 fms (= 593 m) and off Barbados, 13°11'54"N 59°38'45"W, 73 fms (= 134 m) (Fraser, 1943); 32°34'N 74°21.5'W, 4681 m (Vervoort, 1972), and Bermuda Pedestal, c. 32°35'N 64°55'W, 3011-3550 m (Calder, 1996). The present records indicate that the species is well distributed in deep water over the Mid-Atlantic Ridge.

*Acryptolaria crassicaulis* (Allman, 1888), originally described from off Ascension Island in the mid-South Atlantic Ocean, is much like *A. longitheca*. We find nothing to warrant separation of the two in an examination of their types (figs 10, 11), and refer *A. crassicaulis* to the synonymy of *A. longitheca* here. In turn, both appear close to *Acryptolaria conferta* (Allman, 1877).

*Cryptolaria crassicaulis* var. *dimorpha* Ritchie, 1911, is based on a specimen with adnate as well as independently developed, isolated hydrotheca, a phenomenon not uncommon in *Acryptolaria* and allied genera, particularly in young colonies. We have relegated this variety to the synonymy of *Acryptolaria longitheca* (Allman, 1877).

#### Genus *Cryptolarella* Stechow, 1913

##### *Cryptolarella abyssicola* (Allman, 1888) (fig. 12)

*Cryptolaria abyssicola* Allman, 1888: 40, pl. 18, figs 2, 2a; Levinsen, 1893: 164; Marktanner-Turneretscher, 1895: 404; Von Campenhausen, 1896a: 105; Von Campenhausen, 1896b: 309; Hartlaub, 1905: 593; Bedot, 1916: 87; Bedot, 1918: 112; Bedot, 1925: 160.

*Cryptolarella abyssicola*; Stechow, 1913a: 138; Stechow, 1913b: 29; Stechow, 1923b: 147; Kramp, 1951: 121, pl. 1 figs 1-3; Vervoort, 1966: 118, figs 18-20; Millard, 1975: 172, figs 57E-G; Millard, 1978: 191; Millard, 1980: 131; Vervoort, 1985: 285-286; Dawson, 1992: 15; Ramil & Vervoort, 1992a: 52.

*Cryptolaria diffusa* Allman, 1888: 42-43, pl. 21 fig. 1, 1a; Levinsen, 1893: 159, 173; Marktanner-Turneretscher, 1895: 404; Ritchie, 1907a: 488; Bedot, 1912: 87; Bedot, 1918: 113; Bedot, 1925: 161.

*Cryptolarella diffusa*; Stechow, 1913a: 138; Stechow, 1913b: 29; Kramp, 1951: 123.

*Cryptolaria humilis* Allman, 1888: 39-40, pl. 18 figs 1, 1a, 1b; Browne, 1907: 16, 18, 29; Bedot, 1912: 88; Bedot, 1918: 114; Bedot, 1925: 162; Rees & White, 1966: 273.

*Oswaldaria humilis*; Stechow, 1921b: 229; Stechow, 1923b: 147.

*Cryptolarella humilis* - Vervoort, 1966: 118. (Full bibliography).

Type locality.— *Cryptolaria abyssicola* Allman, 1888: Challenger Stn 160, 42°42'S 134°10'E, south of

Australia, 2600 fms (4755 m); *Cryptolaria diffusa* Allman, 1888: Challenger Stn 101, off Sierra Leone, 04°48'N 14°20'W, 2500 fms (= 4572 m); *Cryptolaria humilis*; Allman, 1888: Challenger Stn 73, near the Azores, 38°30'N 31°14'W, 1000 fms (= 1829 m).

Material.— Vema Fracture Zone, Mid-Atlantic Ridge, Vemaute Dive PL 17, 13 fragments, 1.5 cm high, without gonothecae, RMNH-Coel. 27786, two RMNH-Coel. slides 575.

Description.— Colonies erect, 1.5 cm high, arising from a creeping hydrorhizal mat. Hydrocaulus polysiphonic except at distal end, axial tube somewhat crooked with indiscernible nodes, overgrown by wrinkled accessory tubes; irregularly branched, mostly in one plane, resembling hydrocaulus. Perisarc of moderate thickness proximally, thin distally. Hydrothecae long, slender, nearly cylindrical over much of length, tapering proximally; given off from all sides of hydrocaulus and branches, typically adnate to axial tube over most of length, immersed to varying degrees depending upon thickness of fasciculation of hydrocaulus and branches, curving outwards, becoming free distally, total length excluding renovations of margin 1.15–1.25 mm. Hydrothecal walls smooth; perisarc thin, adcauline wall convex, abcauline wall concave. Margin entire, slightly flaring, usually with several renovations; orifice round, diameter 154–177  $\mu\text{m}$ . Operculum, diaphragm, desmocytes, and nematothecae absent.

Gonophores not seen.

Remarks.— *Cryptolaria humilis* Allman, 1888, originally described from Challenger Stn 73 (located on the Mid-Atlantic Ridge near the Azores), was regarded as conspecific with *C. abyssicola* by Vervoort (1966). He also regarded *Cryptolaria diffusa* Allman, 1888, from Challenger Stn 101 off Sierra Leone, as coterminous with *C. abyssicola*. This species has been reported (as either *C. humilis* or *C. abyssicola*) on several occasions from abyssal and bathyal bottoms of the Pacific and the Atlantic Oceans [South Australian Basin (Allman, 1888, type locality, see above); Celebes Sea, Tasman Sea and Kermadec Trench, 2470–4970 m (Vervoort, 1966); northern temperate Atlantic, 4540–4600 m (Kramp, 1915); off Saldanha and Still Bays, South Africa, 2740 and 200 m (Millard, 1975); northern part of the Bay of Biscay, 1980–4715 m (Vervoort, 1985; Ramil & Vervoort, 1992a)]. *Cryptolaria diffusa* is only known from the

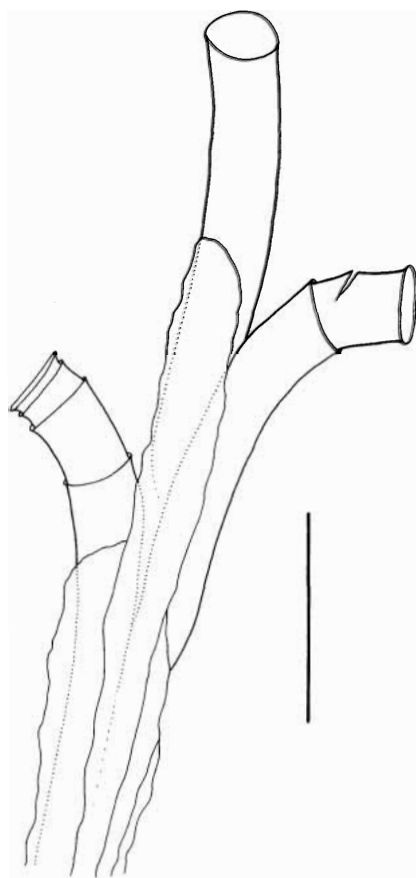


Fig. 12. *Cryptolaria abyssicola* (Allman, 1888). Part of a polysiphonic branch with three hydrothecae, RMNH-Coel. slide 575. Scale line equals 0.5 mm.

type locality; while *Cryptolarella humilis*, since the original record by Allman (1888), has only recorded by Browne (1907) from deep water (754 m) of the Bay of Biscay. Both species are here considered to fall within the synonymy of *Cryptolarella abyssicola* (Allman, 1888) (see above). The latter is here recorded from a single locality in deep water of the Mid-Atlantic Ridge, falling well within the range of Atlantic deep water localities from which the species has so far been obtained.

Genus *Grammaria* Stimpson, 1854

*Grammaria abietina* (M. Sars, 1850)  
(fig. 13)

*Campanularia abietina* M. Sars, 1850: 139.

*Grammaria abietina*; M. Sars, 1863: 34; Kramp, 1935: 127, fig. 55; Leloup, 1940: 16; Vervoort, 1942: 288; Fraser, 1944: 217-218, pl. 44 fig. 200; Naumov, 1960: 283-284, figs 20, 46E, 174, tab. 1 fig. 3; Calder, 1970: 1523, pl. 5 fig. 1; Cornelius, 1975: 382, fig. 3; Millard, 1977a: 12, fig. 3D-E; Cornelius & Ryland, 1990: 135, fig. 4.13; Cornelius, 1995a: 257-259, fig. 59; Cornelius, Manuel & Ryland, 1995: 92, fig. 411.

*Grammaria abietina* f. *typica* Broch, 1918: 18-21.

*Grammaria abietina* f. *brevicyatha* Broch, 1918: 18-21, fig. 5. (Restricted bibliography).

Type locality.— Off Bergen, Norway.

Material examined.— Menez Gwen hydrothermal field, Mid-Atlantic Ridge, DIVA 1, Dive DV 14-2, two young colonies, 1.3-2.2 cm high, without coppiniae, RMNH-Coel. 27290; one young colony, 7 mm high, without coppiniae, as RMNH-Coel. slide 3138.

Description.— Colonies all juvenile, unbranched, erect, up to 2.2 cm high. Hydrocaulus a polysiphonic rhizocaulus arising from converging hydrorhizal stolons adherent to substrate, straight to slightly curved but not geniculate, comprising an axial tube bearing hydrothecae arranged in 3-6 longitudinal series, axial tube overgrown by accessory tubes; nodes indistinct; perisarc thick basally, thinner in younger parts of colony. Hydrothecae narrowest at base, flaring slightly just below margin, nearly cylindrical over much of length, older hydrothecae becoming quite long due to numerous renovations of margin, total length excluding such renovations about 1.1-1.3 mm; each hydrotheca adnate to

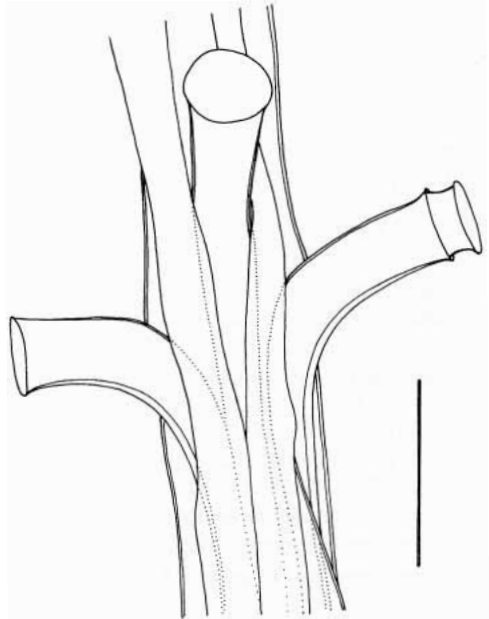


Fig. 13. *Grammaria abietina* (M. Sars, 1850). Hydrocaulus with three hydrothecae, RMNH-Coel. 27290. Scale line equals 0.25 mm.

axial tube basally and immersed to a varying degree depending upon extent of stem fasciculation and margin renovation, curving abruptly outwards, free part becoming perpendicular or nearly so to axis of hydrocaulus distally. Hydrothecal walls smooth; perisarc of abcauline wall thick basally, becoming thin distally; perisarc more uniformly thin along adcauline wall; adnate part of adcauline wall nearly straight, free part convex except becoming concave just beneath margin or near location of original margin; abcauline wall straight to slightly convex proximally, concave distally. Margin entire, slightly flaring, usually with several or many renovations; orifice round, diameter 270-306  $\mu\text{m}$ . Operculum, diaphragm, and nematothecae absent.

Gonothecae not seen.

Remarks.— *Grammaria abietina* (M. Sars, 1850) is a circumpolar species (Naumov, 1960; Calder, 1970) ranging southward to the North Sea in the eastern Atlantic (Cornelius, 1975), and to southern New England in the western Atlantic (Fraser, 1944). This finding of *G. abietina* from the Menez Gwen hydrothermal field is south of the known range of the species in the North Atlantic, although its occurrence at a latitude of 37°N is not unexpected given the depth at which it was found. The species was reported from the southern hemisphere, near the Crozet Islands, by Millard (1977a). *Grammaria abietina* is a eurybathic species, having a reported depth range of 10 to 1500 m (Cornelius, 1975).

## Subfamily Zygophylacinae Quelch, 1885

### Genus *Zygophylax* Quelch, 1885

Type, by monotypy, *Zygophylax profunda* Quelch, 1885. In this genus the following species have been considered:

*Zygophylax abyssicola* (Stechow, 1926); *Z. africana* Stechow, 1923c; *Z. adhaerens* (Fraser, 1938a); *Z. antipathes* (Lamarck, 1816); *Z. arborescens* (Leloup, 1931); *Z. armata* (Ritchie, 1907b); *Z. bathyphila* Leloup, 1940; *Z. biarmata* Billard, 1905 [= *Z. inconstans* Millard, 1977b; *Z. halecioides* var. *annellata* (Pictet & Bedot, 1900)]; *Z. bifurcata* Billard, 1942; *Z. brevitheca* Jäderholm, 1919; *Z. brevitheca* var. *sibogae* Billard, 1942; *Z. brownei* Billard, 1924; *Z. carolina* (Fraser, 1911); *Z. cervicornis* Nutting, 1905; *Z. concinna* (Ritchie, 1911); *Z. convallaria* (Allman, 1877); *Z. crassicaulis* (Fraser, 1943); *Z. crassitheca* Fraser, 1941; *Z. crozetensis* Millard, 1977a; *Z. curvitheca* (Stechow, 1913a); *Z. cyathifera* (Allman, 1888); *Z. elegans* (Fewkes, 1881); *Z. elongata* Ramil & Vervoort, 1992; *Z. flexilis* (Pictet & Bedot, 1900); *Z. geniculata* (Clarke, 1894); *Z. geminocarpa* Millard, 1958; *Z. infundibulum* Millard, 1958; *Z. junceoides* Borradaile, 1905 (questionable species); *Z. leloupi* Ramil & Vervoort, 1992; *Z. levinseni* (Saemundsson, 1911) [= *Z. elegantula* Leloup, 1940]; *Z. millardae* Rees & Vervoort, 1987; *Z. pacifica* Stechow, 1920a; *Z. pinnata* (G.O. Sars, 1874) [= *Z. halecioides* (Allman, 1874)]; *Z. profunda* Quelch, 1885; *Z. recta* Jarvis, 1922; *Z. reflexa* (Fraser, 1948); *Z. rigida* Fraser, 1948; *Z. robusta* (Verrill, 1873); *Z. rufa* (Bale, 1884); *Z. sagamiensis* Hirohito, 1983; *Z. sibogae* Billard, 1918; *Z. stehowi* (Jäderholm, 1919); *Z. thyroscyphiformis* (Marktanner-Turneretscher, 1890); *Z. tizardensis* Kirkpatrick, 1890a; *Z. tottoni* Rees & Vervoort, 1987; *Z. unilateralis* Totton, 1930; *Z. valdivoiae* Stechow, 1923a.

