

# Hydroids of the family Halopterididae (Cnidaria, Hydrozoa) collected in the western Pacific by various French expeditions

**José ANSÍN AGÍS**

Facultade de Ciencias do Mar, Universidade de Vigo,  
Departamento de Ecoloxía e Bioloxía Animal,  
Campus Lagoas-Marcosende, E-36310 Vigo (Spain)  
agis@uvigo.es

**Willem VERVOORT**

Nationaal Natuurhistorisch Museum, P.O. Box 9517,  
NL-2300 RA Leiden (The Netherlands)  
vervoort@naturalis.nnm.nl

**Fran RAMIL**

Facultade de Ciencias do Mar, Universidade de Vigo,  
Departamento de Ecoloxía e Bioloxía Animal,  
Campus Lagoas-Marcosende, E-36310 Vigo (Spain)  
framil@uvigo.es

---

Ansín Agis J., Vervoort W. & Ramil F. 2009. — Hydroids of the family Halopterididae (Cnidaria, Hydrozoa) collected in the western Pacific by various French expeditions. *Zoosystema* 31 (1): 33-61.

## ABSTRACT

This paper is the second result of the study of large collections of Plumulari-oidea (Cnidaria, Hydrozoa, Leptolida), collected in the seas surrounding New Caledonia, in the Philippines and in Indonesian waters by French expeditions. A total of 13 species belonging to the genera *Antennella* (five species), *Cladoplumaria* (one species), *Halopteris* (four species), *Monostaechas* (two species) and *Corhiza* (one species) are described or mentioned in the present report; most of which are illustrated. Three new species, *Antennella sinuosa* n. sp., *Antennella megatheca* n. sp. and *Corhiza pauciarmata* n. sp. are described and another, *Halopteris concava* (Billard, 1911) is recorded for the first time since the original description. Two species, *Antennella* sp. and *Monostaechas* sp. are only identified to the genus level.

## KEY WORDS

Cnidaria,  
Hydrozoa,  
Leptolida (Hydroida),  
Halopterididae,  
Pacific Ocean,  
new species.

## RÉSUMÉ

*Hydres de la famille Halopterididae (Cnidaria, Hydrozoa) récoltés par plusieurs expéditions françaises dans le Pacifique occidental.*

Ce travail est la deuxième publication sur l'étude d'une grande collection d'Hydroïdes de la superfamille Plumularioidea (Cnidaria, Hydrozoa, Leptolida) provenant de diverses campagnes françaises faites dans la région de la Nouvelle-Calédonie, aux Philippines et en Indonésie. Treize espèces, appartenant aux genres *Antennella* (cinq espèces), *Cladoplumaria* (une espèce), *Halopteris* (quatre espèces), *Monostaechas* (deux espèces) et *Corhiza* (une espèce), sont décrites ou mentionnées dans cette étude et la plupart sont aussi figurées. Trois espèces, *Antennella sinuosa* n. sp., *Antennella megatheca* n. sp. et *Corhiza pauciarinata* n. sp., sont décrites comme nouvelles et *Halopteris concava* (Billard, 1911) est signalée pour la première fois après sa description originale. Deux espèces, *Antennella* sp. et *Monostaechas* sp. ont été identifiées seulement au niveau du genre.

## MOTS CLÉS

Cnidaria,  
Hydrozoa,  
Leptolida (Hydroïda),  
Halopterididae,  
océan Pacifique,  
espèces nouvelles.

## INTRODUCTION

Since 1978, the Institut français de Recherche scientifique pour le Développement en Coopération (ORSTOM, now Institut de Recherche pour le Développement), centre de Nouméa has sampled the marine fauna of the New Caledonian region in the southwestern Pacific Ocean between 10°-30°S and 160°-175°E. During these expeditions large and interesting collections of Leptolida (Cnidaria, Hydrozoa) were obtained that so far have been only partly studied. Additional material was collected in the Philippine area and in Indonesian waters. The results of a detailed study of two families, Thyroscyphidae Stechow, 1920 and Sertulariidae Lamouroux, 1812, have been published so far (Vervoort 1993). The present paper is based on the study of a part of the large collection of the superfamily Plumularioidea McCrady, 1859 and reports the description of 10 species belonging to the family Halopterididae Millard, 1962. In addition two new species of *Antennella* Allman, 1877 and one of *Corhiza* Millard, 1962 are described. Another, *Halopteris concava* (Billard, 1911), is recorded for the first time since the original description.

## ABBREVIATIONS

MNHN Muséum national d'Histoire naturelle, Paris;

RMNH National Museum of Natural History (Nationaal Natuurhistorisch Museum), Leiden;  
CP beam trawl;  
DC Charcot dredge;  
DR rocky bottom dredge;  
DW Warén dredge.

## MATERIAL

Station data on the specimens examined in the present study are summarized in Table 1.

## SYSTEMATICS

Superfamily PLUMULARIOIDEA

McCrady, 1859

Family HALOPTERIDIDAE Millard, 1962

Genus *Antennella* Allman, 1877

*Antennella secundaria* (Gmelin, 1791)

*Sertularia secundaria* Gmelin, 1791: 3856.

*Antennella secundaria* – Millard 1975: 332, fig. 107F-L. — Rees & Vervoort 1987: 113, fig. 23a, b. — Ramil & Vervoort 1992: 143, fig. 37a-d. — Schuchert 1997: 14, figs 3a-g, 4a-e, tab. 1. — Ansín Agís *et al.* 2001:

TABLE 1. — List of stations and Halopterididae species collected in western Pacific. Abbreviations: **Ame**, *Antennella megatheca* n. sp.; **Ase**, *A. secundaria* (Gmelin 1791); **Asi**, *A. sinuosa* n. sp.; **Asp**, *Antennella* sp.; **Ava**, *A. varians* (Billard, 1911); **Can**, *Cladoplumaria anomala* Ansin Agis, Ramil & Vervoort, 2004; **Cpa**, *Corhiza pauciamata* n. sp.; **Hca**, *Halopterus campanula* (Busk, 1852); **Hco**, *H. concava* (Billard, 1911); **Hin**, *H. infundibulum* Vervoort, 1966; **Hpo**, *H. polymorpha* (Billard, 1913); **Mqu**, *Monostaechas quadridens* (McCrary, 1859); **Msp**, *Monostaechas* sp.

Locality	Cruise	Stations	Coordinates	Depth (m)	Date	Species collected	
Makassar Strait Philippines	CORINDON 2 MUSORSTOM 3	stn 210	00°14.9'S, 117°53.5'E	338	31.X.1980	<i>Hco</i>	
		stn DR 117	12°31.2'N, 120°39.3'E	92-97	3.VI.1985	<i>Ase; Hco; Mqu</i>	
		stn CP 131	11°36.6'N, 121°43.10'E	111-113	5.VI.1985	<i>Mqu</i>	
Chesterfield Islands	CHALCAL 1	stn CP 5	19°29.10'S, 158°37.63'E	290	16.VII.1984	<i>Can</i>	
		stn CP 12	20°34.30'S, 158°47.40'E	67	23.VII.1984	<i>Mqu</i>	
		stn DC 39	20°28.90'S, 158°48.70'E	40	23.VII.1984	<i>Mqu</i>	
Coral Sea New Caledonia	CHALCAL 1 LAGON	stn P4	19°07.37'S, 158°33.37'E	50	18.VII.1984	<i>Hpo</i>	
		stn 0129	22°30.5'S, 166°47.2'E	45	23.VIII.1984	<i>Ase</i>	
		stn 0420	22°44.2'S, 167°08.9'E	345	24.I.1985	<i>Hca</i>	
	BIOCAL 1	stn DW 36	23°08.647'-23°08.900'S, 167°10.994'-167°11.296'E	650-680	29.VIII.1985	<i>Hin</i>	
		stn DW 38	22°59.74'S, 167°15.31'E	360	30.VIII.1985	<i>Ame</i>	
		stn DW 41	22°45.133'-22°45.129'S, 167°11.744'-167°11.998'E	380-410	30.VIII.1985	<i>Ame</i>	
		stn DW 77	22°15.329'-22°15.659'S, 167°15.405'-167°15.498'E	440	5.IX.1985	<i>Hca</i>	
		stn CP 108	22°02.522'-22°02.735'S, 167°05.680'-167°06.050'E	335	9.IX.1985	<i>Hca; Mqu</i>	
		stn CP 110	22°12.383'-22°13.315'S, 167°06.434'-167°09.936'E	275-320	9.IX.1985	<i>Hca; Mqu</i>	
		MUSORSTOM 4	stn CP 155	18°52.8'S, 163°19.5'E	500-570	15.IX.1985	<i>Asi</i>
			stn DW 162	18°35.0'S, 163°10.3'E	525	16.IX.1985	<i>Hca</i>
			stn CP 171	18°57.8'S, 163°14.0'E	435	17.IX.1985	<i>Hca</i>
stn CP 180	18°56.8'S, 163°17.7'E		450	18.IX.1985	<i>Hca</i>		
stn 0599	22°17.0'S, 167°06'E		50	5.VIII.1986	<i>Hca</i>		
LAGON							
MUSORSTOM 5 CHALCAL 2 CALSUB	stn DC 388	20°45.35'S, 160°53.69'E	500-510	22.X.1986	<i>Ava</i>		
	stn DW 76	23°40.50'S, 167°45.20'E	470	30.X.1986	<i>Hca; Mqu</i>		
	stn PI 19	22°46'S, 167°20'E	416-404	10.III.1989	<i>Hca</i>		
Loyalty Islands	MUSORSTOM 6	stn DW 391	20°47.35'S, 167°05.70'E	390	13.II.1989	<i>Hca</i>	
		stn DW 461	21°06.00'S, 167°26.20'E	240	21.II.1989	<i>Hca</i>	
Norfolk Ridge	SMIB 4	stn DW 44	24°56.0'-24°46.5'S, 168°08.2'-168°08.2'E	270-300	8.III.1989	<i>Mqu</i>	
		stn DW 50	23°42.4'-23°41.6'S, 168°00.8'-168°00.6'E	260-295	9.III.1989	<i>Ase</i>	
		stn DW 51	23°41.3'-23°40.5'S, 168°00.6'-168°00.7'E	245-260	9.III.1989	<i>Hca</i>	
		stn DW 53	23°40.1'-23°39.5'S, 167°59.9'-168°00.3'E	250-270	9.III.1989	<i>Hca</i>	
		stn DW 55	23°21.4'-23°21.4'S, 168°04.5'-168°04.8'E	215-260	9.III.1989	<i>Ase; Asp; Cpa; Hca; Mqu; Msp</i>	
		stn DW 56	23°20.6'-23°21.1'S, 168°05.2'-168°04.7'E	230-260	9.III.1989	<i>Hca; Mqu</i>	
		stn DW 57	23°21.5'-23°21.0'S, 168°04.6'-168°04.5'E	210-260	9.III.1989	<i>Hca; Mqu</i>	
		stn DW 64	22°55.3'-22°54.9'S, 167°16.4'-167°15.5'E	455-460	10.III.1989	<i>Hca</i>	
		SMIB 5	stn DW 72	23°42.0'S, 168°00.8'E	400	7.IX.1989	<i>Hca</i>
			stn DW 76	23°41.2'S, 168°00.5'E	280	7.IX.1989	<i>Hca; Mqu</i>
			stn DW 78	23°40.8'S, 168°00.2'E	245	7.IX.1989	<i>Hca</i>
			stn DW 85	22°20.0'S, 169°42.9'E	260	13.IX.1989	<i>Hca</i>
			stn DW 93	22°20.0'S, 168°42.3'E	255	13.IX.1989	<i>Hca</i>
			stn DW 95	22°59.7'S, 168°19.8'E	200	14.IX.1989	<i>Ase; Asp; Hca; Mqu</i>
			stn DW 101	23°21.2'S, 168°04.9'E	270	14.IX.1989	<i>Ase; Cpa; Hca; Mqu; Msp</i>
stn DW 102	23°19.6'S, 168°04.7'E		305	14.IX.1989	<i>Hca</i>		

TABLE 2. — Measurements of *Antennella varians* (Billard, 1911) in  $\mu\text{m}$ .

<b>MUSORSTOM 5</b>	
<b>stn DC 388</b>	
Maximum height of stem (in mm)	75
Length between successive hydrothecae	780-1300
Axis, diameter	140-210
Hydrotheca:	
Length abcauline wall	300-370
Diameter at rim	180-250
Lateral nematotheca on apophyses:	
Length	210-230
Diameter at rim	55-60
Lateral nematotheca on basis of apophyses:	
Length	110-150
Diameter at rim	50-55
Mesial nematotheca:	
Length	110-130
Diameter at rim	50-60
Female gonotheca:	
Length	850-900
Maximum diameter	370-440
Male gonotheca:	
Length	540-600
Maximum diameter	230-310

140, fig. 63a-e. — Vervoort & Watson 2003: 345, fig. 83J-L.

**MATERIAL EXAMINED.** — **New Caledonia.** LAGON, stn 0129, 22°30.5'S, 166°47.2'E, 45 m, 23.VIII.1984, 1 damaged colony with 4 stems on barnacle shell, no gonothecae (MNHN).

**Philippines.** MUSORSTOM 3, stn DR 117, 12°31.2'N, 120°39.3'E, 92-97 m, 3.VI.1985, 1 colony with 8 stems without gonothecae (MNHN).

**Norfolk Ridge.** SMIB 4, stn DW 50, 23°42.4'-23°41.6'S, 168°00.8'-168°00.6'E, 260-295 m, 9.III.1989, *c.* 10-15 mm high stems on worm-tubes, no gonothecae (MNHN). — Stn DW 55, 23°21.4'-23°21.4'S, 168°04.5'-168°04.8'E, 215-260 m, 9.III.1989, 1 colony on Bryozoa with immature gonothecae (MNHN).

SMIB 5, stn DW 95, 22°59.7'S, 168°19.8'E, 200 m, 14.IX.1989, 1 stem with gonothecae on basal part of *Monostaechas quadridens* (McCrary, 1859) (MNHN). — Stn DW 101, 23°21.2'S, 168°04.9'E, 270 m, 14.IX.1989, 1 small colony growing on stem of *M. quadridens*, no gonothecae (MNHN).

**DISTRIBUTION.** — Several authors consider *Antennella secundaria* a cosmopolitan species (Rees & Thursfield 1965; Millard 1975; Ryland & Gibbons 1991), with a preference for warm and temperate waters (Schuchert 1997).

Our specimens were collected from New Caledonia,

the Philippines and the Norfolk Ridge. The depth range at those localities was between 45 and 295 m.

*Antennella varians* (Billard, 1911)  
(Fig. 1; Table 2)

*Plumularia varians* Billard, 1911: 62, fig. 2. — Van Praët 1979: 930, fig. 72A-C.

*Antennella varians* — Billard 1913: 11, fig. 4A-E, pl. 1, figs 5, 8. — Rees & Vervoort 1987: 117, fig. 23c, d. — Schuchert 1997: 32, figs 10a-f, 11a-f.

*Antennella varians* — Hirohito 1969: 24, fig. 17.

**MATERIAL EXAMINED.** — **New Caledonia.** MUSORSTOM 5, stn DC 388, 20°45.35'S, 160°53.69'E, 500-510 m, 22.X.1986, bunch of unbranched hydrocladia arising from small tuft of fibres, with female and male gonothecae (MNHN).

**DISTRIBUTION.** — *Antennella varians* was collected from various localities in the eastern part of the Malayan Archipelago (Billard 1913), from several Japanese localities (Hirohito 1969), from Zanzibar (Rees & Vervoort 1987) and from Madagascar (Schuchert 1997). The depth range varies between 16 and 165 m.

The material examined was collected at a single station near New Caledonia, between 500 and 510 m.

**DESCRIPTION**

Colonies with numerous unbranched stems arising from a tubular hydrorhiza attached to substrate.

Basal part of stem divided into several ahydrothecate internodes by transverse nodes, with exception of an ultimate, strongly oblique node. Each internode with variable number of nematothecae in two rows. First hydrothecate internode separated by strongly oblique nodes (hinge-joints), remainder of stem undivided although sometimes, after damage and subsequent regeneration, a well-marked oblique node was observed.

Hydrotheca cup-shaped in lateral view, abcauline wall straight and slightly thickened, adcauline wall fully adnate, rim smooth, perpendicular to axis or slightly tilted towards adcauline side. Two pairs of lateral nematothecae, one pair placed at end of well-developed apophyses, long and conical. Second pair of lateral nematothecae smaller, inserted on base of apophyses, with slightly scooped rim

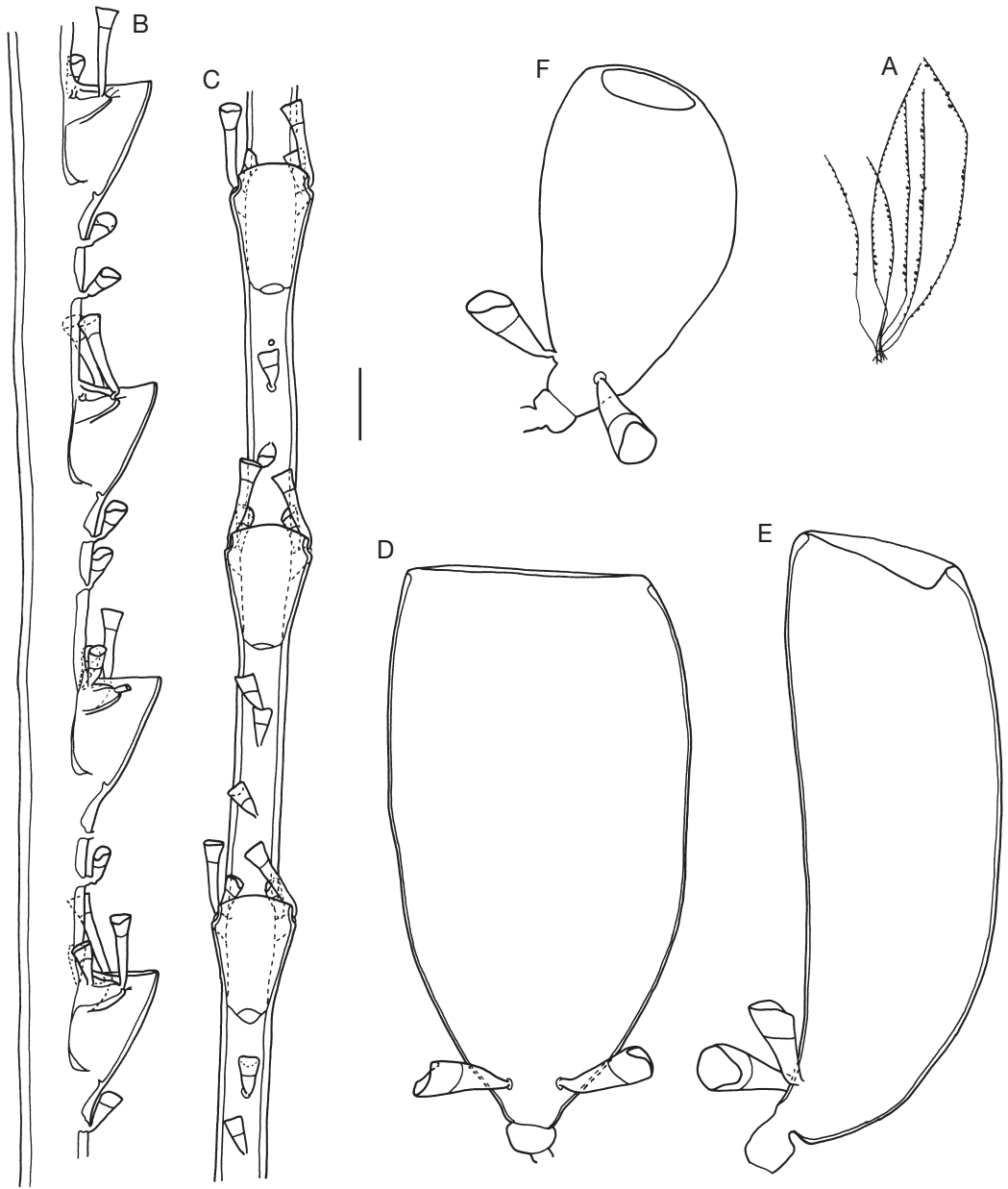


FIG. 1. — *Antennella varians* (Billard, 1911), MUSORSTOM 5, stn DC 388: **A**, colony; **B**, internodes from middle of hydrocladia, lateral view; **C**, internode, frontal view; **D**, female gonotheca, frontal view; **E**, female gonotheca, lateral view; **F**, male gonotheca, latero-frontal view. Scale bar: A, 1 cm; B-E, 0.2 mm; F, 0.1 mm.