A new species, *Zygophylax echinata*, is described below.

### *Zygophylax echinata*, spec. nov.

(figs 14a-h, 15)

Material examined.— Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 13-4, one colony,

with a coppinia, RMNH-Coel. 27285 and three fragments of colonies, 6-17 mm high, without coppiniae (paratypes); one colony in slide 3134 as MNHN-Hy 1220 (holotype).

Description of type series.— Fertile specimen only in fair condition; colony erect, 2.5 cm high, surrounded by a coppinia or part of one basally. Hydrocaulus weakly geniculate, strongly polysiphonic, about 350  $\mu\text{m}$  in diameter near base; axial tube largely obscured throughout by accessory tubes, diameter at upper end 85-100  $\mu\text{m}$ , giving rise to alternate hydrocladia directed to either side in one plane, cauline hydrothecae present between successive hydrocladia, including one in each axil (unless broken off), nodes if present not readily apparent; bases of hydrocladia and pedicels of cauline hydrothecae both surrounded by accessory tubes of stem; perisarc thick, especially at proximal end. Hydrocladia short, reaching 3 mm in length, polysiphonic at least basally, not secondarily branched, straight or very slightly geniculate; nodes on axial tube of hydrocladium apparently infrequent, transverse, at irregular intervals; hydrocladial apophyses prominent, located laterally or fronto-laterally on axial tube, directed alternately to left and right, each apophysis normally supporting a pedicellate hydrotheca, two lateral nematothecae evidently present when apophyses not overgrown by accessory tubes and when nematothecae not dislodged. Nematothecae common on hydrocaulus and hydrocladia, short, tumbler-shaped, with rounded or stalk-like pedicels, walls smooth or slightly wrinkled, narrowing somewhat below rim, margin entire, round, straight or very slightly everted, frequently renovated, length of non-renovated part 42-68  $\mu\text{m}$ , 24-31  $\mu\text{m}$  wide at orifice, pedicels 13-18  $\mu\text{m}$  long. Hydrothecal pedicels smooth, short, adcauline side 29-111  $\mu\text{m}$  in length, abcauline side 26-117  $\mu\text{m}$ , longest pedicels being axillary, each delineated from apophysis below by a node, narrowest proximally, usually increasing slightly in diameter distally, merging at diaphragm with base of hydrotheca. Hydrothecae small, very slender, vase-shaped, distal part flaring and trumpet-shaped, walls smooth, perisarc moderately thin; diaphragm distinct, oblique, 46-68  $\mu\text{m}$  in diameter; adcauline wall convex over most of length, concave distally, 267-397  $\mu\text{m}$  long excluding renovations; abcauline wall concave distally, slightly convex to slightly concave basally, length without renovations 254-364  $\mu\text{m}$ ; margin entire, round, slightly everted, often repeatedly renovated, nearly perpendicular to main axis of hydrotheca, diameter of original opening 94-117  $\mu\text{m}$ .

Gonophores fixed sporosacs. Gonothecae aggregated into an oval coppinia surrounding hydrocaulus basally; coppinia probably fragmentary, 2 mm high, 3.5 mm wide; gonothecae flask-shaped, walls adnate to each other basally for approximately 570  $\mu\text{m}$ , slightly less than 2/3 of total length, distal free part about 450  $\mu\text{m}$  in height, width maximal at top of contiguous part, then tapering distally to form a single, large spine; orifice single, pyriform, about half-way between base and tip of spine. Nematoramous ramules with nematothecae and hydrothecae growing over coppinia, but not profusely so; nematothecae about 55  $\mu\text{m}$  long, rim diameter 30  $\mu\text{m}$ ; hydrothecae about 310  $\mu\text{m}$  long, margin 90  $\mu\text{m}$  in diameter.

Smaller paratypes resembling fertile colony but up to 1.7 cm high, about 290  $\mu\text{m}$  wide basally, branches reaching 6 mm long; one of these re-branched, resembling hydrocaulus. Nematothecae 47-60  $\mu\text{m}$  deep, margin diameter 23-30  $\mu\text{m}$ . Hydrothecal pedicels length abcauline side 26-65  $\mu\text{m}$ , length adcauline side 20-52  $\mu\text{m}$ . Hydrothecae

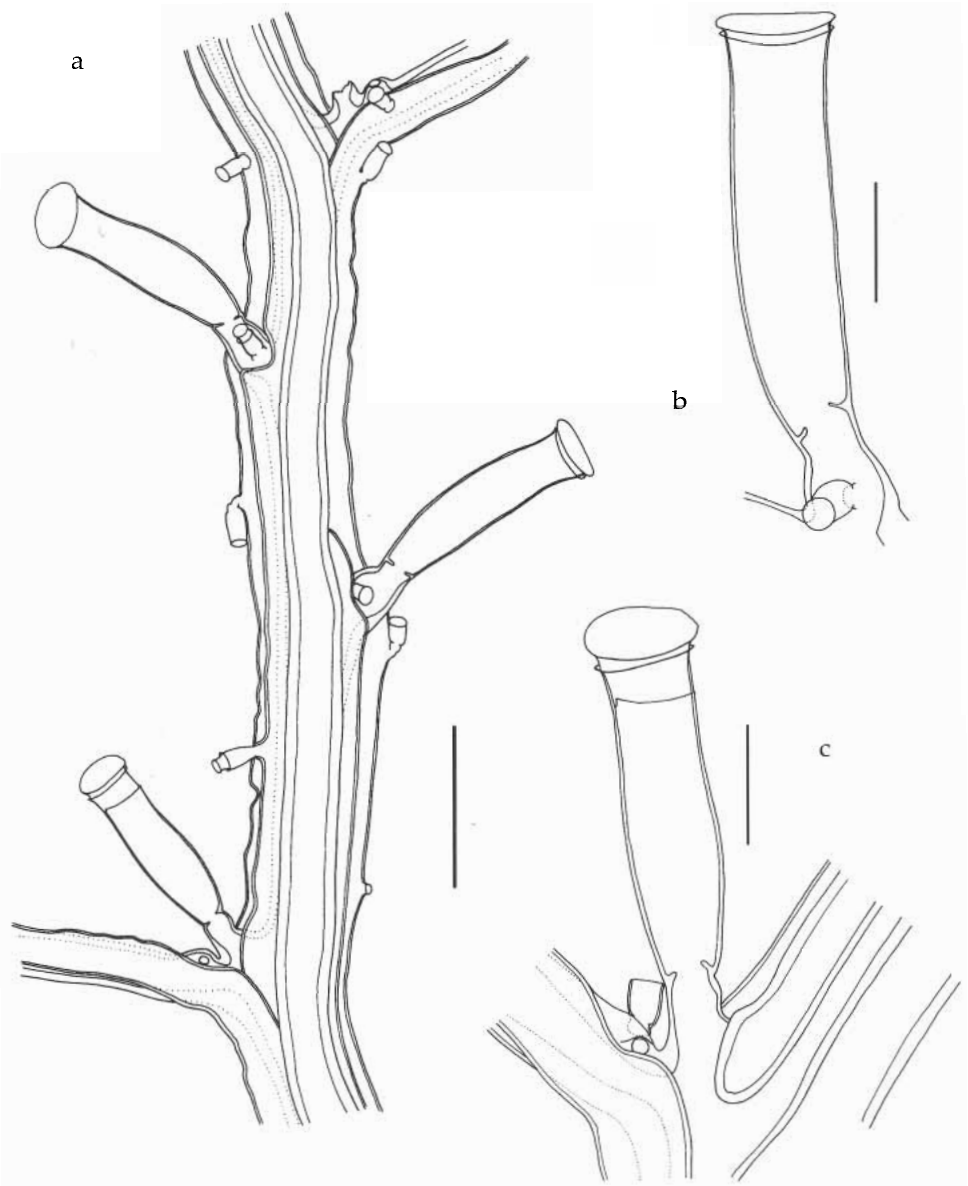
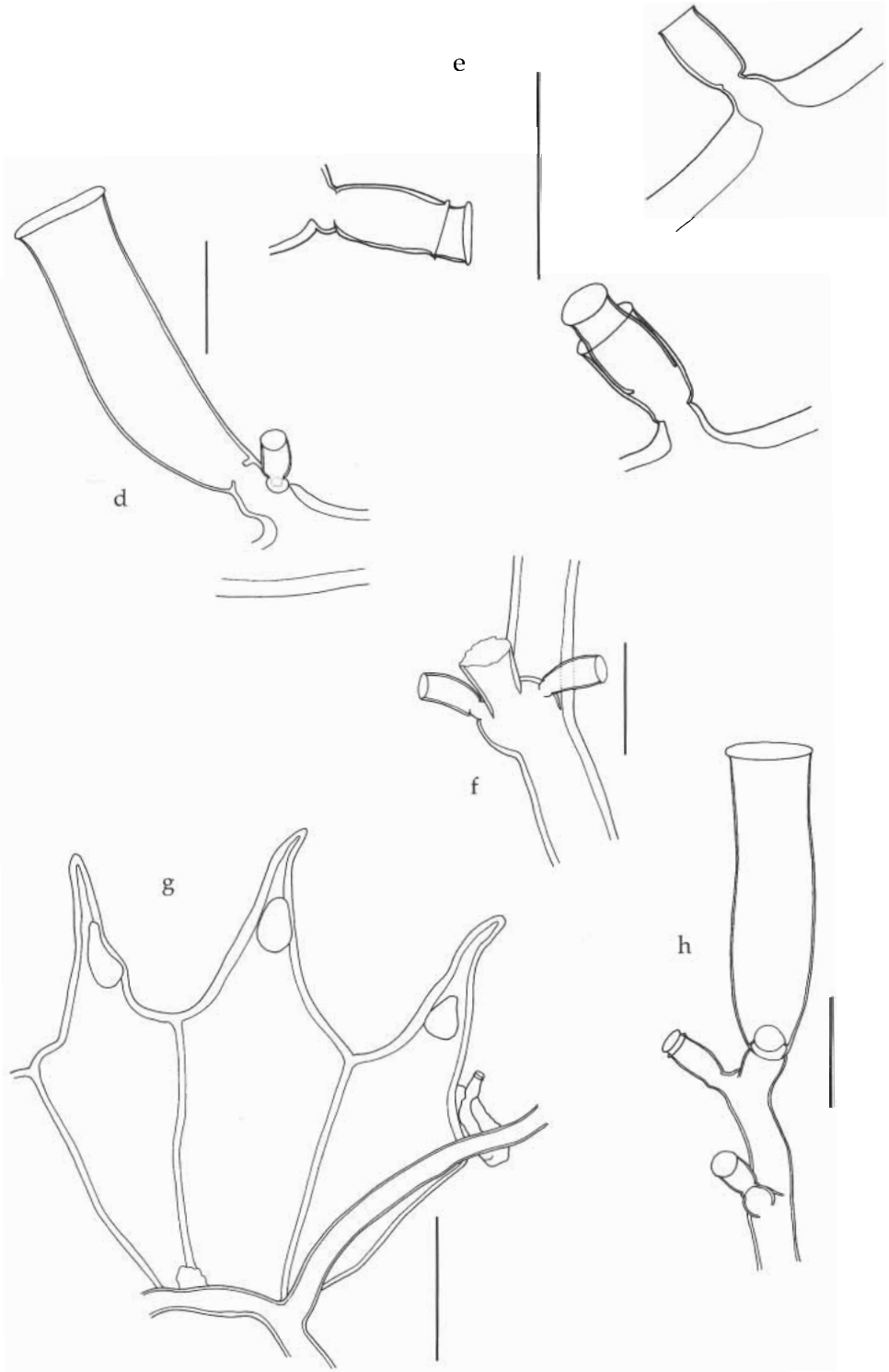


Fig. 14. *Zygophylax echinata*, spec. nov., RMNH-Coel. 27285, paratype. a, distal part of hydrocaulus, with hydrothecae and nematothecae; b, hydrotheca and nematotheca, on hydrocaulus; c, axillary hydrotheca; d, hydrotheca and nematotheca from distal end of hydrocladium; e, cauline nematotheca; f, hydrocladial apophysis with two lateral nematothecae and remnant of hydrothecal pedicel; g, three gonothecae and nematophorous ramule from coppinia; h, end of nematophorous ramule of coppinia, with nematothecae and hydrotheca. Scale lines for a and g equal 0.25 mm; scale lines for b, c, d, f, and h equal 0.10 mm; scale line for e equals 100  $\mu$ m.