of apical chamber; both pairs of lateral nematothecae surpassing the hydrothecal rim. Between two consecutive hydrothecae, two to five mesial

nematothecae arranged in two frontal rows at first and second hydrothecate internode and in a single row in the remaining internodes; adcauline wall of

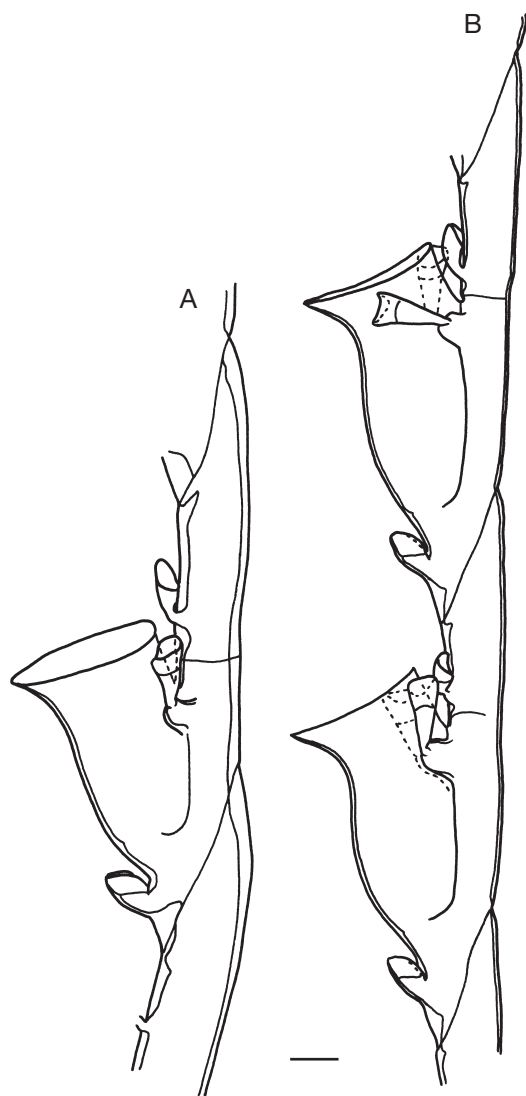


FIG. 2. — *Antennella sinuosa* n. sp., MUSORSTOM 4, stn CP 155: **A**, first internode of stem, lateral view; **B**, internodes from distal part of stem, lateral view. Scale bar: 0.1 mm.

upper chamber slightly scooped. All nematothecae bithalamic and movable.

Gonothecae inserted at hydrothecal base, between the two rows of mesial nematothecae. Gonothecae of both sexes on same stem, female gonothecha distal to male ones. Female gonothecha sack-shaped with distal end truncated and large terminal aperture; two nematothecae near

TABLE 3. — Measurements of *Antennella sinuosa* n. sp. in  $\mu\text{m}$ .

<b>MUSORSTOM 4</b>	
<b>stn CP 155</b>	
Maximum height of stem (in mm)	16.5
Length hydrothecate internode	610-700
Length ahydrothecate internode	460-650
Diameter at node	90-125
Hydrotheca:	
Length abcauline wall	450-480
Length free portion adcauline wall	130-140
Diameter at rim	270-290
Mesial infracalycine nematotheca:	
Length	100-110
Diameter at rim	30-45
Lateral nematotheca:	
Length	150-160
Diameter at rim	50-60
Nematotheca of ahydrothecate internode:	
Length	110-125
Diameter at rim	30-50

base. Male gonothecha smaller, ovoid, with circular aperture closed by a lid and basal part with two nematothecae; one male gonothecha without nematothecae. Nematothecae on gonothecae of both sexes bithalamic, movable and with rim of apical chamber slightly scooped at sides adjacent to gonothecha.

REMARKS

*Antennella varians* is considered a variable species by Rees & Vervoort (1987). Variations described by Billard (1913) were related to the length of hydro- and nematothecae and the position of the hydrothecal rim, perpendicular or oblique to stem. Later, Rees & Vervoort (1987) found in material of the John Murray expedition, a strong development of apophyses of the lateral nematothecae, specimens with a mesial nematotheca under each hydrothecae and the absence on the first hydrothecate internodes of a pair of hinge-joints.

Our material also shows some variations. The arrangement of nematothecae in a double row is only visible on the first or sometimes second hydrothecate internodes. The male gonothecae have normally two nematothecae; only one, probably an immature male gonothecha, is devoid of nematothecae and agrees with the putative male gonothecae described by Schuchert (1997: 33, fig. 10f).

The other morphological characters of the New Caledonian material agree with the available descriptions of *Antennella varians*. Therefore we included the present material in this species.

*Antennella sinuosa* n. sp.  
(Fig. 2; Table 3)

TYPE MATERIAL. — New Caledonia. MUSORSTOM 4, stn CP 155, 18°52.8'S, 163°19.5'E, 500-570 m, 15.IX.1985, single detached stem, no gonothecae, holotype (MNHN Hy 1294).

ETYMOLOGY. — The specific name *sinuosa* refers to the sinuose shape of the abcauline wall of the hydrotheca.

DISTRIBUTION. — This material comes from a single station near New Caledonia and was collected between 500 and 570 m.

DESCRIPTION

Stem reaching 16.5 mm in height. Basal part, with signs of damage and posterior regenerations, divided in several internodes by straight nodes; last internode with three nematothecae and ending with a distal oblique node.

Rest of stem heteromerously segmented by alternating oblique and transverse nodes, sometimes indistinct. Hydrothecate internodes with a hydrotheca and three nematothecae: one mesial infracalycine and two laterals. Intermediate internodes with a single nematotheca in proximal part.

Hydrotheca cylindrical and deep, rim smooth and tilted towards abcauline side. Abcauline wall sinuose, slightly convex in basal half and concave above. Adcauline wall straight and adnate in  $\frac{3}{4}$  of its length; rest of adcauline wall free, straight or slightly concave.

All nematothecae two-chambered. Mesial inferior nematotheca immovable, not reaching the hydrothecal base; upper chamber with adaxial wall lowered down to bottom of chamber. Lateral nematothecae placed on distinct apophyses, movable, reaching hydrothecal rim, with adcauline margin of upper chamber scooped. Nematothecae on ahydrothecate internodes similar to mesial inferior ones, but with longer adaxial wall and movable.

Gonothecae not observed.

TABLE 4. — Measurements of *Antennella megatheca* n. sp. in  $\mu$ m.

	BIOCAL	
	stn DW 38	stn DW 41
Maximum height of stem (in mm)	5.4	13
Length hydrothecate internode	450-590	470-600
Length ahydrothecate internode	590-700	560-790
Diameter at node	60-90	75-110
Hydrotheca:		
Length abcauline wall	370-610	500-690
Length free portion adcauline wall	330-410	370-470
Diameter at rim	260-320	310-360
Mesial infracalycine nematotheca:		
Length	60-80	80-90
Diameter at rim	30-40	30-40
Lateral nematotheca:		
Length	110-130	120-150
Diameter at rim	50-60	30-50
Nematotheca of ahydrothecate internode:		
Length	70-80	80-110
Diameter at rim	30	30-50

REMARKS

This species is characterised by the morphology of its hydrothecae, which are cylindrical with the abcauline wall convex in its basal part and concave above, and the adcauline wall straight with the distal  $\frac{1}{4}$  free.

In spite of the fact that the New Caledonian material lacks gonothecae, it is described as a new species here because of the morphology of the hydrothecae, with their sinuose abcauline wall, which is unknown in the other species of this genus.

*Antennella megatheca* n. sp.  
(Fig. 3; Table 4)

TYPE MATERIAL. — New Caledonia. BIOCAL 1, stn DW 38, 22°59.74'S, 167°15.31'E, 360 m, 30.VIII.1985, 1 colony with 7 stems, no gonothecae, holotype (MNHN Hy 1295). — Stn DW 41, 22°45.133'-22°45.129'S, 167°11.744'-167°11.998'E, 380-410 m, 30.VIII.1985, 2 stems, no gonothecae, paratype (RMNH-Coel. 35230, slide 815).

ETYMOLOGY. — The species name *megatheca* refers to the big size of the hydrotheca.

DISTRIBUTION. — Material collected near New Caledonia between 360 and 410 m.