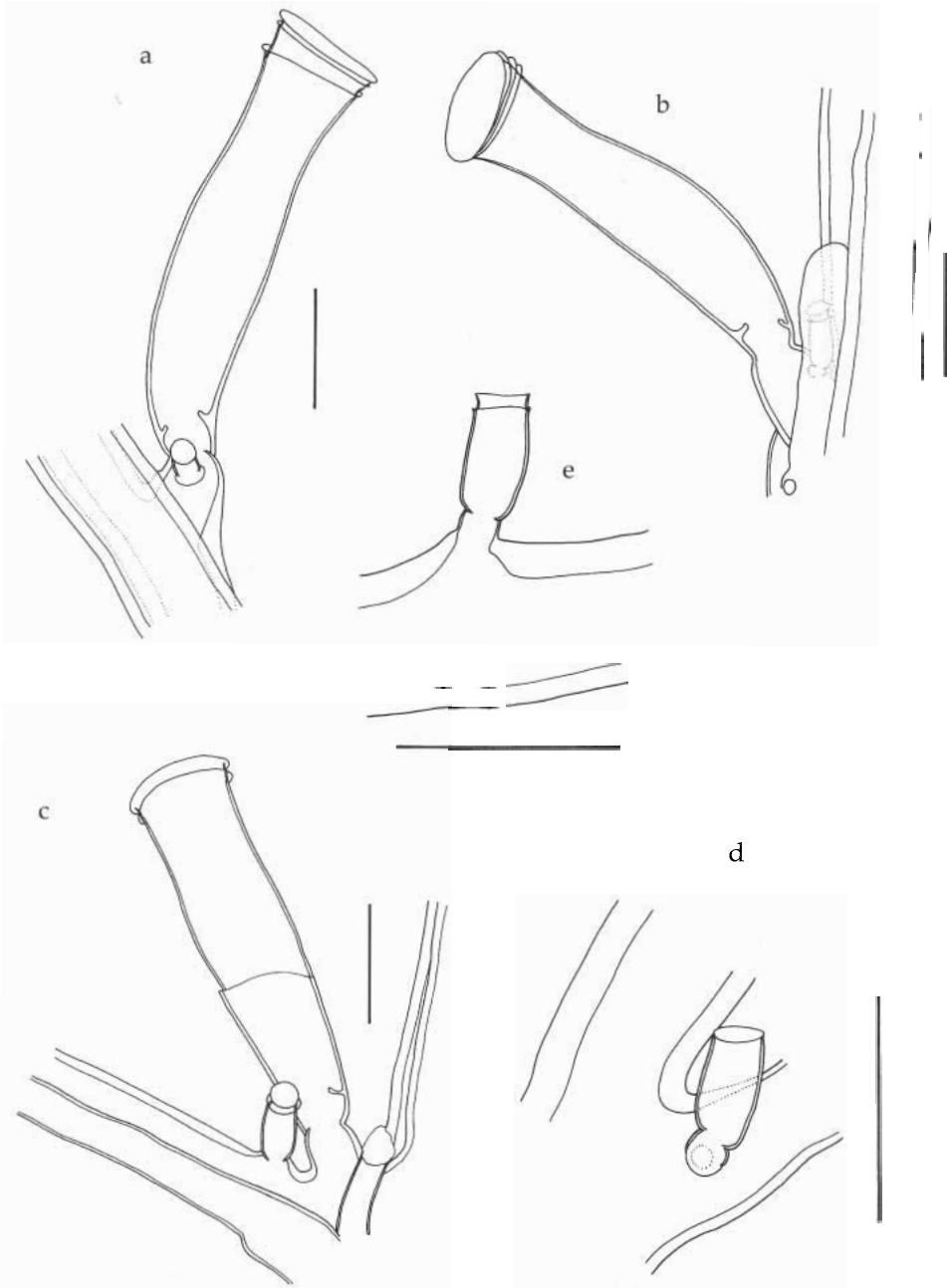


Fig. 15. *Zygophylax echinata*, spec. nov., holotype (slide 3134, NMNH-Hy. 1220). a, cauline hydrotheca and nematotheca; b, cauline hydrotheca; c, axillary hydrotheca, renovated, with adjacent nematotheca; d, nematotheca on apophysis of hydrocladium; e, nematotheca on hydrocaulus. Scale lines for a, b, and c equal 0.10 mm; scale lines for d and e equal 100  $\mu$ m.



diameter at diaphragm 52-57  $\mu\text{m}$ , diameter at margin 88-111  $\mu\text{m}$ , adcauline wall length 286-371  $\mu\text{m}$ , length abcauline wall 293-367  $\mu\text{m}$  (all measurements of nematothecae and hydrothecae on non-renovated parts).

Remarks.— The specimens most closely resemble *Zygophylax sagamiensis*, described by Hirohito (1983) from upper bathyal depths (250-300 m) in Sagami Bay, Japan. In *Z. echinata*, the hydrothecae are vase-shaped and distinctly flared distally rather than being tubular to slightly curved outwards. Moreover, the hydrothecal pedicels of *Z. echinata* were consistently short and lacked annulations, instead of varying from short to very long and sometimes being annulated. The occurrence of one large distal spine instead of two smaller ones on the gonothecae, and the presence of distally flaring rather than tubular hydrothecae, distinguish *Z. echinata* from *Z. africana* Stechow, 1923a.

The Menez Gwen material also corresponds in some respects with illustrations of *Zygophylax inconstans* Millard, 1977b, by Izquierdo, García-Corrales & Bacallado (1986) from the Canary Islands, although hydrothecae in their material are much more robust. Ramil & Vervoort (1992a) considered *Z. inconstans*, and the material described by Izquierdo, et al. under that name, to be conspecific with *Z. biarmata* Billard, 1905. Gonothecae of *Z. biarmata* are decidedly different from those of *Z. echinata*, particularly in lacking a spine distal to the aperture.

Etymology.— The specific name *echinata*, from Latin, alludes to the prominent spine found at the distal end of the gonothecae of this species.

*Zygophylax leloupi* Ramil & Vervoort, 1992  
(fig. 16a-c)

*Zygophylax geniculata*; Leloup, 1940: 13-14, pl. 1 fig. 9 [not *Zygophylax geniculata* (Clarke, 1894)].  
*Zygophylax leloupi* Ramil & Vervoort, 1992a: 74, figs 16a-c, 17a-d; Bouillon, Massin & Kresevic, 1995: 55. (Full bibliography).

Type Locality.— Off the coast of Morocco, BALGIM Stn CP 90 (34°21.4'N 07°23.6'W, 890 m).

Material.— Seamount at Zone 38 20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 10, two colonies, 1.6 and 2.9 cm high, without coppiniae, two slides 3137 (RMNH-Coel. 27289 and ROMIZ B3004).

Description.— Colonies erect, up to 2.9 cm high, arising from a creeping hydro-rhizal mat; specimens in fair condition only; nematothecae sparse. Hydrocaulus geniculate, polysiphonic except at distal end, with axial tube overgrown by accessory tubes, axial tube 197-262  $\mu\text{m}$  wide, giving rise to outward- and upward-directed apophyses at regular intervals; each cauline apophysis typically bearing (except where broken off) a hydrocladium, or a hydrotheca or the remains of its pedicel, or both (with hydrotheca axillary), an axillary nematotheca also present on distal apophysis of one colony; hydrocaulus and hydrocladia without regular nodes; perisarc quite thick. Hydrocladia mostly unbranched, weakly geniculate, bearing fronto-lateral apophyses alternately directed to either side; each hydrocladial apophysis supporting a pedicellate hydrotheca, nematothecae or circular points of their original insertion occasionally present; nematothecae about 130  $\mu\text{m}$  long, 60  $\mu\text{m}$  wide at margin, tumbler-shaped with short pedicel, margin entire, not everted, sometimes renovated.

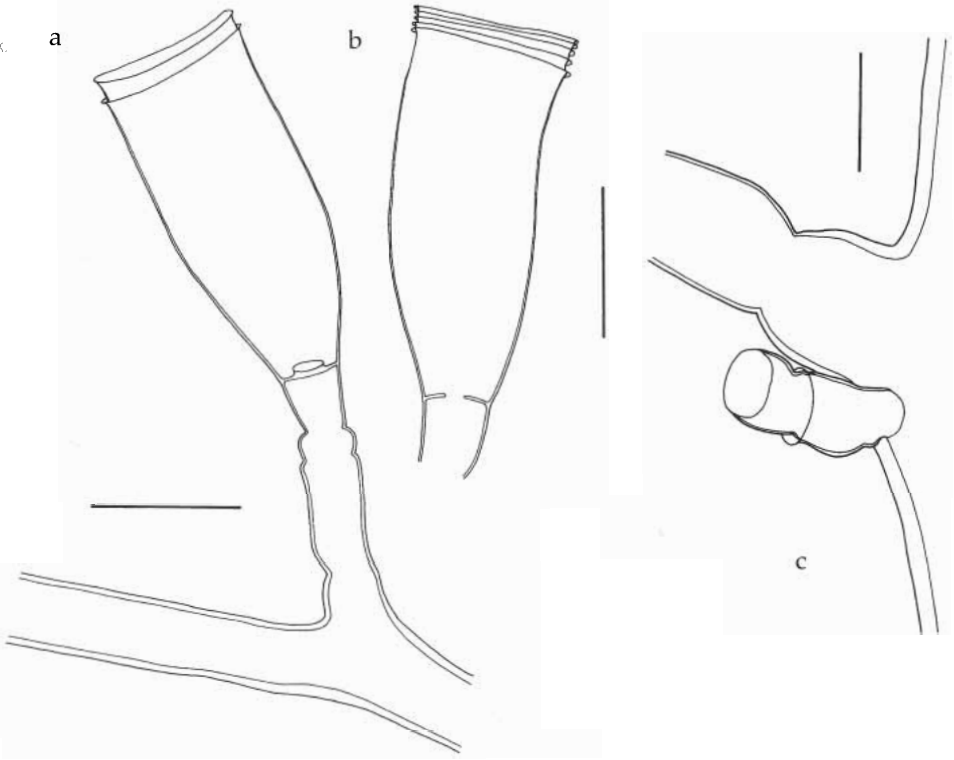


Fig. 16. *Zygophylax leloupi* Ramil & Vervoort, 1992a. a, part of hydrocaulus, with pedicel and hydrotheca; b, hydrotheca; c, nematotheca, with renovated margin, at base of hydrocladial apophysis; all slide 3137. Scale lines for a and b equal 0.25 mm; scale line for c equals 0.10 mm.

Hydrothecal pedicels each separated from its apophysis by node, moderately long, virtually all renovated repeatedly in present material and comprising a series of segments of decreasing age, 344-492  $\mu\text{m}$  long, youngest part immediately below hydrotheca 82-246  $\mu\text{m}$  in length, smooth, narrowest proximally, gradually increasing in diameter distally, merging at diaphragm with base of hydrotheca; diaphragm distinct, slightly oblique, diameter 115-131  $\mu\text{m}$ . Hydrothecae deeply campanulate, somewhat curved, maximum total depth 574-648  $\mu\text{m}$ , walls smooth, perisarc thin; adcauline wall convex except concave below margin; abcauline wall convex; margin entire, flaring, usually renovated, oblique to main axis of hydrotheca, diameter 292-325  $\mu\text{m}$ ; orifice round.

Coppinia not present.

Remarks.— The material studied here corresponds with the description and illustrations of *Zygophylax geniculata* (Clarke, 1894) from three bathyal stations near the Azores (38°30'30"N 26°50'15"W, 845 m; 37°55'N 25°23'45"W, 880 m; 38°45'30"N 28°07'45"W, 1095 m) by Leloup (1940). Ramil & Vervoort (1992a) founded a new species, *Zygophylax leloupi*, for specimens from bathyal bottoms off Morocco, and assigned Leloup's material to it. They considered *Zygophylax geniculata*, a smaller, poorly known species originally described (Clarke, 1894) from a depth of 458 fathoms

(838 m) off the Pacific coast of Panama, to be a different species from the Atlantic hydroids studied by Leloup.

The geographical distribution of this species is restricted to the deeper water of the eastern Atlantic, where it has been found near the Azores, 845-1095 m depth (Leloup, 1940, as *Zygophylax geniculata*) and at the coast of Morocco off Rabat, 890-1378 m depth (Ramil & Vervoort, 1992a). The present record is in the vicinity of the localities given by Leloup (1940).

*Zygophylax levinseni* (Saemundsson, 1911)  
(fig. 17a-c)

*Lictorella Levinseni* Saemundsson, 1911: 86-88, fig. 2a-i.

*Zygophylax levinseni*; Rees & Vervoort, 1987: 72; Ramil & Vervoort, 1992a: 78-82, figs 18a-d, 19a-f; Altuna Prados & Álvarez Claudio, 1995: 6-10, figs 3-4.

*Zygophylax biarmata*; Broch, 1918: 24-25 [not *Zygophylax biarmata* Billard, 1905].

*Zygophylax elegantula* Leloup, 1940: 11-12, pl. 1 fig. 8; Rees & White, 1966: 274; Rees & Vervoort, 1987: 78.

*Zygophylax* sp. Aguirrezabalaga et al., 1988: 229, fig. 12a-f. (Full bibliography).

Type locality.— Iceland, "habitat ad oram meridionalem Islandiae, prope insulas Vestmanneyjar, profund. 510 m" (Saemundsson, 1911).

Material.— Mid-Atlantic Ridge, Faranaut Dive FR 03, colonies and fragments up to 20 mm high, without coppiniae (MNHN-Hy 1221).

Mid-Atlantic Ridge, Faranaut Dive FR 13, on sponge no. 2 (and on *Acryptolaria longitheca* on sponge no. 2), straggling colonies up to 33 mm, without coppiniae, RMNH-Coel. 27308; two colonies 14 and 33 mm high on RMNH-Coel. slides 3156; 14 mm high colony ROMIZ B3005.