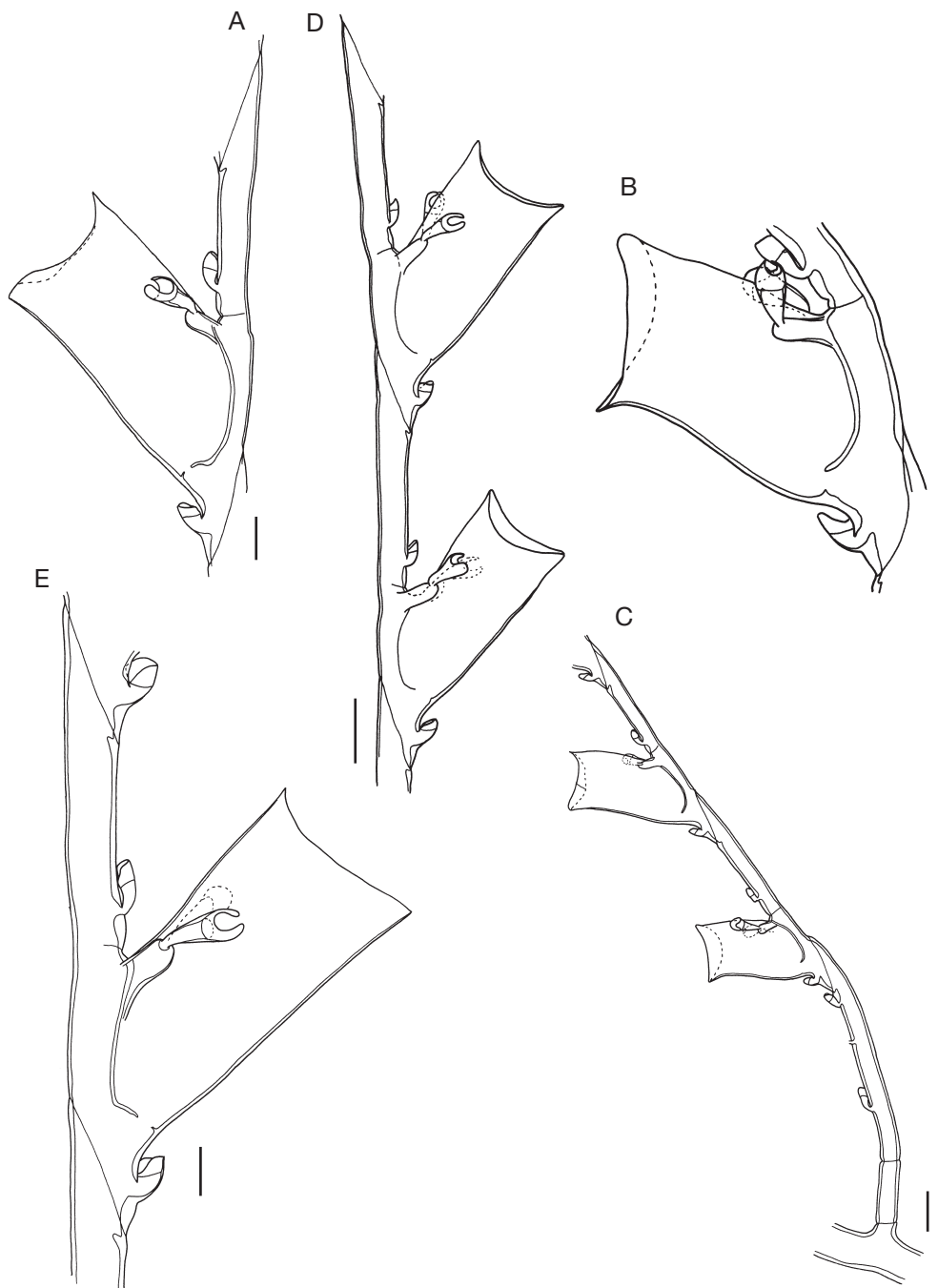


FIG. 3. — *Antennella megatheca* n. sp., BIOCAL 1: **A-C**, stn DW 38; **A**, detail of hydrothecate and ahydrothecate internodes, lateral view; **B**, first hydrothecate internode, lateral view; **C**, basal portion of stem; **D, E**, stn DW 41; **D**, internodes from distal part of stem, lateral view; **E**, hydrothecate and ahydrothecate internodes, lateral view. Scale bars: A, B, E, 0.1 mm; C, D, 0.2 mm.



## DESCRIPTION (HOLOTYPE)

Colony with seven stems arising, alternately directed left or right, from tubular stolon without nematothecae. Basal part of stem composed of two athecate internodes, the first short and separated by transverse nodes; the second long, with two or three frontal nematothecae and distal oblique node. Remainder of stem divided into hydrothecate and ahydrothecate internodes by well-marked oblique and weak straight nodes.

Hydrothecate internodes with basal oblique and distal straight node, one hydrotheca and three nematothecae: one mesial inferior and two laterals. Hydrotheca tubular, deep and of big size, walls straight (or nearly straight) and almost parallel; adcauline wall adnate for *c.*  $\frac{1}{3}$  its length, abcauline wall straight; hydrothecal rim smooth and lowered laterally. Mesial inferior nematotheca immovable, not reaching hydrothecal base; adcauline wall of upper chamber deeply scooped. Lateral nematothecae movable, placed on well-developed apophyses, one on each side, reaching middle of hydrothecae; rim of upper chamber rolled inwards and with a deep emargination on both sides.

Ahydrothecate internodes with one movable basal nematotheca; adcauline wall of upper chamber deeply scooped. All nematothecae are bithalamic.

Gonothecae absent.

## VARIABILITY

Some stems show one or two frontal nematothecae (one basal and the other distal) in the first ahydrothecate internode. First hydrotheca of all stems with abcauline wall slightly convex in its basal part and concave below the margin (Fig. 3B).

## REMARKS

This material is characterised by big and deep hydrothecae; the lateral nematothecae are inserted on well-developed apophyses with the upper chamber deeply scooped on both sides, and there is a single nematotheca on the ahydrothecate internodes.

The trophosome of *Antennella megatheca* n. sp. shows similarity with *A. siliquosa* (Hincks, 1877), *A. tubulosa* (Bale, 1894) and *A. kiwiana* Schuchert, 1997, but it differs by the great size of its hydro-

TABLE 5. — Measurements of *Antennella* sp. in  $\mu\text{m}$ .

	SMIB 4 stn DW 55
Maximum height of stem (in mm)	14
Length hydrothecate internode	410-500
Length ahydrothecate internode	410-710
Diameter at node	50-90
Hydrotheca:	
Length abcauline wall	140-150
Length free portion adcauline wall	60-80
Diameter at rim	190-200
Mesial infracalycine nematotheca:	
Length	120-150
Diameter at rim	35-50
Lateral nematotheca:	
Length	75-100
Diameter at rim	50-60
Axillar nematotheca:	
Length	60-70
Diameter at rim	25-30
Nematotheca of ahydrothecate internode:	
Length	75-100
Diameter at rim	30-40

thecae (twice that of *A. kiwiana* and *A. tubulosa*). In the presence of a single nematotheca on ahydrothecate internodes instead of two, this material also differs from *A. siliquosa*. The insertion of the lateral nematothecae on well-developed apophyses separates this species from *A. tubulosa*, where the apophysis is short or lacking.

*Antennella* sp.  
(Fig. 4; Table 5)

MATERIAL EXAMINED. — **Norfolk Ridge**. SMIB4, stn DW 55, 23°21.4'-23°21.4'S, 168°04.5'-168°04.8'E, 215-260 m, 9.III.1989, 1 colony on sponge composed of several stems with 1 damaged gonotheca (MNHN).

SMIB5, stn DW 95, 22°59.7'S, 168°19.8'E, 200 m, 14.IX.1989, single stem without gonothecae (MNHN).

DISTRIBUTION. — The colonies were collected at two localities of the Norfolk Ridge, between 200 and 260 m.

DESCRIPTION (COLONY FROM SMIB 4,  
STN DW 55)

Hydrorhiza tubular, adhering to sponge; stems monosiphonic and unbranched.



FIG. 4. — *Antennella* sp., SMIB 4, stn DW 55: **A**, internode from middle of hydrocladium, lateral view; **B**, internode with longer mesial infracalycine nematotheca, lateral view; **C**, internodes from middle of hydrocladium with three nematothecae on ahydrothecate internode, lateral view. Scale bar: 0.1 mm.

Basal part of stem composed of three internodes separated by straight nodes; last internode with several nematothecae (maximum nine) arranged in two alternate longitudinal series and separated from remainder of stem by an oblique node. Rest of stem composed of a succession of hydrothecate and ahydrothecate internodes separated by alternating oblique and transverse nodes. Hydrothecate internode with oblique basal and distal straight node; reverse in ahydrothecate internodes.

Hydrothecate internodes with one hydrotheca and four nematothecae: one mesial inferior, two laterals and one axillar behind hydrotheca. Hydrothecae cup-shaped; abcauline wall straight or slightly concave in distal half; adcauline wall adnate for *c.*  $\frac{1}{3}$  its length and free portion concave; rim smooth. Mesial nematotheca reaching hydrothecal base, adcauline wall of upper chamber deeply scooped. Lateral nematothecae conical, placed on well-developed apophyses, one on each side of hydrotheca, reaching hydrothecal rim but not surpassing it. One axillar nematotheca behind hydrotheca, with wall of upper chamber lowered almost to bottom.

Ahydrothecate internodes with two or three nematothecae with adcauline wall of upper chamber lowered. All nematothecae are bithalamic and movable.

One damaged gonotheca, with two nematothecae on basal part, inserted below a hydrotheca on a short pedicel. The distal part is lost and it is therefore not possible to give a more detailed description.

#### VARIABILITY

The length of the mesial inferior nematotheca varies considerably, surpassing the hydrothecal base and reaching halfway the abcauline wall.

#### REMARKS

In morphology of the trophosome this material approaches *Antennella secundaria* (Gmelin, 1791), but it differs by the free portion of the adcauline wall that is concave, and by the varied length of the mesial inferior nematothecae that generally reach the hydrothecal base, although they can reach halfway the abcauline wall. Therefore we record this material as *Antennella* sp. and separate it from *Antennella secundaria*.

#### Genus *Cladoplumaria*

Ansín Agís, Ramil & Vervoort, 2004

#### *Cladoplumaria anomala*

Ansín Agís, Ramil & Vervoort, 2004

*Cladoplumaria anomala* Ansín Agís, Ramil & Vervoort, 2004: 314, figs 1-4.

MATERIAL EXAMINED. — **Chesterfield Islands**. CHALCAL 1, stn CP 5, 19°29.10'S, 158°37.63'E, 290 m, 16.VII.1984, fragments of several large colonies, many with phylactocarps and male and female gonothecae (MNHN).

DISTRIBUTION. — *Cladoplumaria anomala* is only known from the type locality at the Chesterfield Islands.

#### REMARKS

This species was previously fully described by Ansín Agís *et al.* (2004); it is not necessary to repeat the description here.

#### Genus *Halopterus* Allman, 1877

#### *Halopterus campanula* (Busk, 1852)

(Figs 5; 6; Table 6)

*Plumularia campanula* Busk, 1852: 401. — Bale 1884: 124, pl. 10, fig. 5; 1888: 776, pl. 20, figs 1-6. — Billard 1913: 17, pl. 1, figs 11-13. — Hirohito 1974: 33, fig. 15.

*Plumularia indivisa* Bale, 1882: 39, pl. 15, fig. 1.

*Plumularia laxa* Allman, 1883: 19, pl. 1, figs 5, 6.

*Plumularia rubra* von Lendenfeld, 1885: 476, pl. 13, figs 11, 12, pl. 14, fig. 15. — Bale 1888: 778, pl. 20, figs 1-6.

*Plumularia torresia* von Lendenfeld, 1885: 477, pl. 13, figs 13, 14, pl. 14, fig. 16.

*Plumularia zygocladia* Bale, 1914: 171, pl. 24, fig. 2.