Description.— Colonies erect, straggly, up to 3.3 cm high, arising from a creeping hydrorhiza or hydrorhizal mat attached to large sponge spicules; nematothecae abundant on hydrorhiza and on accessory tubes of hydrocaulus, also present on axial tube of hydrocaulus, hydrocladia, and apophyses, occasionally on hydrothecal pedicels. Hydrocaulus geniculate, polysiphonic except at distal end, with axial tube overgrown by accessory tubes; axial tube 124-146  $\mu\text{m}$  wide, bearing fronto-lateral apophyses alternately directed to either side; cauline apophyses each with a hydrotheca, or with a hydrocladium and an axial hydrotheca, one or more lateral nematothecae usually present; hydrocaulus and hydrocladia with distinct transverse nodes at irregular intervals, usually part-way between two apophyses; perisarc thin distally, thick proximally. Hydrocladia occasionally polysiphonic basally but usually monosiphonic throughout, unbranched, often very long, up to 18 mm in length, weakly geniculate, giving rise to frontal apophyses directed left and right at more or less regular intervals; hydrocladial apophyses each supporting a pedicellate hydrotheca and one or more lateral nematothecae or circular indications of their original insertion. Nematothecae tubular with short, often rounded pedicels, margin entire, round, slightly everted, frequently renovated, length of non-renovated part 94-237  $\mu\text{m}$ , 36-55  $\mu\text{m}$  wide at orifice. Hydrothecal pedicels 228-488  $\mu\text{m}$  long, smooth, each delineated from apophysis by a node basally, narrowest proximally, gradually increasing in diameter distally, merging at diaphragm with base of hydrotheca. Hydrothecae cornucopia-

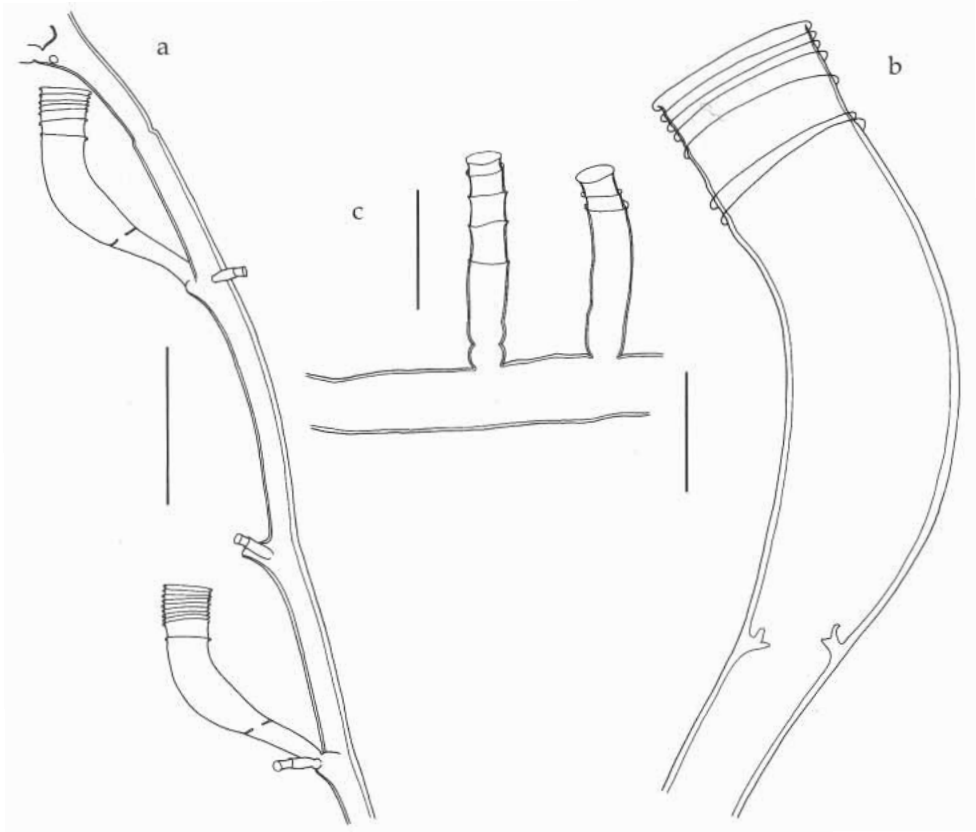


Fig. 17. *Zygophylax levinseni* (Saemundsson, 1911). a, part of hydrocladium, with hydrothecae and nematothecae; b, hydrotheca; c, nematothecae on hydrorhizal tube; all RMNH-Coel. slide 3156. Scale line for a equals 0.5 mm; scale lines for b and c equals 0.10 mm.

shaped, walls smooth, perisarc thin; diaphragm distinct, oblique, 94-117  $\mu\text{m}$  in diameter; adcauline wall very slightly convex basally, concave elsewhere, 361-390  $\mu\text{m}$  long, excluding renovations; abcauline wall convex, length without renovations 445-514  $\mu\text{m}$ ; margin entire, round, slightly flaring, repeatedly renovated, oblique to main axis of hydrotheca, diameter of original opening 166-179  $\mu\text{m}$ .

Coppinia not present.

Remarks.— With slender, elongate, and gradually curved hydrothecae, and moderately long hydrothecal pedicels, these hydroids fit accounts of *Zygophylax levinseni* (Saemundsson, 1911), *Z. sibogae* Billard, 1918, and *Z. elongata* Ramil & Vervoort, 1992a. *Zygophylax abyssicola* (Stechow, 1926) appears to be similar (Ramil & Vervoort, 1992a), but was briefly described and has not been illustrated. All except *Z. abyssicola*, from the Indian Ocean off east Africa, have been reported from the North Atlantic; the type locality of *Z. sibogae*, nevertheless, is near the Kai Islands, Banda Sea.

Unlike *Zygophylax sibogae* as described by Billard (1918), Ralph (1958), Millard (1975), Hirohito (1983), Altuna Prados & Álvarez Claudio (1994), and others, the hydrothecae of Mid-Atlantic Ridge specimens lack the striking outward curvature a

short distance below the margin, and the pedicels are generally shorter than the hydrothecae. *Zygophylax levinseni* is distinguished from *Z. elongata* by the smaller and less curved hydrothecae, shorter hydrothecal pedicels, and laterally curved tubes at the distal ends of the gonothecae, and in lacking nematophorous ramules associated with the coppinia (Ramil & Vervoort, 1992a). Absence of coppiniae in Faranaut material makes an identification of it difficult, particularly since certain species with very similar trophosomes have different gonosomes (Millard, 1977). Nevertheless, the size of hydrothecae and pedicels in our material corresponds more closely with measurements of *Z. levinseni* provided by Ramil & Vervoort (1992a), rather than with those of *Z. elongata*. We have thus referred our material to *Z. levinseni*, an Atlantic deep-water species with a reported bathymetric range of 183-3657 m, and a geographic range from Iceland southward to abyssal bottoms off the Cape Verde Islands (Saemundsson, 1911; Broch, 1918; Leloup, 1940; Ramil & Vervoort, 1992a; Altuna Prados & Álvarez Claudio, 1995). The present localities generally fit into that picture.

Superfamily Sertularioidea Lamouroux, 1812

Family Sertulariidae Lamouroux, 1812

Genus *Diphasia* L. Agassiz, 1862

*Diphasia margareta* (Hassall, 1841)

(fig. 18a, b)

*Sertularia Margareta* Hassall, 1841: 284, pl. 6 figs 3, 4.

*Diphasia margareta*; Cornelius, 1979: 263-265, fig. 11a-c; Izquierdo, García-Corrales, Bacallado & Vervoort, 1990: 32-33, fig. 2. (in figure: *Dyphasia margareta*); Ramil & Vervoort, 1992a: 201-210, figs 52a-c, 53a-g, 54a-e, 55a-c, 56c-e, 57a, 58a-d; Boero & Bouillon, 1993: 264; Altuna Prados, 1995: 54; Álvarez-Claudio & Anadón, 1995: 239; Bouillon, Massin & Kresevic, 1995: 64; Medel & López-González, 1996: 203.

*Diphasia pinaster*; Hincks, 1868: 252-253, pl. 50 fig. 1.

*Diphasia elegans* G.O. Sars, 1874: 107-108, pl. 3 figs 23-26.

*Diphasia pectinata*; Vervoort, 1959: 255-256, figs 23-24. (Restricted bibliography).

Type locality.— *Diphasia margareta*: Ireland (Howth and Giant's Causeway) (Hassall, 1841); *Diphasia elegans*: Norway, "Habitat sat frequens ad insulam Hvitingsö in prof. 150-200 orgyarum, fundo argillaceo" (G.O. Sars, 1874).

Material.— Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 11-2, four fragments of colonies, reaching 2.2 cm high, without gonothecae, two slides 3130, RMNH-Coel. 27280; two colonies, 2.3 and 3.2 cm high, without gonothecae, MNHN-Hy 1145.

Description.— Colonies erect, up to 3.2 cm high, arising from a creeping hydro-rhiza. Hydrocaulus monosiphonic, straight, unbranched or with a single branch arising just below base of a hydrotheca. Basal part of hydrocaulus tubular, athecate, of varied length; remainder of hydrocaulus with opposite to sub-opposite pairs of hydrothecae at regular intervals, nodes mostly indistinct. Perisarc moderately thick. Adjacent hydrothecae of a pair separated from each other front and back, well spaced from adjacent pairs. Hydrothecae slender, horn-shaped with narrow base, 156-213

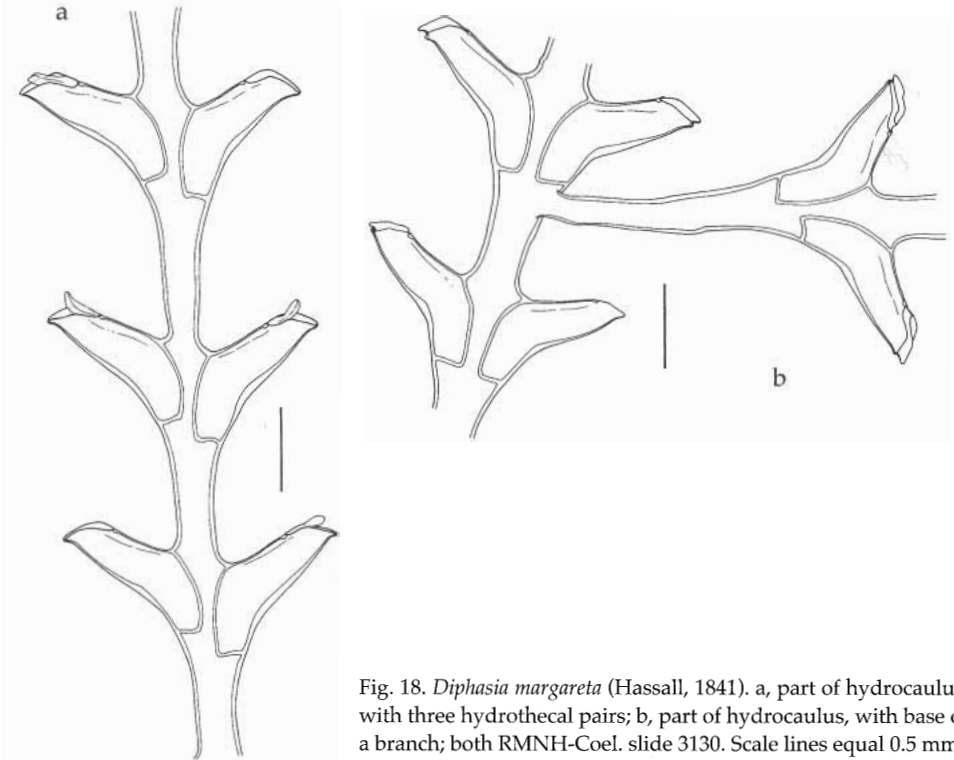


Fig. 18. *Diphasia margareta* (Hassall, 1841). a, part of hydrocaulus, with three hydrothecal pairs; b, part of hydrocaulus, with base of a branch; both RMNH-Coel. slide 3130. Scale lines equal 0.5 mm.

$\mu\text{m}$ , expanding medially, tapering distally; axis oblique to that of internode; curving outwards, with orifice facing upwards and outwards; abcauline wall convex distally, concave medially and just below margin, 804-1050  $\mu\text{m}$  long; adnate portion of adcauline wall convex, 508-640  $\mu\text{m}$  long; free part of adcauline wall essentially straight or slightly concave, 246-492  $\mu\text{m}$  in length. Hydrothecal perisarc thickest just proximal to midpoint of abcauline wall, becoming gradually thinner proximally and distally; perisarc on free part of adcauline wall thin, with a slight thickening just below margin. Hydrothecal walls smooth except for a pair of longitudinal striae along free part of adcauline wall, one each on front and back side, an additional pair also occasionally present. Hydrothecal margin slightly flaring, frequently renovated, with a U-shaped adcauline sinus, marginal teeth two, not prominent; orifice oval, 279-344  $\mu\text{m}$  wide from adcauline sinus to abcauline wall. Operculum consisting of a large fingernail-shaped adcauline valve. Intrathecal teeth absent.

Gonothecae not seen.

Remarks.— The nomenclature of *Diphasia margareta* (Hassall, 1841) was discussed by Cornelius (1979), who recognized the species as distinct from *D. pinastrum* (Cuvier, 1830). He referred Allman's (1888) record of *Diphasia pinaster* (Ellis and Solander, 1786) from Challenger Stn 75 (38°38'N 28°28'30"W, 450 fms (= 823 m), near the Azores and close to the present site, to *D. margareta*.

The morphology of *Diphasia margareta* is highly varied (Ramil & Vervoort, 1992a). Material from the Mid-Atlantic Ridge resembles specimens described and illustrated

from the Strait of Gibraltar by those authors. As in their hydroids, the abcauline wall of the hydrothecae in our specimens lacked a perisarcial ledge, tooth, or fold, and the hydrothecae were long and slender.

*Diphasia margareta* has a reported latitudinal distribution from Norway (G. O. Sars, 1874; as *Diphasia elegans*) to Guinea Bissau (Gili, Vervoort, & Pagès, 1989; as *Diphasia pectinata*) in the eastern Atlantic. Bathymetrically, it has been found between 135 and 1318 m (Ramil & Vervoort, 1992a).

### Genus *Sertularella* Gray, 1848

#### *Sertularella gayi robusta* Allman, 1874 (fig. 19a-b)

*Sertularella Gayi* var. *robusta* Allman, 1873: 186 (nomen nudum).

*Sertularella gayi* var. *robusta* Allman, 1874: 474, pl. 66 figs 3, 3a; Allman, 1877: 22-23, pl. 15 figs 3-5; Fewkes, 1881: 128, 130; Kirchenpauer, 1884: 41, 42, 53; Nutting, 1895: 179, fig. 1; Hartlaub, 1901: 62, 66; Nutting, 1904: 79, fig. 123, pl. 14 figs 6-7; Billard, 1906a: 331; Billard, 1906b: 157, 185, fig. 9B; Bedot, 1912: 354; Bedot, 1916: 204; Bedot, 1918: 238; Bedot, 1925: 370; Stechow, 1925: 483; Vervoort, 1993a: 190.

*Sertularella gayi robusta*; Vervoort, 1972: 118, figs 36c-d; Ramil & Vervoort, 1992a: 223-225, figs 60b, 62a-c.

*Sertularella Gayi* var. *elongata* Billard, 1906: 311; 1906a: 157, 185-186, fig. 9c; Bedot, 1925: 370. (Full bibliography).