*Plumularia campanula* var. *geelongensis* Mulder & Trebilcock, 1916: 76, pl. 11, figs 2-2c.

*Halopterus campanula* var. *zelandica* Totton, 1930: 219, text-fig. 57.

*Halopterus campanula* — Leloup 1938: 20, fig. 14. — Rees & Vervoort 1987: 124, fig. 26. — Schuchert 1997: 99, fig. 35. — Vervoort & Watson 2003: 353, figs 85G, 86A-E.

TABLE 6. — Measurements of *Halopteris campanula* in  $\mu\text{m}$ . \* Measurements of two gonothecae only.

	SMIB 5		MUSORSTOM 4	SMIB 4	
	stn DW 101	stn DW 76	stn CP 180	stn DW 53	stn DW 55
Height of colony (in mm)	54	31	37		
Axial segments:					
Length	920-1630	700-1400	790-1600	500-1070	820-1150
Diameter at node	180-340	110-250	110-280	120-210	130-260
Cauline hydrotheca:					
Length	280-300	250-260	240-290	260-270	240-260
Diameter at rim	250-290	260-280	230-260	250-260	210-220
Cauline nematothecae:					
Length	70-130	80-110	70-100	80-100	70-120
Diameter at rim	80-140	70-100	60-100	60-90	60-70
Hydrocladial internode:					
Length	630-780	650-730	650-780	670-760	700-760
Diameter at node	85-115	90-120	70-110	70-90	80-90
Hydrotheca:					
Length abcauline wall	320-370	250-300	250-290	290-360	270-320
Length free portion adcauline wall	160-210	140-180	150-200	190-240	170-200
Diameter at rim	290-310	240-290	250-290	230-270	220-310
Mesial infracalycine nematotheca:					
Length	70-80	60-80	60-75	50-70	60-70
Diameter at rim	40-60	35-40	30-50	40	35-40
Lateral nematotheca:					
Length	50-60	40-50	40-50	45-60	40-50
Diameter at rim	50-70	45-50	50-55	50	50-60
Mesial supracalycine nematotheca:					
Length	70-80				60
Diameter at rim	30-40				30
Female gonotheca:					
Length	810-860	770-900	750-800*	840-920	
Maximum diameter	550-720	500-550	530-570*	610-680	
Length nematotheca	90-100	100-120	90-110*	90-100	
Male gonotheca:					
Length				460-500	
Diameter at rim				110-180	
Length nematotheca				60	

*Halopteris campanula* var. *campanula* Ralph, 1961: 47.

*Halopteris zygocladia* – Schuchert 1997: 119, fig. 43.

MATERIAL EXAMINED. — **New Caledonia.** LAGON, stn 0420, 22°44.2'S, 167°08.9'E, 345 m, 24.I.1985, 25 stems rising from stolon, 3 with a few gonothecae (MNHN).

BIOCAL 1, stn DW 77, 22°15.329'-22°15.659'S, 167°15.405'-167°15.498'E, 440 m, 5.IX.1985, 2 colonies on stem of *Lytocarpia myriophyllum* (Linnaeus, 1758), no gonothecae (MNHN). — Stn CP 108, 22°02.522'-22°02.735'S, 167°05.680'-167°06.050'E, 335 m, 9.IX.1985, many stems, 1 with damaged female gonothecae (MNHN). — Stn CP 110, 22°12.383'-22°13.315'S, 167°06.434'-167°09.936'E, 275-320 m, 9.IX.1985, colonies on worm tube and stem of hydroid, 1 colony with female gonothecae (MNHN).

MUSORSTOM 4, stn DW 162, 18°35.0'S, 163°10.3'E, 525 m, 16.IX.1985, several stems on gorgonid axis, some with male and female gonothecae (MNHN). — Stn CP 171, 18°57.8'S, 163°14.0'E, 435 m, 17.IX.1985, 10 colonies on various objects and other hydroids, some damaged gonothecae (MNHN). — Stn CP 180, 18°56.8'S, 163°17.7'E, 450 m, 18.IX.1985, many colonies attached to stems of other hydroids, on sponge and also some detached stems, with 6 female gonothecae (MNHN). LAGON, stn 0599, 22°17.0'S, 167°06'E, 50 m, 5.VIII.1986, single stem with damaged male gonothecae (MNHN). CHALCAL 2, stn DW 76, 23°40.50'S, 167°45.20'E, 470 m, 30.X.1986, 1 colony with several stems on sponge, with male and female gonothecae (MNHN). CALSUB, stn PL 19, 22°46'S, 167°20'E, 416-404 m, 10.III.1989, 4 stems, no gonothecae (MNHN). **Loyalty Islands.** MUSORSTOM 6, stn DW 391, 20°47.35'S, 167°05.70'E, 390 m, 13.II.1989, 2 colonies

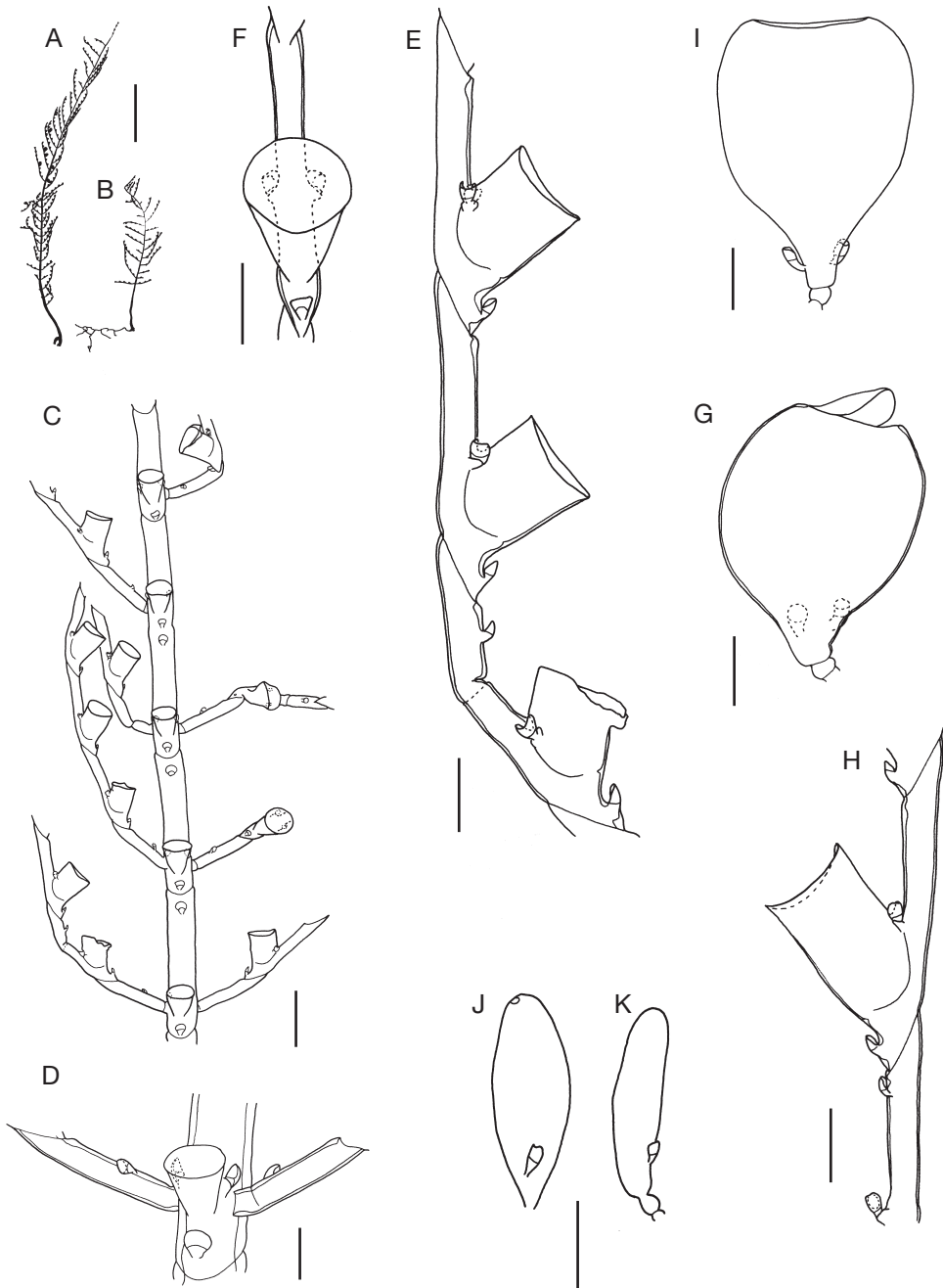


FIG. 5. — *Halopteris campanula* (Busk, 1852): **A**, SMIB 5, stn DW 101, colony; **B**, BIOCAL 1, stn CP 108, colony; **C-G**, MUSORSTOM 4, stn CP 180; **C**, fragment of colony, frontal view; **D**, detail of stem and branching, frontal view; **E**, internode, lateral view; **F**, internode, frontal view; **G**, female gonotheca, frontal view; **H**, SMIB 5, stn DW 85, internodes with and without distal nematotheca, lateral view; **I-K**, SMIB 4, stn DW 53; **I**, female gonotheca, frontal view; **J**, **K**, male gonothecae, lateral views. Scale bars: A, B, 1 cm; C, 0.5 mm; D-K, 0.2 mm.

with several stems, no gonothecae (MNHN). — Stn DW 461, 21°06.00'S, 167°26.20'E, 240 m, 21.II.1989, 1 stem without gonothecae (MNHN).

**Norfolk Ridge.** SMIB 4, stn DW 51, 23°41.3'-23°40.5'S, 168°00.6'-168°00.7'E, 245-260 m, 9.III.1989, 2 mutilated stems on alcyonarian axis, no gonothecae (MNHN). — Stn DW 53, 23°40.1'-23°39.5'S, 167°59.9'-168°00.3'E, 250-270 m, 9.III.1989, 1 colony with female gonothecae (MNHN). — Stn DW 55, 23°21.4'-23°21.4'S, 168°04.5'-168°04.8'E, 215-260 m, 9.III.1989, several colonies and fragments on sponge and Bryozoa, without gonothecae (MNHN). — Stn DW 56, 23°20.6'-23°21.1'S, 168°05.2'-168°04.7'E, 230-260 m, 9.III.1989, 1 colony with several stems, with female gonothecae (MNHN). — Stn DW 57, 23°21.5'-23°21.0'S, 168°04.6'-168°04.5'E, 210-260 m, 9.III.1989, 3 stems without gonothecae (MNHN). — Stn DW 64, 22°55.3'-22°54.9'S, 167°16.4'-167°15.5'E, 455-460 m, 10.III.1989, many colonies without gonothecae (MNHN).