Type locality.— Deep water (371-1106 m) west of the Shetland Islands (Allman, 1874).

Material.— Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 10-1, three very young colonies with 3-4 hydrothecae, 6-9 mm high, without gonothecae, RMNH-Coel. 27284.

Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 15-3, one specimen, 10.7 cm high, without gonothecae, RMNH-Coel. 27273; one young colony, 3.1 cm high, and fragments of hydrocladia, without gonothecae, on three slides of which one RMNH-Coel. 3124, one MNHN-Hy 1223, and one ROMIZ B3006.

Description.— Colonies erect, up to 10.7 cm high; small specimens arising from a creeping hydrorhiza, large colony from a hydrorhizal mat. Hydrocaulus polysiphonic basally except in smallest hydroids, nearly straight when strongly polysiphonic, otherwise geniculate; axial tube bearing alternate hydrothecae, nodes oblique, sometimes obliterated; cauline internodes each bearing a hydrotheca at distal end. Large colony more or less alternately branched in one plane; hydrocladia unbranched, monosiphonic, geniculate, up to 2.5 cm long, most often arising from every third cauline internode although this varies, each branch inserting immediately beneath a hydrotheca; nodes of hydrocladia somewhat indistinct, oblique, internodes 1.6-2.7 mm long, 410-525  $\mu$ m wide across nodes, proximalmost internode longest; each internode bearing a hydrotheca distally; hydrothecae alternate. Perisarc thin only in youngest parts of colony; light yellow in colour. Hydrothecae pitcher-shaped, walls essentially smooth, widest at junction of adcauline wall and internode, tapering in either direction and becoming narrowest at base and beneath margin; axis of hydrotheca oblique to that of cauline internode; adcauline wall adnate to internode for 1/2 or less of its

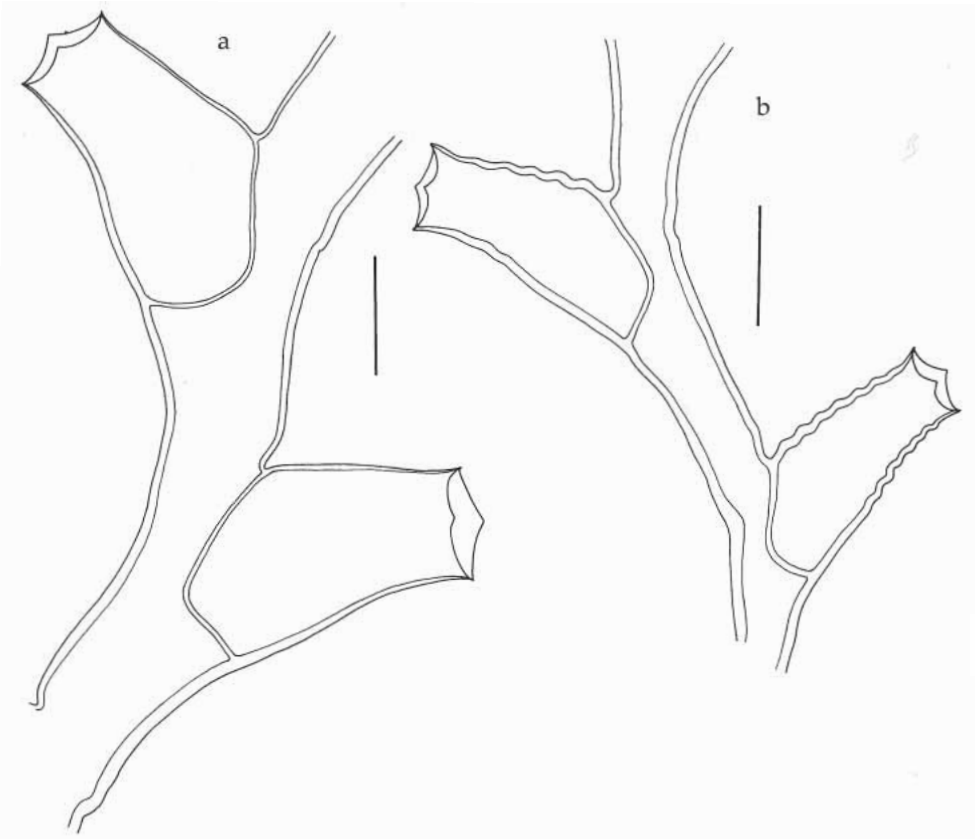


Fig. 19. *Sertularella gayi robusta* Allman, 1874. a, part of hydrocladium, with two hydrothecae, RMNH-Coel. 27273; b, part of hydrocaulus, with two hydrothecae, RMNH-Coel. 27284. Scale lines equal 0.5 mm.

length, convex basally, free part nearly straight except slightly concave immediately below margin, 574-689  $\mu\text{m}$  adnate, 787-968  $\mu\text{m}$  free; abcauline wall slightly convex to straight proximally, concave distally, 1017-1148  $\mu\text{m}$  long; base diameter 344-410  $\mu\text{m}$ ; margin slightly flaring. Hydrothecal orifice 467-508  $\mu\text{m}$  wide from adcauline to abcauline tooth, oblique to main axis of hydrotheca; margin with four distinct, equally developed teeth; submarginal teeth absent. Operculum of four valves. Very young colonies much less robust than large branched one; internode length 1.3-2.1 mm, width across nodes 312-394  $\mu\text{m}$ ; hydrothecae more slender, walls distinctly annulated, with ridges more pronounced on adcauline than on abcauline wall; length of adcauline wall adnate 361-541  $\mu\text{m}$ , free 738-836  $\mu\text{m}$ ; length of abcauline wall 968-1099  $\mu\text{m}$ ; base diameter 254-361  $\mu\text{m}$ ; orifice diameter 361-443  $\mu\text{m}$ .  
Gonothecae not present.

Remarks.— The Menez Gwen material differs from Allman's (1873, 1874) original description of *Sertularella Gayi* var. *robusta* in two ways, both considered insignificant. First, the hydrocladia are given off alternately in one plane, rather than from all sides



of the polysiphonic hydrocaulus. Notably, however, Allman found specimens in some dredgings in which the hydrocladia were "rather more pinnate". Thus, the arrangement of the hydrocladia appears to change with age and size of the colony. Secondly, the hydrocaulus of the large Menez Gwen specimen (RMNH-Coel. 27273) was unbranched, whereas an occasional polysiphonic branch was given off in Allman's material. In more important aspects, our material corresponds so well with *S. gayi robusta* that we are convinced it is the same (sub)species.

Allman (1874) refrained from establishing the robust form as a species distinct from *S. gayi* (Lamouroux, 1821) because he found what he considered transitional forms between the two. We follow Vervoort (1972) and Ramil & Vervoort (1992a) in recognizing this form as a subspecies of *S. gayi*. Hydroids identified as *S. gayi* have been reported from the Azores, near the present collection site, by Jäderholm (1903), Leloup (1940), Rees & White (1966), and Cornelius (1992a). The distribution of *S. gayi robusta* has been summarized by Ramil & Vervoort (1992a: 225); it occurs in deeper water of both the eastern and western Atlantic. The record nearest to the present sites is that from south of Madeira by Billard (1906a, 1906b, as *Sertularella Gayi* var. *elongata* Billard, 1906).

*Sertularella tenella* (Alder, 1856)  
(fig. 20a-b)

*Sertularia tenella* Alder, 1856: 357, pl. 13, figs 3-6.

*Sertularella tenella*; Hincks, 1868: 242, pl. 47, figs 3, 3a-c; Cornelius, 1979: 292-294, fig. 24; Cornelius & Garfath, 1980: 285; Hirohito, 1983: 48, fig. 20; Cornelius & Ryland, 1990: 148, fig. 4.19; Cairns et al., 1991: 26; Boero & Bouillon, 1993: 264; Vervoort, 1993a: 192, 236-238, fig. 54b-e, tab. 44; Bouillon, Massin & Kresevic, 1995: 71; Cornelius, 1995b: 80-81, fig. 19; Hirohito, 1995: 203-205, fig. 67e; Medel & López-González, 1996: 205.

*Sertularella geniculata* Hincks, 1874: 152-153, pl. 7 figs 13-14. (Restricted bibliography).

Type locality.— *Sertularella tenella*: Northumberland, U.K. (Alder, 1856, cf. Cornelius & Garfath, 1980); *Sertularella geniculata*: off Reykjavik, Iceland (Hincks, 1874).

Material.— Lucky Strike hydrothermal field, Mid-Atlantic Ridge, DIVA 2, Dive PL 02, site "Sintra", on coral fragments, three colonies, up to 7 mm high, without gonothecae, RMNH-Coel. 27291; two fragmentary specimens, 7-13 mm high, without gonothecae, slide RMNH-Coel. 3139.

Description.— Colonies erect, up to 13 mm high, arising from a creeping hydro-rhiza. Hydrocaulus monosiphonic, strongly geniculate, unbranched, divided into internodes by deeply cut, oblique nodes sloping alternately in opposite directions; perisarc moderately thick basally, thin distally. Internodes 1.1-2.4 mm long, extremely slender, 115-213  $\mu\text{m}$  wide at nodes, each internode with a varying number of spiral annulations basally, distal end expanded and bearing a hydrotheca. Hydrothecae alternate, widely separated, pitcher-shaped, widest just above base, tapering distally and becoming narrowest below margin, adcauline wall adnate to internode for 1/3 or less of its length, axis of hydrotheca oblique to that of cauline internode; hydrothecal walls distinctly rugose with about six annulations, these more pronounced on adcauline than on abcauline wall; adcauline wall mostly convex, becoming concave imme-

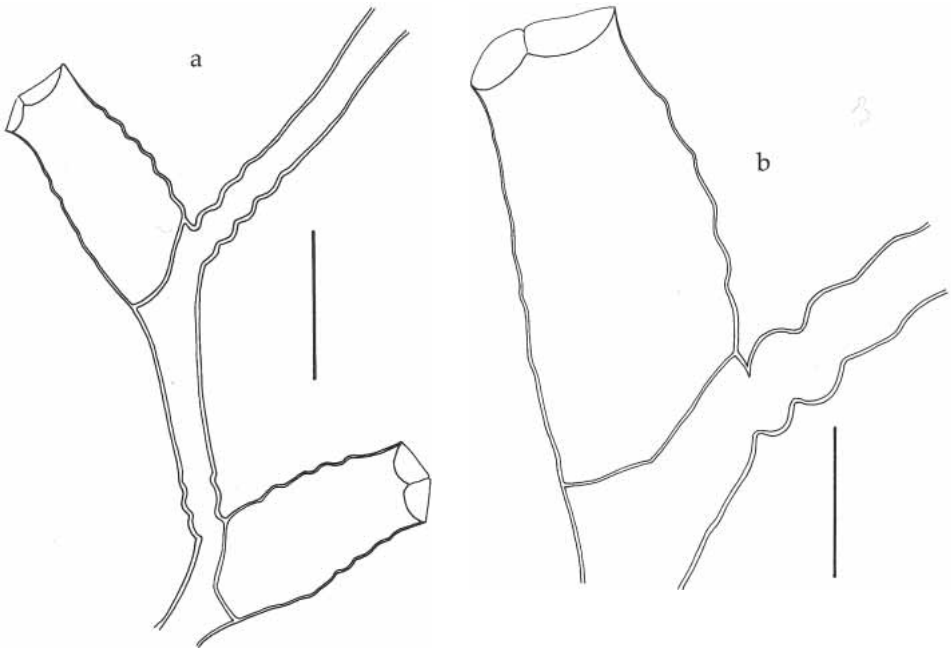


Fig. 20. *Sertularella tenella* (Alder, 1856). a, part of hydrocaulus, with two hydrothecae; b, hydrotheca; both RMNH-Coel. slide 3139. Scale line for a equals 0.5 mm; scale line for b equals 0.25 mm.

diately below margin, 197-279  $\mu\text{m}$  adnate, 672-787  $\mu\text{m}$  free; abcauline wall concave at distal end, nearly straight elsewhere, 738-836  $\mu\text{m}$  long; base diameter 123-197  $\mu\text{m}$ ; margin slightly flaring. Hydrothecal orifice 287-312  $\mu\text{m}$  wide from adcauline to abcauline tooth, perpendicular or nearly so to main axis of hydrotheca; margin with four distinct, equally developed teeth; submarginal teeth absent. Operculum of four valves.

Gonothecae not present.

Remarks.— The morphology of these small and exceedingly slender specimens most closely coincided with the original account of *Sertularella geniculata*, described by Hincks (1874) from material collected off Iceland. Most authors since Hartlaub (1901), except Nutting (1904) and Fraser (1944), have regarded *S. geniculata* to be conspecific with *S. tenella* Alder, 1856. The specimens are also much like hydroids from northern Canada assigned to *S. tenella* by Calder (1970).

Some accounts of *Sertularella gayi robusta* Allman, 1874, appear similar to those of *S. tenella*, although Allman's (1874) description of the subspecies was based on a particularly large (15 cm high), robust, polysiphonic, and regularly branched hydroid species. Mid-Atlantic Ridge material might represent very young colonies of *S. gayi robusta*, but its small and slender colony form appears quite different (compare with young colonies of *S. gayi robusta*, RMNH-Coel. 27284). Thus, we refer the specimens from the "Sintra" site to *S. tenella*.

This near-cosmopolitan species has been recorded from many North Atlantic

localities, ranging from Iceland and Spitzbergen in the north to the coasts of Angola in the south, usually but not exclusively on flustrid Bryozoa in the deeper parts of the littoral zone. It has, however, also been recorded as deep as 1000 m (Naumov, 1960).

Genus *Symplectoscyphus* Marktanner-Turneretscher, 1890

*Symplectoscyphus bathyalis* Vervoort, 1972  
(fig. 21a-b)

*Symplectoscyphus bathyalis* Vervoort, 1972:174, figs 58-59, 60a; Stepan'yants, 1979: 70, pl. 12 fig. 4; Vervoort, 1993a: 239, 242-245, figs 54f-h, 55a-b, d, tab. 45. (Full bibliography).

Type Locality.— Bay of Biscay, 48°04'N 9°23'W, 1828 m (Vervoort, 1972).

Material examined.— Lucky Strike region, Mid-Atlantic Ridge, Alvin 2603, Station 4, one colony, 3.3 cm high, with gonothecae, RMNH-Coel. 27292; six fragments of specimens, up to 1.5 cm high, with gonothecae, two slides of which one RMNH-Coel. 2358 and one MNHN-Hy 1224.

Lucky Strike hydrothermal field, Mid-Atlantic Ridge, DIVA 2, Dive PL 02, site "Sintra", fragment of a colony, 14 mm high, with gonothecae, RMNH-Coel. 27292 as slide 3140.

Description.— Colonies erect, up to 3.3 cm high, arising from creeping hydrorhizae. Hydrocaulus polysiphonic basally in largest colony, monosiphonic throughout in others, with basal part tubular, athecate, of varied length, remaining part strongly geniculate and bearing alternate hydrothecae; branches, when present, essentially alternate, in one plane, secondary branches lacking in present material; hydrocaulus and branches divided into internodes by oblique nodes sloping alternately in opposite directions; perisarc thin in small hydroids, moderately thick in largest specimen. Internodes 1.4-1.9 mm long, very slender, 172-295  $\mu\text{m}$  wide at nodes, each with distal end slightly expanded and bearing a hydrotheca. Hydrothecae widely separated, vase-shaped, narrowest at base, free part expanding slightly in diameter toward distal end, curved outwards, adcauline wall adnate to internode for less than 1/5 of its length, axis of hydrotheca oblique to that of cauline internode; hydrothecal walls smooth; adcauline wall convex basally, nearly straight to slightly concave distally, 205-295  $\mu\text{m}$  adnate, 902-1164  $\mu\text{m}$  free; abcauline wall generally concave throughout, 656-886  $\mu\text{m}$  long; base diameter 213-262  $\mu\text{m}$ ; margin scarcely flaring. Hydrothecal orifice triangular, 402-508  $\mu\text{m}$  wide from adcauline tooth to abcauline sinus, oblique to main axis of hydrotheca; margin frequently renovated, with three distinct, more or less equally developed teeth, one adcauline and two laterals; submarginal teeth absent. Operculum of three triangular valves.

Gonothecae pyriform with about seven well marked, transverse ribs, about 1.7 mm high, 1.0 mm wide at widest point about 2/3 of distance to orifice, occurring on both hydrocaulus and branches, each gonotheca inserting just proximal to base of hydrotheca and to one side of it; aperture distal, small, round, at end of a small funnel-shaped neck.

Remarks.— These hydroids correspond in most respects with the original account of *Symplectoscyphus bathyalis* from the Bay of Biscay, and from abyssal depths off the Golfo de Peñas, Chile, by Vervoort (1972). One of the colonies from the "Lucky

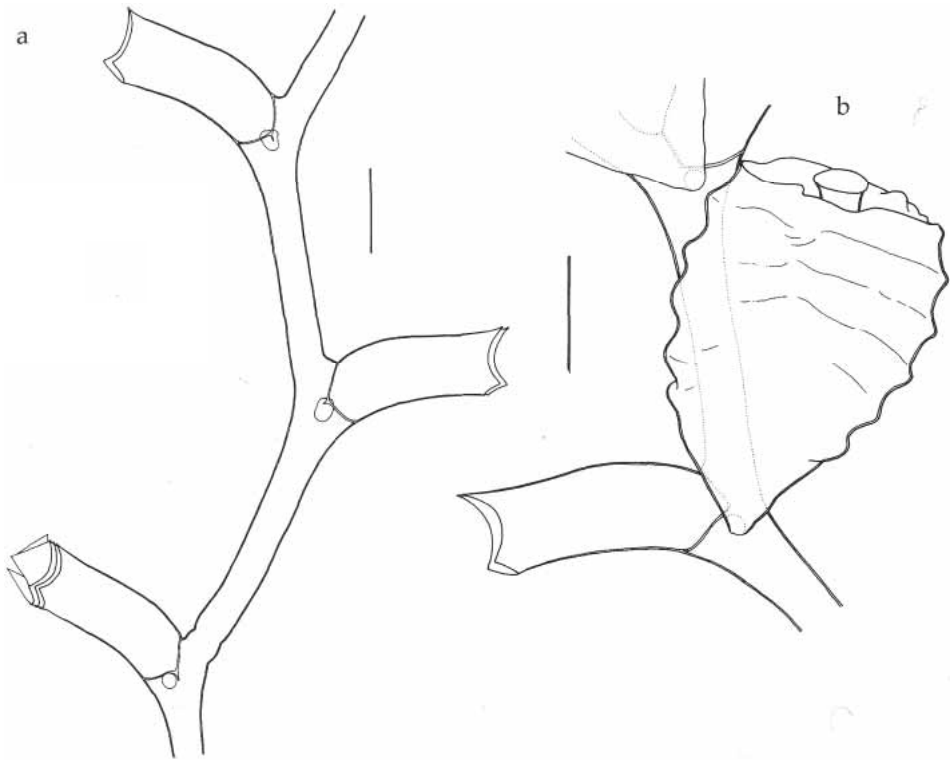


Fig. 21. *Symplectoscyphus bathyalis* Vervoort, 1972. a, part of hydrocaulus, with three hydrothecae; b, part of hydrocaulus, with hydrotheca and gonotheca (somewhat flattened in slide preparation), both RMNH-Coel. slide 2358. Scale lines equal 0.5 mm.

Strike" site (RMNH-Coel. 27292) is weakly polysiphonic basally, as in material of *S. bathyalis* from New Caledonia (Vervoort, 1993a). Hydrothecae of specimens from the Mid-Atlantic Ridge are elongate, even before the renovations of the margin, and especially resemble those of *S. bathyalis* from Chile (Vervoort, 1972). Considerable variation in hydrothecal shape was noted in specimens from New Caledonia by Vervoort (1993a).

*Symplectoscyphus bathyalis* is similar to and possibly conspecific with *S. paulensis* Stechow, 1923a, founded on sterile material. Gonothecae of hydroids ascribed to *S. paulensis* were described by Millard (1967). Like those in *S. bathyalis* (Vervoort, 1972, 1993a), the gonothecal walls of Mid-Atlantic Ridge specimens bear about seven ribs with thickened margins. These ribs are well developed and occur over the distal 2/3 or more of the gonothecae, rather than being light corrugations concentrated over the distal half, as described in *S. paulensis* (Millard, 1967, 1975; Vervoort, 1993a). Based on these differences, we continue to consider the two as separate species.

The species has so far exclusively been recovered from deep water of the Atlantic (Bay of Biscay, 48°04'N 09°23'W, 1828 m, Vervoort, 1972) and of the Pacific (Golfo de

Peñas, Chile, 46°59.5'S, 75°54'W, 2657-2470 m, Vervoort, 1972; northwestern tip of the Norfolk Ridge, SE of New Caledonia, 650-680 m, Vervoort, 1993a). The present records extend the distribution in deep water of the Atlantic Ocean.

Superfamily Plumularioidea McCrady, 1859

Family Plumulariidae McCrady, 1859

Genus *Nemertesia* Lamouroux, 1812

*Nemertesia antennina* (Linnaeus, 1758)

(fig. 22a-d)

*Sertularia antennina* Linnaeus, 1758: 811.

*Nemertesia* (*Sertularia*) *antennina*; Lamouroux, 1812:184.

*Nemertesia antennina*; Bedot, 1921b: 22-23; Cornelius & Ryland, 1990: 152, fig. 4.22; Cairns et al., 1991: 27; Ramil & Vervoort, 1992a: 163-169, figs 42a-r, 43a-h (full synonymy); Dawson, 1992: 17; Boero & Bouillon, 1993: 264; Vervoort, 1993b: 551-552; Álvarez-Claudio & Anadón, 1995: 239; Bouillon, Massin & Krešević, 1995: 59; Cornelius, 1995b: 148-151, fig. 34; Hirohito, 1995 (English text): 264-266, fig. 89a-g; Medel & Vervoort, 1995: 50-52, figs 21, 23b; Álvarez-Claudio, 1996: 16; Medel & López-González, 1996: 202. (Restricted bibliography).

Type Locality.—“Habitat in Oceano” (Linnaeus, 1758).

Material.— Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 12-1, one colony, 8 cm high, with gonothecae, RMNH-Coel. 27278, and two fragments of a c. 70 mm high colony, RMNH-Coel. slide 3128.

Description.— Colonies erect, reaching 8 cm high, arising from a creeping hydro-rhizal mat with numerous long nematothecae. Hydrocaulus coarse, monosiphonic, straight to very slightly geniculate in parts, divided at essentially regular intervals by transverse nodes, cauline internodes 640-1771  $\mu\text{m}$  long, 221-398  $\mu\text{m}$  wide at nodes; proximal cauline internodes each bearing a single distal apophysis, with these alternating more or less to left and right; upper cauline internodes with two opposite apophyses at distal end, with pairs arranged in alternating planes; cauline nematothecae several per internode, at various locations around tube; apophyses very long, directed obliquely upwards, each with a prominent dorsal mamelon proximally, typically with three nematothecae, one each on front and back in axil, and one distal to mamelon, an internal perisarcal ring sometimes visible distally. Perisarc fairly thick basally, thin distally. Hydrocladia long, slender, unbranched, up to 1 cm long, divided into a series of alternating athecate and thecate internodes by distinct, oblique nodes, occasionally with irregularities in the sequence of thecate and athecate internodes, diameter at nodes 42-98  $\mu\text{m}$ , some internodes with an internal perisarcal ring at each end; basal internode usually shortest, 328-672  $\mu\text{m}$ , athecate, commonly with two nematothecae, one at proximal end and one distally; thecate internodes 640-943  $\mu\text{m}$  long, each with one hydrotheca, one median inferior nematotheca well separated from hydrotheca, and two lateral nematothecae extending well beyond hydrothecal margin; athecate internodes 705-1107  $\mu\text{m}$  long, most often with one proximal and one

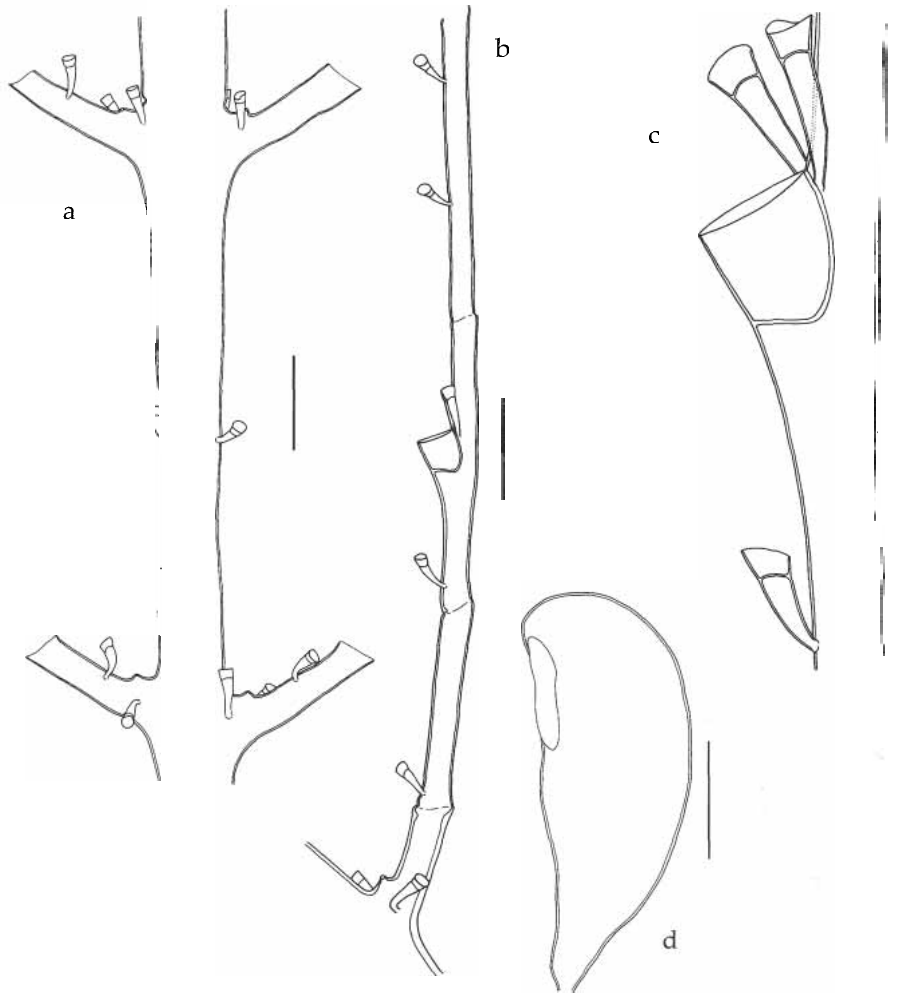


Fig. 22. *Nemertesia antennina* (Linnaeus, 1758). a, part of hydrocaulus, and apophyses, RMNH-Coel. slide 3128; b, apophysis and basal part of hydrocladium, with athecate and thecate internodes, RMNH-Coel. slide 3128; c, part of hydrocladial internode, with hydrotheca and nematothecae, RMNH-Coel. slide 3128; d, gonotheca, RMNH-Coel. 27278. Scale lines for a, b, and d equal 0.25 mm; scale line for c equals 0.10 mm.

distal median nematotheca. All nematothecae bithalamic, movable, conical; unpaired ones (except those on hydrorhiza) frequently with adcauline wall slightly lower than abcauline. Hydrothecae usually near middle of thecate internodes, cup-shaped, small; abcauline wall straight to very slightly convex basally and convex distally, 85-104  $\mu\text{m}$  long; adcauline wall convex, entirely adnate to internode, 111-150  $\mu\text{m}$  long; axis of hydrotheca oblique to that of internode; margin entire, perpendicular to axis of hydrotheca; orifice round, 111-124  $\mu\text{m}$  wide from adcauline to abcauline wall.

Gonophores fixed sporosacs. Fully developed gonothecae sparse in present mate-

rial, arising from apophyses, fusiform, with a short, slender base, length about 980  $\mu\text{m}$ , width 380  $\mu\text{m}$ ; orifice disto-lateral, oval in outline.