SMIB 5, stn DW 72, 23°42.0'S, 168°00.8'E, 400 m, 7.IX.1989, 1 mutilated stem without gonothecae (MNHN). — Stn DW 76, 23°41.2'S, 168°00.5'E, 280 m, 7.IX.1989, small fragment, no gonothecae (MNHN). — Stn DW 78, 23°40.8'S, 168°00.2'E, 245 m, 7.IX.1989, 2 colonies, no gonothecae (MNHN). — Stn DW 85, 22°20.0'S, 169°42.9'E, 260 m, 13.IX.1989, small fragment with a male gonotheca (MNHN). — Stn DW 93, 22°20.0'S, 168°42.3'E, 255 m, 13.IX.1989, 1 colony without gonothecae (MNHN). — Stn DW 95, 22°59.7'S, 168°19.8'E, 200 m, 14.IX.1989, 2 stems without gonothecae (MNHN). — Stn DW 101, 23°21.2'S, 168°04.9'E, 270 m, 14.IX.1989, many colonies attached to sponge and some fragments (some damaged), with female gonothecae (MNHN). — Stn DW 102, 23°19.6'S, 168°04.7'E, 305 m, 14.IX.1989, 2 fragments without gonothecae (MNHN).

**DISTRIBUTION.** — Rees & Vervoort (1987) consider *Halopteris campanula* to be restricted to tropical and subtropical parts of the Indo-west Pacific.

This species has been recorded from Japan (Leloup 1938; Hirohito 1974), New Zealand (Totton 1930 as *H. campanula* var *zelandica*; Schuchert 1997; Vervoort & Watson 2003), Australia (Busk 1852; Bale 1884, 1914 as *H. zygocladia*), Malay Archipelago (Billard 1913), Gulf of Aden (Rees & Vervoort 1987) and Gulf of Suez and Red Sea (Billard 1933).

The present material comes from New Caledonia, Norfolk Ridge and Loyalty Islands, and was collected between 50 and 525 m depth.

**DESCRIPTION (COLONIES FROM SMIB 5, STN DW 101)**

Colonies formed by plumose cormoids arising from a tubular hydrorhiza. Stem monosiphonic, basal part with some ahydrothecate internodes separated by

transverse nodes; the last ahydrothecate internode separated from rest of stem by an oblique node and provided with some frontal nematothecae. Remainder of stem composed of hydrothecate internodes separated by oblique nodes. Each segment with one hydrotheca and four nematothecae: one mesial inferior, a pair of laterals and one mesial superior.

Hydrocladia arise laterally of hydrothecae of stem internodes on short, often indistinct apophyses. Hydrocladial arrangement is opposite basally and alternating right and left in middle and distal parts of stem. First internode of hydrocladium with oblique distal node and one or two nematothecae. Rest of hydrocladium composed of hydrothecate internodes separated by oblique nodes. Each segment with one hydrotheca and four nematothecae with the same distribution as on the stem.

Hydrotheca of stem and hydrocladium identical, almost cylindrical, walls slightly narrowing towards hydrothecal base; abcauline wall straight; adcauline wall adnate for half its length, rim circular, sometimes slightly flaring.

Mesial inferior nematotheca not reaching hydrothecal base and with adcauline wall of upper chamber missing. Lateral nematothecae short, bithalamic, placed on small apophyses, apical chamber globular and with deeply scooped adcauline wall, basal chamber small. Other nematothecae on stem and hydrocladia smaller and similar to mesial inferior nematothecae. Lateral nematothecae of stem with basal chamber better developed than those of hydrocladia.

Male and female gonothecae arising on same cormoid, inserted on internode next to hydrothecal base. Female gonothecae laterally compressed, pear-shaped, with oval terminal operculum; basal part narrowing to a pedicel composed of two short internodes, with two nematothecae of which adcauline wall of upper chamber is deeply scooped. Male gonothecae smaller than female, oblong, with small circular terminal aperture; basal part with one nematotheca placed on short pedicel similar to female gonotheca.

**VARIABILITY**

In youngest parts of some hydrocladia the nodes between hydrothecate internodes are only indistinctly

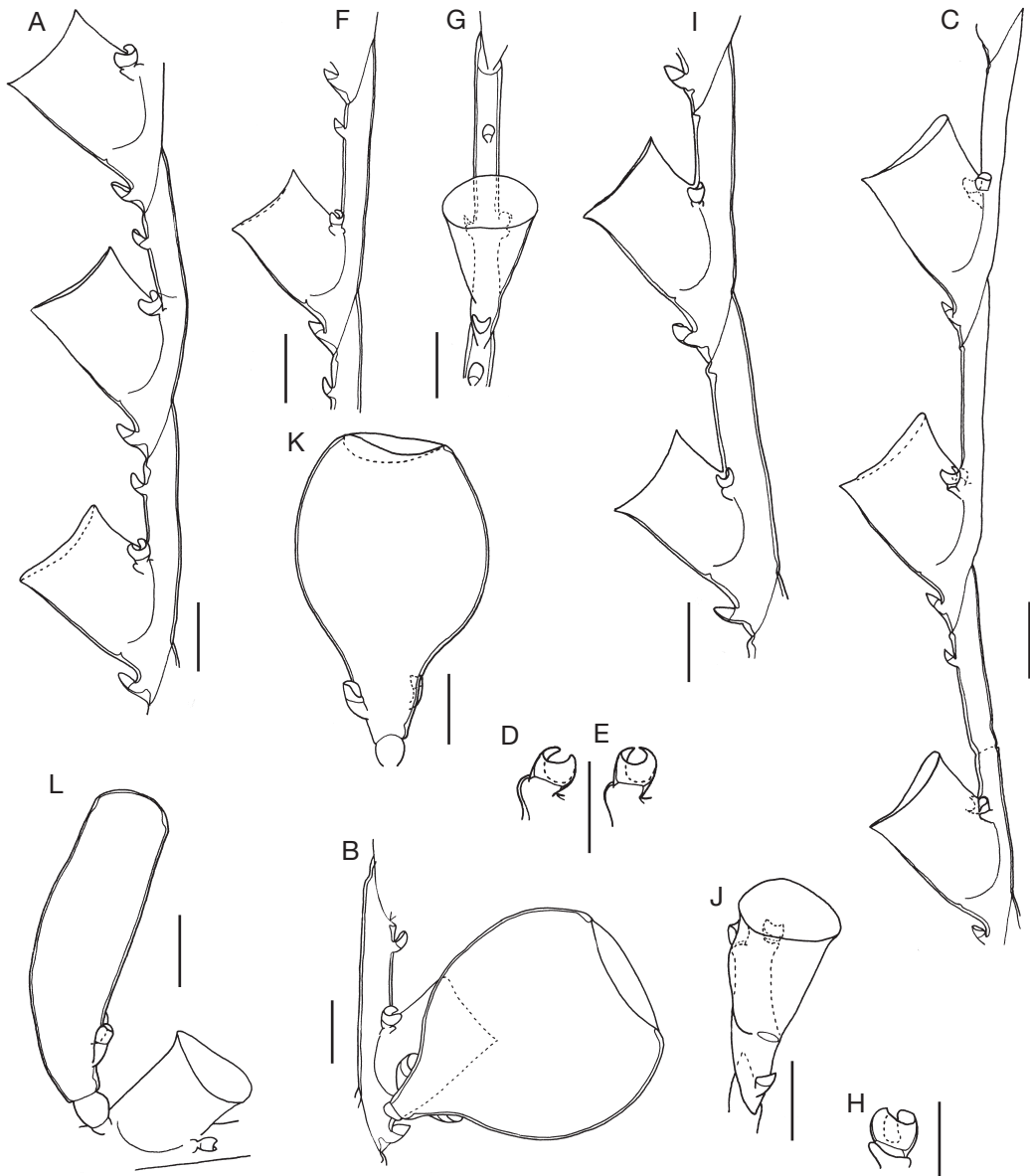


FIG. 6. — *Halopteris campanula* (Busk, 1852): **A, B**, SMIB 5, stn DW 101; **A**, internode with suprahydrothecal nematotheca and with node between hydrothecate and ahydrothecate internodes, lateral view; **B**, female gonotheca, frontal view, and internode, lateral view; **C-E**, BIOCAL 1, stn CP 108; **C**, internodes without suprahydrothecal nematotheca, lateral view; **D, E**, detail of lateral nematothecae; **F-H**, SMIB 4, stn DW 55; **F**, internode, lateral view; **G**, internode, frontal view; **H**, lateral nematotheca; **I-L**, SMIB 5, stn DW 76; **I**, internodes, lateral view; **J**, last internode of hydrocladium, oblique frontal view; **K**, female gonotheca, frontal view; **L**, female gonotheca, lateral view. Scale bars: A-C, F, G, I-L, 0.2 mm; D, E, H, 0.1 mm.

visible. In apical parts of the colonies the supracalycine nematotheca is frequently absent in many axial and hydrocladial internodes, but this nematotheca never

lacks in the basal parts. Many colonies sometimes have one supracalycine nematotheca in apical part, as the results of damage and posterior regeneration;

nevertheless, the material from SMIB 4, stn DW 56 and SMIB 5, stn DW 85 has one supracalcine nematotheca in some internodes, but without signs of damage.

The material of SMIB 4, stn DW 57 is composed of three axis, one with supracalcine nematothecae but in the others the presence of this nematotheca is quite rare.

The number of supracalcine nematothecae in axial internodes varies between 0 and 2.

#### REMARKS

The material studied is characterized by the arrangement of the hydrocladia, opposite in basal parts of the colony and alternate in middle and distal parts. Besides, in the majority of the material the supracalcine nematotheca is absent; nevertheless, the morphology of colony and gonothecae, when present, is identical with material with supracalcine nematothecae.