Remarks.— The “Menez Gwen” material consists solely of small colonies, although a few gonothecae are present. In these colonies, the hydrocladia are given off alternately and in one plane at the proximal end of the hydrocaulus, and alternately and in two planes at the distal end of the colony. The well developed whorls of hydrocladia frequently considered diagnostic of *Nemertesia* are thus lacking. As shown by Broch (1918), however, the arrangement of the hydrocladia changes from biserial to multiserial with age, at least in certain species of the genus. In *N. antennina*, the number of hydrocladia per row or whorl varies from 2-10, according to Millard (1975).

Five species referable to the genus *Nemertesia* Lamouroux, 1812 have been reported from the region around the Azores: *N. antennina* (Linnaeus, 1758), *N. ramosa* Lamarck, 1816, *N. irregularis* (Quelch, 1885), *N. belini* Bedot, 1916, and *N. incerta* Bedot, 1916 [= *N. ventriculiformis* (Marktanner-Turneretscher, 1890)]. Material from the Menez Gwen site typically has two nematothecae on athecate internodes of the hydrocladia, as reported in *N. irregularis* by Ramil & Vervoort (1992a), but otherwise it most closely corresponds with *N. antennina*, in our opinion.

*Nemertesia antennina* has a wide distribution in neritic and bathyal waters of the North Atlantic, and of other oceans (Fraser, 1944; Ralph, 1961; Millard, 1975; Cornelius, 1995b). The species was reported, together with *Antennella secundaria*, *Polyplumaria flabellata*, and *Nemertesia belini*, as part of a collection from a submarine cable located 32 miles (51.5 km) east-southeast of Pico, Azores, depth 1160 m, by Bedot (1921b). This location is in the vicinity of the “Menez Gwen” site, southwest of the Azores.

*Nemertesia ramosa* (Lamarck, 1816)  
(fig. 23a-c)

*Antennularia ramosa* Lamarck, 1816:123.

*Nemertesia ramosa*; Lamouroux, 1816:164; Rees & Vervoort, 1987: 133-135, fig. 28a-b (full synonymy); Cornelius & Ryland, 1990: 154, fig. 4.22; Cornelius, 1992: 83 et seq.; Ramil & Vervoort, 1992a: 173-176, fig. 44a-f; Boero & Bouillon, 1993: 264; Vervoort, 1993b: 552-553; Álvarez-Claudio & Anadón, 1995: 239; Bouillon, Massin & Kresevic, 1995: 60; Cornelius, 1995b: 155-158, fig. 36; Álvarez-Claudio, 1996: 17; Medel & López-González, 1996: 202-203. (Restricted bibliography).

Type locality.—Europe, “habite dans l’Océan” (Lamarck, 1816: 164).

Material examined.— Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 10-5, one colony, 1.7 cm high, without gonothecae, RMNH-Coel. 27287.

Seamount at Zone 38°20'N, Mid-Atlantic Ridge, DIVA 1, Dive DV 11-5, 788 m, 19.v.1994, one colony, 1.5 cm high, without gonothecae, RMNH-Coel. 27288 as slide 3136.

Description.— Colonies small, erect, reaching 1.7 cm high, arising from a creeping hydrorhizal mat. Hydrocaulus monosiphonic, basal part straight but otherwise geniculate, nodes transverse, at irregular intervals; cauline internodes varied in length, 1.1-4.4 mm long, 66-197  $\mu\text{m}$  in diameter at nodes, with from 1-8 apophyses and a varying number of lateral nematothecae; apophyses very long, directed obliquely upwards,

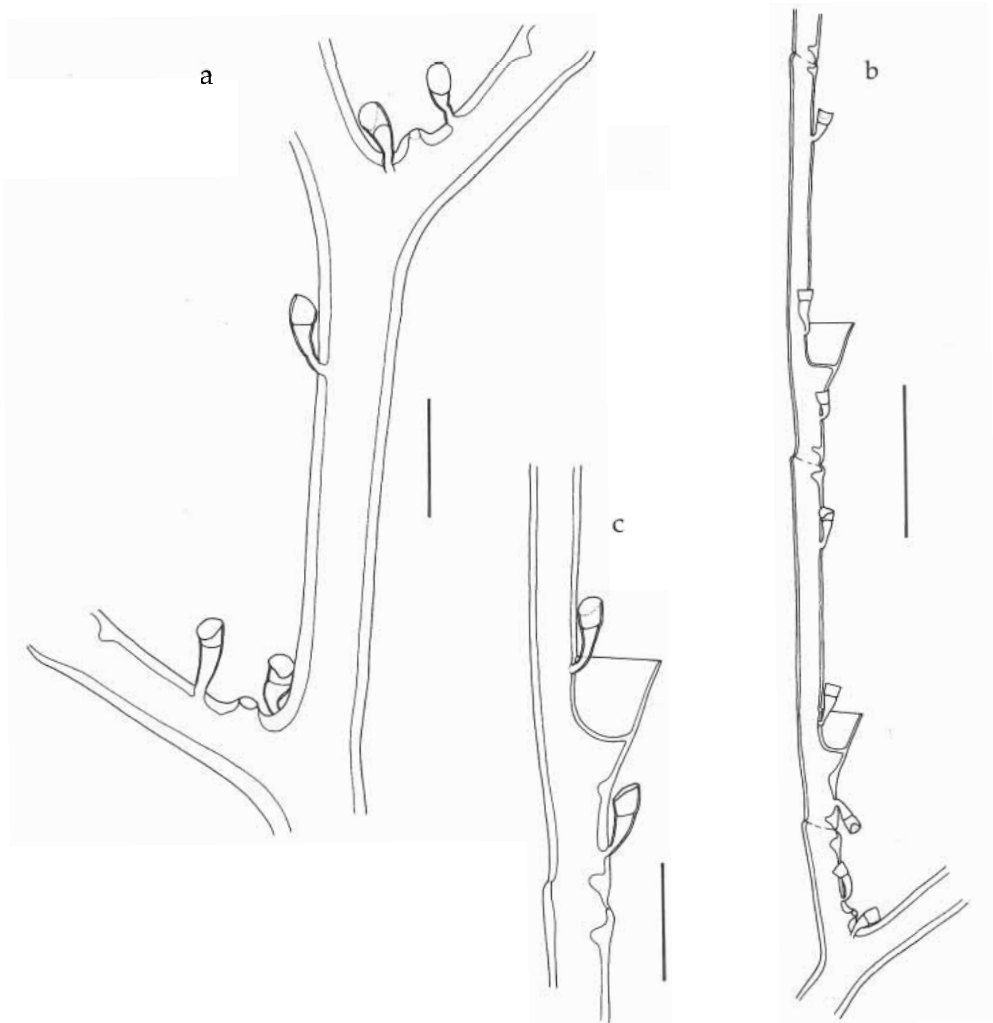


Fig. 23. *Nemertesia ramosa* (Lamarck, 1816). a, part of hydrocaulus, and two apophyses; b, apophysis and basal part of hydrocladium with thecate internodes; c, part of hydrocladial internode, with hydrotheca and nematotheca; all RMNH-Coel. slide 3136. Scale lines for a and c equal 0.10 mm; scale for b equals 0.25 mm.

given off alternately from left and right sides of hydrocaulus, each with a prominent dorsal mamelon, two nematothecae (or perisarcal pores indicating their location), one axillary and one distal to mamelon, and a distal internal perisarcal ring. Perisarc fairly thick basally, thinner distally. Hydrocladia with a maximum of five hydrothecae per clade, unbranched, up to 3.7 mm long, weakly curved with dorsal and frontal sides slightly convex, divided into a series of long, slender internodes by distinct, oblique nodes; regenerated branches with first internode of hydrocladium sometimes appearing short and athecate, otherwise all hydrocladial internodes thecate, 670-1070  $\mu\text{m}$  long, 40-70  $\mu\text{m}$  wide across nodes, with a distinct internal perisarcal ring at proximal



and distal ends, occasionally with 1-2 additional rings proximal to base of hydrotheca; each internode with one hydrotheca, one median inferior nematotheca well separated from hydrotheca, two lateral nematothecae extending considerably beyond hydrothecal margin, and one median superior nematotheca; all nematothecae bithalamic and movable, sometimes missing. Hydrothecae at proximal end of internode, cup-shaped, small; abcauline wall straight to slightly convex basally and concave distally, 60-91  $\mu\text{m}$  long; adcauline wall convex, entirely adnate to internode, 60-88  $\mu\text{m}$  long; axis of hydrotheca nearly parallel to that of internode; margin entire, perpendicular to axis of hydrotheca; orifice round, 78-94  $\mu\text{m}$  wide from adcauline to abcauline wall.

Gonothecae not present.

Remarks.— Our identifications of these two specimens are somewhat doubtful because both are small and their hydrocladia are biserial instead of multiserial in arrangement. Nevertheless, they conform with diagnoses of the genus *Nemertesia*, and of *Nemertesia ramosa* (Lamarck, 1816), in their morphology. Characters we consider significant, singly or in combination, include the presence of: (1) very long hydrocladial apophyses, each with a prominent basal mamelon, (2) one axillary nematotheca on each apophysis, and another distal to the mamelon, (3) homomerously segmented hydrocladia, with even the first internode thecate, (4) long and slender hydrocladial internodes, each with more or less distinct septa at the proximal and distal ends, (5) shallow, cup-shaped, and entirely adnate hydrothecae, with the abcauline walls slightly longer than the adcauline ones, (6) typically four nematothecae per hydrocladial internode (one median inferior, one pair of laterals, and one superior). The specimens also correspond very closely with the descriptions and illustrations of young colonies of *N. ramosa*, from bathyal waters south of Iceland, by Broch (1918). Finally, they resemble the descriptions and illustrations of hydroids, from the vicinity of the Strait of Gibraltar, that were identified as *N. ramosa* by Ramil & Vervoort (1992a).

Ramil & Vervoort (1992a) concluded that reliable records of *Nemertesia ramosa* existed only for locations in the Atlantic Ocean. The known latitudinal range of the species is from Iceland, the Faeroes, and Scotland (Broch, 1918) southward to South Africa (Millard, 1975). It was also reported along the southeast coast of Africa, in the Indian Ocean, by Millard. *Nemertesia simplex* (Allman, 1877) and *N. rugosa* (Nutting, 1900) from the western North Atlantic appear to be similar, but both need further study. *Nemertesia ramosa* has been reported previously from the Azores region, although from the neritic zone, by Pictet & Bedot (1900), Bedot (1921b), Rees & White (1966), and Cornelius (1992a). However, the species has been recorded as deep as 1182 m, off Morocco, by Ramil & Vervoort (1992a).

Lamouroux (1816) is sometimes credited as the author of the specific name *ramosa*, as used in the binomen *Nemertesia ramosa*, but his usage of it was predated by Lamarck's (1816), according to Van Praët (1979: 872, 915).

Family Halopterididae Millard, 1962

Genus *Polyplumaria* G. O. Sars, 1874

The authors disagree concerning the family assignation of this genus. One of us

(W.V.) is inclined, pending a cladistic study of Plumularioidea, to follow Schuchert (1997) in placing this genus in Plumulariidae; however the views of the co-author have here been followed (cf. Calder, 1997).

*Polyplumaria flabellata* G.O. Sars, 1874  
(fig. 24a-c)

*Polyplumaria flabellata* G. O. Sars, 1874: 101, pl. 2 figs 16-22; Cornelius & Ryland, 1990: 154, fig. 4.23; Ramil & Vervoort, 1992a: 193-197, fig. 50a-g; Altuna Prados, 1995: 54; Álvarez-Claudio & Anadón, 1995: 239; Cornelius, 1995b: 163-165, fig. 38; Medel & Vervoort, 1995: 61-63, fig. 26; Bouillon, Massin & Kreševic, 1995: 62; Álvarez-Claudio, 1996: 17-18; Medel & López-González, 1996: 203. (Restricted bibliography).

Type locality.— Norway, "habitat haud frequens ad insulam Hvitingso in prof. 80-100 orgyarum spongiis affixa" (G.O. Sars, 1874).

Material examined.— Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 12-5, two colonies, 7-18 cm high, with gonothecae, RMNH-Coel. 27275; three specimens, 3.5 cm high, two with gonothecae and one without, three slides 3126.

Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 13-5, one specimen, 3.5 cm high, and pieces of three branches, with gonothecae, two slides 3129, one as RMNH-Coel. 27279, one as ROMIZ B3007; two colonies (or one colony broken in two), 13-17 cm high, with gonothecae, MNHN-Hy 1144.