Schuchert (1997) indicated that hydrothecae, nematothecae and female gonothecae of *Halopterus campanula* (Busk, 1852) are indistinguishable from those of *H. zygocladia* (Bale, 1914), and the only difference between both species is the arrangement of hydrocladia, alternate in *H. campanula* and opposite in *H. zygocladia*. The author considers *H. campanula* a variable species but keeps both species apart because in his opinion the arrangement of hydrocladia, opposite or alternate, is a reliable character to separate species.

Our material shows the characteristic features of *H. campanula*, but with opposite hydrocladia in basal parts and alternate in middle and distal parts of the colony. The presence of both types of hydrocladial arrangements in the same colonies demonstrates that this character is variable too and therefore unsuitable for specific differentiation. In consequence we propose the inclusion of *H. zygocladia* in the synonymy of *H. campanula*.

In the absence of supracalcine nematothecae our material approaches *H. gemellipara* Millard, 1962, but as all morphological characters of trophosome and gonosome agree with those of *H. campanula* it has been included in that species. Besides, lateral nematothecae of axis and hydrocladium are always two-chambered (Figs 5;

6), despite the fact that their basal chamber can be strongly reduced; in *H. gemellipara* the lateral nematothecae are one-chambered. Development of the basal chamber of lateral nematothecae in *H. campanula* is variable (Schuchert 1997), it may almost completely disappear. In our opinion, *H. gemellipara* is close to *H. campanula*, but as the gonosome of *H. gemellipara* is unknown it is necessary to study new material before drawing final conclusions.

#### *Halopterus concava* (Billard, 1911) (Fig. 7; Table 7)

*Plumularia concava* Billard, 1911: 65, fig. 6; 1913: 19, figs 9A, B, 10, pl. 1, fig. 14.

*Thecocalus concavus* – Bedot 1921: 8. — Von Schenck 1965: 928.

*Halopterus concava* – Schuchert 1997: 121.

MATERIAL EXAMINED. — **Makassar Strait.** CORINDON 2, stn 210, 00°14.9'S, 117°53.5'E, 338 m, 31.X.1980, 1 colony, no gonothecae (MNHN).

**Philippines.** MUSORSTOM 3, stn DR 117, 12°31.2'N, 120°39.3'E, 92-97 m, 3.VI.1985, 1 colony with 2 gonothecae and a few hydrothecae of *Hebella dysymetra* Billard, 1933 (MNHN).

DISTRIBUTION. — Known only from type locality, Duroa (Kei Islands) and Bay of Kwandang (01°0.5'N, 122°56'E), between 52 and 80 m deep. The present records extend the geographical distribution to the Philippines and Makassar Strait and the bathymetrical range to 338 m.

DESCRIPTION (COLONY FROM MUSORSTOM 3, STN DR 117)

Hydrorhiza tubular and adhering to substrate; hydrocauli monosiphonic.

Basal part of axis with several internodes separated by transverse nodes and with many renovations; last internode with several nematothecae arranged in two frontal rows, separated from remainder of axis by an oblique node. Rest of hydrocaulus composed of hydrothecate internodes separated by oblique nodes. Each hydrothecate axial internode with one hydrotheca, a lateral apophysis (alternately directed left and right, supporting hydrocladia)



and 10 or 11 nematothecae: one mesial inferior, two laterals on short apophyses reaching the hydrothecal margin, one behind hydrotheca and six or seven supracalcine nematothecae in two rows, usually in opposite pairs. Cauline hydrotheca in basal part of internode identical to those of hydrocladium.

Hydrocladia alternately directed left and right. First internode ahydrothecate, with basal node slightly oblique, distal node strongly oblique, and with two or three frontal nematothecae. Remainder of hydrocladium composed of a succession of hydrothecate internodes separated by scarcely visible oblique nodes. Each internode with one hydrotheca and six or seven nematothecae: one mesial inferior, two laterals and three or four supracalcine nematothecae, with the most basal located just behind adcauline wall of hydrotheca. Hydrotheca cup-shaped, adcauline wall adnate for more than half its length, free portion of adcauline wall concave; abcauline wall nearly straight and longer than adcauline wall; hydrothecal aperture circular and rim smooth. Mesial inferior nematotheca immovable, not reaching hydrothecal base, deeply scooped on adcauline side. Lateral nematothecae placed on well-developed apophyses on both sides of hydrotheca, reaching hydrothecal margin; upper chamber deeply emarginated on inner and outer sides. Supracalcine nematothecae movable; upper chamber with adcauline wall scooped.

Gonothecae borne on axial, hydrothecate internodes, inserted laterally at hydrothecal base by means of a short pedicel. Gonotheca pyriform with latero-terminal circular aperture closed by a lid; two nematothecae on basal part.

#### VARIABILITY

Regeneration of broken hydrocladia leads towards development of ahydrothecate internodes with one to three nematothecae.

A new hydrocladium may develop from the inside of a hydrocladial hydrotheca.

In a colony from MUSORSTOM 3, stn DR 117 the hydrocladia of three basal internodes are disposed in opposite pairs; rest of the axis with hydrocladia pinnately arranged.

TABLE 7. — Measurements of *Halopteris concava* (Billard, 1911) in  $\mu\text{m}$ .

	<b>MUSORSTOM 3 stn DR 117</b>
Height of colony (in mm)	25
Axial segments:	
Length	450-840
Diameter at node	90-160
Cauline hydrotheca:	
Length	100-120
Diameter at rim	100-120
Cauline nematothecae:	
Length	60-80
Diameter at rim	30-40
Hydrocladial internode:	
Length	400-450
Diameter at node	50-60
Hydrotheca:	
Length abcauline wall	130-145
Length free portion adcauline wall	40-55
Diameter at rim	100-120
Mesial infracalcine nematotheca:	
Length	48-55
Diameter at rim	25-30
Lateral nematotheca:	
Length	55-70
Diameter at rim	40-45
Mesial supracalcine nematotheca:	
Length	55-60
Diameter at rim	20-30
Gonotheca:	
Length	390-400
Maximum diameter	180-210
Gonothecal nematotheca:	
Length	60-70
Diameter at rim	30

Two mesial inferior nematothecae have been observed, but the basal one with identical structure as supracalcine nematothecae.

Material from MUSORSTOM 3, stn DR 117 shows a weakly developed oblique node separating the ahydrothecate basal part from the distal part of the colony. A strongly oblique node has been observed in the material from CORINDON 2, stn 210 and also in the syntypes of *Halopteris concava* (MNHN).

The material from stn 210 usually has two supracalcine nematothecae and sometimes three.

#### REMARKS

The material agrees with the original description given by Billard (1911); it needs no further comments.

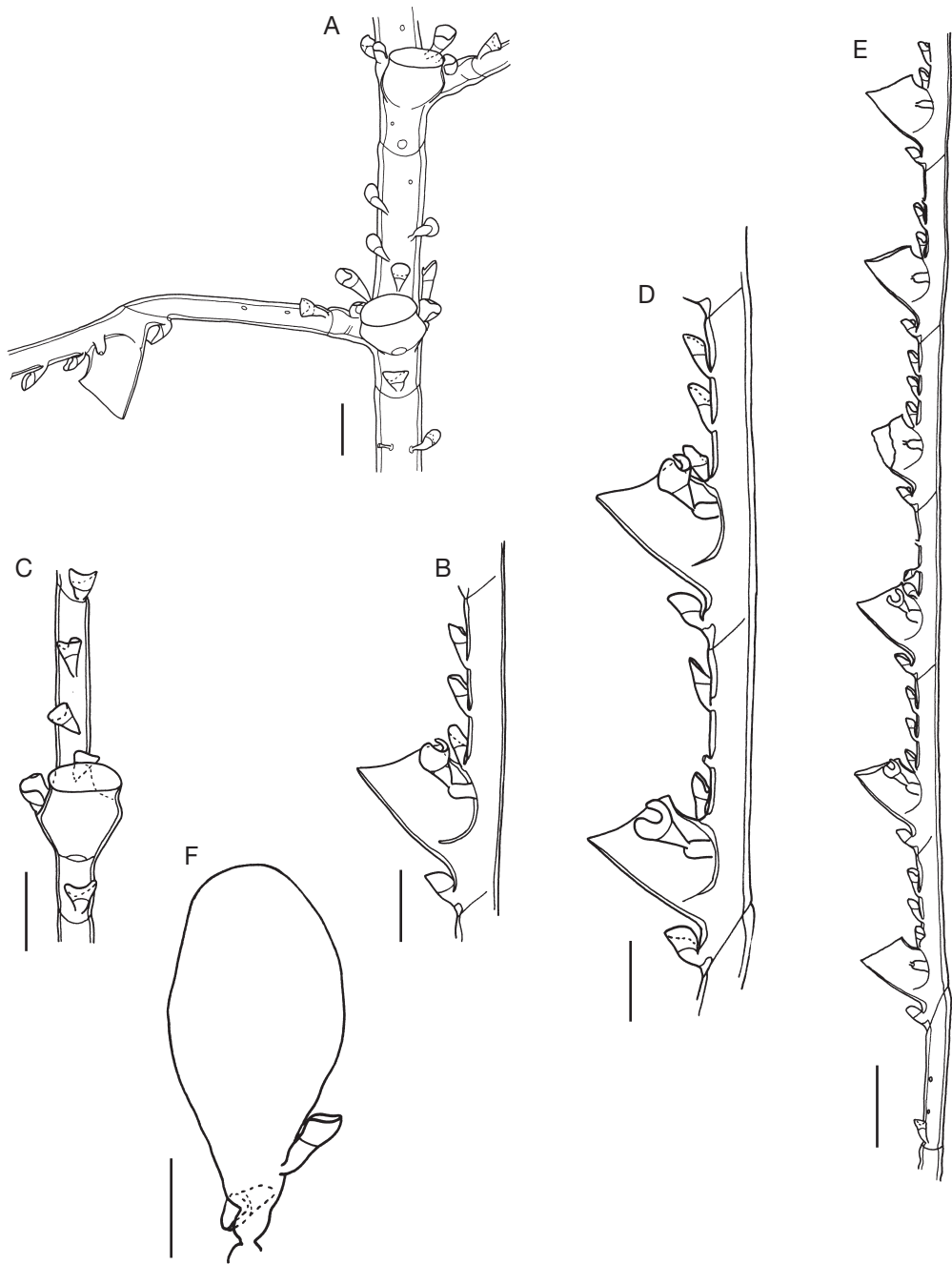


FIG. 7. — *Halopteris concava* (Billard, 1911), MUSORSTOM 3, stn DR 117: **A**, internodes of stem and branching, frontal view; **B**, internode from apical part of hydrocladium, lateral view; **C**, internode, frontal view; **D**, internodes from basal part of hydrocladium, lateral view; **E**, several internodes from hydrocladium, lateral view; **F**, gonotheca, posterior view. Scale bars: A-D, F, 0.1 mm; E, 0.2 mm.