Description.— Colonies up to 18 cm high, all broken off basally. Hydrocaulus polysiphonic except at extreme distal end, pinnately branched; branches opposite, in one plane, polysiphonic except distally, arising from accessory tubes of hydrocaulus, a few branches with secondary branches and resembling hydrocaulus. Axial tubes of hydrocaulus and branches frontal with accessory tubes posterior in younger parts of colony, completely overgrown in older parts, divided at irregular intervals by nodes into internodes of varied length with a varying number of apophyses; apophyses large, fronto-lateral, directed obliquely outwards and forwards, given off alternately towards left and right sides along axial tube, each with a prominent axillary mamelon and commonly with three nematothecae, two axillary and one distal to mamelon. Nematothecae abundant on axial and accessory tubes of hydrocaulus and branches, occurring at various locations around these tubes. Perisarc thick except at youngest points of colony. Hydrocladia unbranched, reaching about 3 mm long, weakly curved with upper side convex; basal internode of hydrocladium short, 215-273  $\mu\text{m}$  in length, athecate, with one median nematotheca, node transverse or nearly so at proximal end, decidedly oblique at distal; remaining internodes of hydrocladium typically thecate with nodes strongly oblique at both ends, length 449-657  $\mu\text{m}$ , diameter across nodes 72-104  $\mu\text{m}$ , each internode with one hydrotheca, one median inferior nematotheca reaching to hydrothecal base, one pair of lateral nematothecae on distinct apophyses, an additional pair of laterals with one flanking each side of free adcauline wall of hydrotheca, and 1-3 median superior nematothecae; all nematothecae bithalamic, movable, conical with an adcauline sinus; hydrocladium occasionally with an athecate internode intermediate between thecate ones. Hydrothecae large, deeply campanulate, occurring at proximal end of internode, axis of hydrotheca at angle of about 45 degrees to that of internode; abcauline wall with a slight convexity in mid-

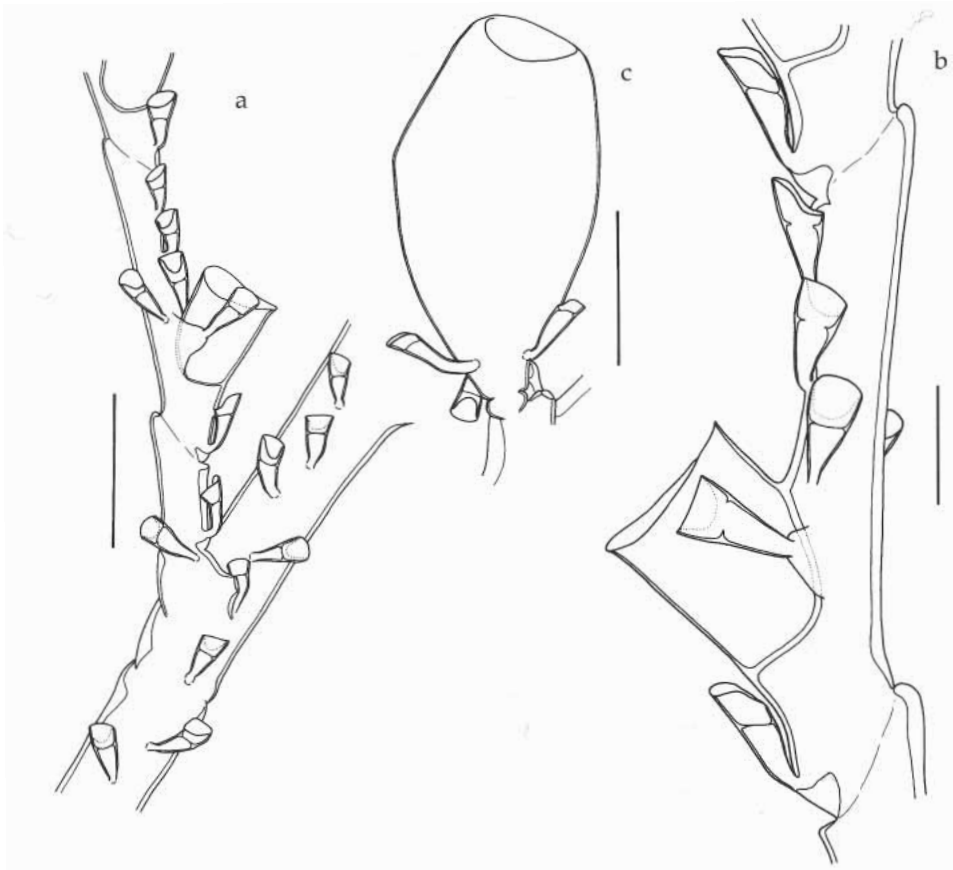


Fig. 24. *Polyplumaria flabellata* G. O. Sars, 1874. a, central axis of a branch, with apophysis and base of a hydrocladium; b, internode of hydrocladium, with hydrotheca and nematothecae; c, gonotheca, with basal nematothecae; all RMNH-Coel. slide 3126. Scale lines for a and c equal 0.25 mm; scale line for b equals 0.10 mm.

region, 176-228  $\mu\text{m}$  long; adcauline wall more than 1/3 free, adnate part generally convex, 130-153  $\mu\text{m}$  long, free part concave, 78-104  $\mu\text{m}$  in length; margin entire, slightly flaring, perpendicular to axis of hydrotheca; orifice round, 146-163  $\mu\text{m}$  wide from adcauline to abcauline wall. Gonophores fixed sporosacs. Gonothecae arising by short pedicels from apophyses of axial tubes on both hydrocaulus and branches, cornucopia shaped with tapered base, walls smooth, perisarc thin; total length of gonotheca excluding pedicel about 650  $\mu\text{m}$ , width at widest point 380  $\mu\text{m}$ ; gonothecal aperture apical, 175  $\mu\text{m}$  wide, with an opercular lid; commonly with 3-4 nematothecae at proximal end.

Remarks.— These specimens correspond very closely with the original account of *Polyplumaria flabellata* by G.O. Sars (1874), and are considered conspecific with that species. As in Sars's material, few of the hydrocladia are branched, and any secondary hydrocladia resemble the primary ones except in being shorter. No aberrant sec-

ondary hydrocladia, such as the long and slender athecate ones described in material from the Strait of Gibraltar region by Ramil & Vervoort (1992a), were observed.

*Polyplumaria flabellata* is known only from the eastern North and South Atlantic, with a reported range from Norway (G.O. Sars, 1874) and Iceland (Kramp, 1938) to upper bathyal waters off the Congo River (Vervoort, 1966). It extends bathymetrically from deeper neritic waters on downward well into the bathyal zone. The present localities well fit into the general pattern of the geographical distribution of the species.

Family Aglaopheniidae Marktanner-Turneretscher, 1890  
Subfamily Aglaopheniinae Marktanner-Turneretscher, 1890  
Tribe Cladocarpini Calder, 1997

Genus *Cladocarpus* Allman, 1874

*Cladocarpus cartieri* Bedot, 1921  
(fig. 25a-d)

*Cladocarpus pectiniferus*; Pictet & Bedot, 1900: 49 [not *Cladocarpus pectiniferus* Allman, 1883].

*Cladocarpus cartieri* Bedot, 1921a: 326 [nomen nudum]; Ramil & Vervoort, 1992a: 101-103, fig. 25a-e.

*Cladocarpus* (?) *cartieri* Bedot, 1921b: 56, pl. 6 figs 59-60. (Full bibliography).

Type Locality.—“Stn 247, profondeur 318 m. Près de Pico, Açores” (Bedot, 1921b). The coordinates of this station were given in Ramil & Vervoort (1992a) as 38°24'N 28°01'25"W.

Material examined.—Menez Gwen region, Mid-Atlantic Ridge, DIVA 1, Dive DV 12-5, two fragmentary specimens, 1 cm high, without phylactocarps, slide 3135, RMNH-Coel. 27286.

Description.—Fragmentary colonies erect, up to 1 cm high, arising from an unknown substrate. Hydrocaulus monosiphonic, unbranched, lacking internal perisarc ridges (“septa”); proximal part long, slender, somewhat crooked, with thick perisarc, nodes at irregular intervals, lacking apophyses and hydrocladia, with cauline nematothecae only at upper end, one of specimens also with several hydrothecae in this region; distal part divided into internodes by indistinct nodes; internodes slender, 640-820  $\mu$ m long, 104-124  $\mu$ m wide at nodes, each with a lateral apophysis distally and with three nematothecae, one cauline nematotheca on frontal side almost midway along internode and two axillary nematothecae, one on either side of apophysis. Apophyses relatively short, given off alternately from opposite sides of hydrocaulus, each directed upwards, supporting a hydrocladium. Hydrocladia unbranched, each inserted directly on apophysis, up to 3 mm long, with as many as five hydrothecae, divided into long internodes by slightly oblique nodes. Hydrocladial internodes 738-820  $\mu$ m long, slender, 85-96  $\mu$ m wide at nodes, each with one frontally-placed hydrotheca, one median inferior nematotheca, and one pair of lateral nematothecae; internodal ridges including one at base of inferior nematotheca, one on either side of intrathecal shelf, and occasionally with 1-2 others beneath hydrotheca. Hydrothecae well separated from each other, elongate, with a distinct bend just posterior to mid-region,

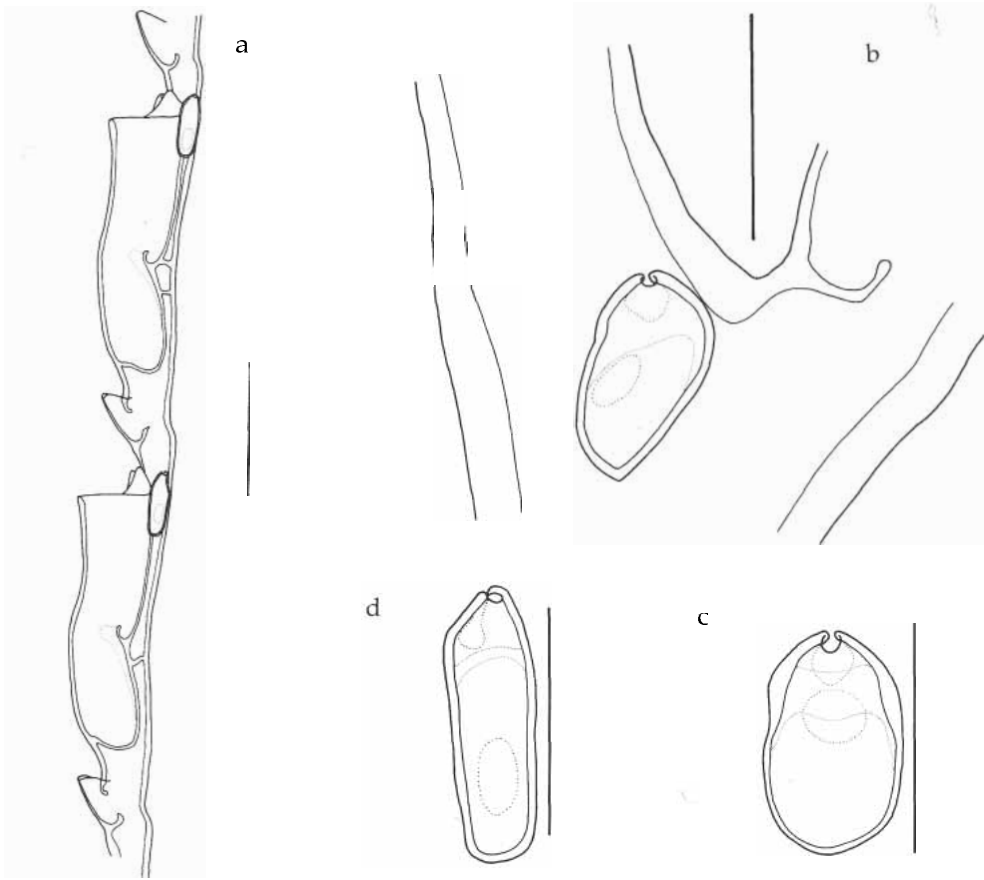


Fig. 25. *Cladocarpus cartieri* Bedot, 1921b. a, part of hydrocladium, with two hydrothecae and adjacent nematothecae; b, axillary nematotheca; c, cauline nematotheca; d, lateral nematotheca; all RMNH-Coel. slide 3135. Scale line for a equals 0.25 mm; scale lines for b, c and d equal 100  $\mu$ m.

total length 468-533  $\mu$ m; adcauline wall entirely adnate, divided into two convex parts by a prominent constriction associated with an intrathecal perisarcal shelf, proximal part of wall shorter than distal; abcauline wall convex basally, concave over distal half; perisarc of moderate thickness. Hydrothecal aperture about 137-156  $\mu$ m in diameter from adcauline to abcauline wall, plane of orifice very slightly oblique to axis of internode, margin entire except for a triangular anterior extension of adcauline wall between lateral nematothecae. Median inferior nematotheca one-chambered, immovable, anvil-shaped, separated from hydrotheca, aperture scoop-shaped, basal opening to internode large. Lateral nematothecae bottle-shaped, 117-138  $\mu$ m long, one-chambered, immovable, projecting beyond hydrothecal margin, aperture slit-shaped, facing hydrothecal orifice, nematothecal chamber with large opening into lumen of internode.

Phylactocarps not present.

Remarks.— The type material of *Cladocarpus cartieri* was incorrectly identified as *Cladocarpus pectiniferus* Allman, 1883, by Pictet and Bedot (1900). The name *C. cartieri* first appeared as a nomen nudum (Bedot, 1921a, May), but was made available later that year by Bedot (1921b, December).

Our present report of *Cladocarpus cartieri* apparently represents the first record of the species since its original description by Bedot (1921b). The type material, from a station (38°24'N 28°01'25"W, 318 m) near Pico, Azores, was examined, described, and illustrated by Ramil & Vervoort (1992a). The phylactocarp of *C. cartieri* has yet to be described. Ramil & Vervoort (1992b) have drawn attention to the necessity to reconsider the genus allocation of several species hitherto classified in *Cladocarpus* because of differences in the structure of the gonosome. These morphological differences make it necessary to remove species that agree in structure of the phylactocarp with *Cladocarpus pectiniferus* (Allman, 1883) to the genus *Streptocaulus* Allman, 1883, type *Streptocaulus pulcherrimus* Allman, 1883 (for details see Ramil & Vervoort, 1992b), leaving in *Cladocarpus* the species that have a phylactocarpal morphology comparable to that of its type, *Cladocarpus formosus* Allman, 1874, and for the time being also such species of which the gonosome is still unknown. The genus allocation of *Cladocarpus carteri* Bedot, 1921b, with unknown gonosome, consequently is provisional.

### Acknowledgements

One of us (DRC) wishes to acknowledge support of the Natural Sciences and Engineering Research Council of Canada; thanks are also due to the Netherlands Organization for Scientific Research (Nederlandse Organisatie voor Wetenschappelijk Onderzoek, NWO) for funding to visit the Nationaal Natuurhistorisch Museum (Leiden), where much of this work was carried out. The authors wish to express their gratitude to the chief scientists J.-M. Auzende (Vemanaut), H. Bougault (Faranaut), Y. Fouquet (DIVA 1), A.-M. Alayse & D. Desbruyères (DIVA 2), all IFREMER, Brest, France; C. Langmuir (Lucky Strike), Lamont-Doherty Earth Observatory, U.S.A., J. Dubois (Gravinaut), Institut de Physique du Globe, Paris, as well as to the crews of both vessels and submersibles 'Nautilie' and 'Alvin', that participated in the cruises. We extend our gratitude to Dr. Michel Segonzac, director of CENTOB (IFREMER, Brest, France), for providing the hydroid specimens and the map reproduced here as figure 1.

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Received: 27.xi.1997

Accepted: 10.xii.1997

Edited: J.C. den Hartog

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