*Halopterus infundibulum* Vervoort, 1966  
(Fig. 8; Table 8)

*Halopterus infundibulum* Vervoort, 1966: 133, fig. 36a-d. — Schuchert 1997: 121, fig. 44a-d. — Vervoort & Watson 2003: 359, fig. 87C-J.

MATERIAL EXAMINED. — New Caledonia. BIOCAL 1, stn DW 36, 23°08.647'-23°08.900'S, 167°10.994'-167°11.296'E, 650-680 m, 29.VIII.1985, 1 colony with 2 immature gonothecae (MNHN).

DISTRIBUTION. — This species is known from the Tasman Sea (42°10'S, 170°10'E) at 610 m depth (Vervoort 1966), and from New Zealand waters south of 43°S, depth 512-1006 m. Our material comes from a single station in the New Caledonia area, collected between 650 and 680 m depth.

DESCRIPTION

Colony with a hydrorhiza composed of perisarcal fibres attached to substratum, from which rises a monosiphonic hydrocaulus. Nevertheless, basal part of colony shows several secondary tubes.

Hydrocaulus unbranched, with basal part divided into ahydrothecate internodes by transverse nodes as the result of regeneration processes after damage; last node with 14 frontal nematothecae in two longitudinal rows, separated from remainder of stem by a hinge-joint. First hydrothecate internode, delimited by hinge-joints, bearing 10 nematothecae: one infracalcine, two pairs of laterals and five supracalcine in two rows; without lateral apophyses. Remainder of stem with hydrothecae, nematothecae and lateral apophyses but not divided into internodes. Cauline hydrothecae not strictly in one line, but slightly displaced towards hydrocladial apophyses, not as deep as hydrocladial hydrothecae and flanked by two pairs of lateral nematothecae; between two consecutive hydrothecae there are two mesial nematothecae. Apophyses short, without nematothecae, placed besides cauline hydrothecae and alternately directed left and right, except in second cauline hydrotheca where they are opposite

Hydrocladia inserted on lateral apophyses next to cauline hydrothecae. First hydrocladial internode short, ahydrothecate, without nematothecae, with basal transverse and distal oblique node. Remainder of hydrocladium unsegmented; only a weak trans-

TABLE 8. — Measurements of *Halopterus infundibulum* Vervoort, 1966 in  $\mu\text{m}$ . \* Gonothecae are still immature.

	BIOCAL 1 stn DW 36
Height of colony (in mm)	30
Axial segments:	
Length	
Diameter at node	220-380
Cauline hydrotheca:	
Length	180-210
Diameter at rim	220-230
Hydrocladial internode:	
Length	760-940
Diameter at node	90-150
Hydrotheca:	
Length abcauline wall	330-370
Length adnate part adcauline wall	230-270
Length free portion adcauline wall	100-130
Diameter at rim	280-310
Lateral nematotheca (long pair):	
Length	200-270
Diameter at rim	50-55
Lateral nematotheca (short pair):	
Length	80-110
Diameter at rim	50-60
Gonotheca*:	
Length	420-450
Maximum diameter	220-240

verse node above a hydrotheca can occasionally be found, usually in distal parts of hydrocladia. Each hydrocladial internode, when visible, with one hydrotheca and six nematothecae: two median inferior and two pairs of lateral nematothecae. Hydrothecae almost cylindrical, deep, with  $\frac{3}{4}$  of adcauline wall adnate and abcauline wall almost straight. Mesial inferior nematothecae with apical chamber (slightly) lowered on adcauline side. First pair of lateral nematothecae on well-developed apophyses, long, slightly curved and surpassing the hydrothecal rim; basal chamber much longer than distal one, rim of apical chamber slightly lowered at side close to hydrotheca. Second pair of lateral nematothecae inserted on base of apophyses, small and with the rim of apical chamber deeply scooped. All nematothecae are bithalamic and movable.

Two immature gonothecae inserted at hydrothecal base by one-segmented pedicel, cone-shaped, and with one or two nematothecae on basal part; apical chamber of nematothecae lowered at side close to gonotheca.

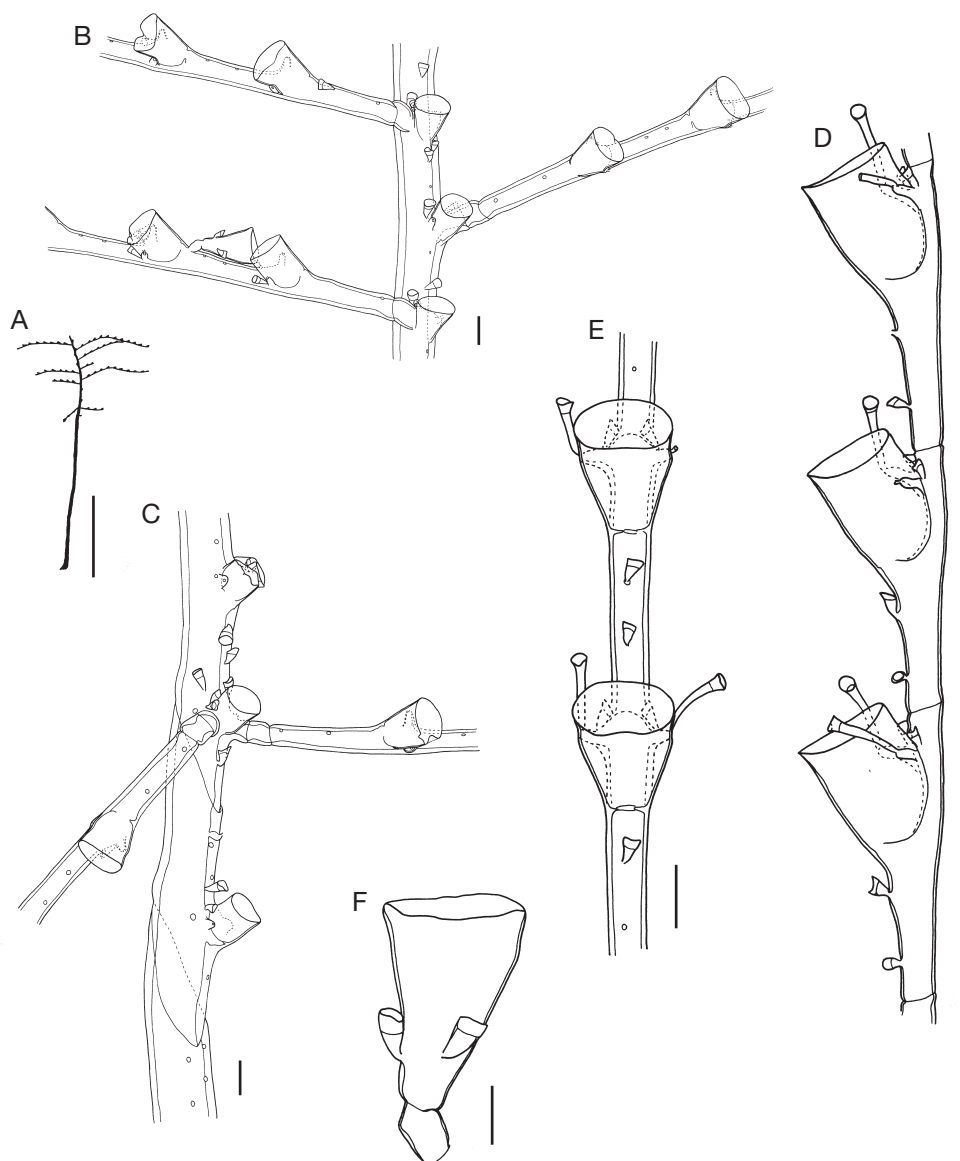


FIG. 8. — *Halopteris infundibulum* Vervoort, 1966, BIOCAL 1, stn DW 36: **A**, colony, frontal view; **B**, fragment of colony with immature gonotheca, latero-frontal view; **C**, basal internodes of stem, latero-frontal view; **D**, internodes from distal part of hydrocladium, lateral view; **E**, internodes, frontal view; **F**, immature gonotheca. Scale bars: A, 1 cm; B-E, 0.2 mm; F, 0.1 mm.

VARIABILITY

Once three nematothecae were observed between two successive axial hydrothecae.

REMARKS

Material from New Caledonia shows the first axial internode limited by oblique nodes (hinge-joints), but

it agrees with the type material of *Halopteris infundibulum* in all morphological characters of trophosome, gonosome and also with the measurements.

*Halopteris polymorpha* (Billard, 1913)

*Plumularia polymorpha* Billard, 1913: 24, figs 14A-C, 15.

*Halopteris polymorpha* – Vervoort 1966: 132, fig. 35a-d. — Millard & Bouillon 1973: 83, fig. 10F-J. — Millard 1975: 354, fig. 112G-L. — Hirohito 1983: 62, fig. 31. — Ryland & Gibbons 1991: 530, fig. 4A-C. — Schuchert 1997: 64, figs 20a-f, 21a-h, 22a-h, 23a-f. — Ansín Agís *et al.* 2001: 167, fig. 70a-d.

*Plumularia nuttingi* Billard, 1911: 66, fig. 8.

*Plumularia buski* – Billard 1913: 21, text-fig. 11, pl. 1, fig. 15. — Redier 1966: 90, pl. 2, figs 1-3, pl. 3, fig. 1 [not *Plumularia buskii* Bale, 1884 = *Halopteris buskii* (Bale, 1884)].

*Halopteris buskii* – Vervoort & Vasseur 1977: 72, figs 30c, 31a-d. — Ryland & Gibbons 1991: 527, fig. 2A-C.

*Halopteris buskii* p.p. – Rees & Vervoort 1987: 119, fig. 25a, b, tab. 22 (material from John Murray Expedition stn 112).

*Halopteris polymorpha* var. *sibogae* Billard, 1913: 25, fig. 16. — Millard & Bouillon 1973: 84, fig. 10K.

*Thecocalus polymorphus* var. *sibogae* – Bedot 1921: 9.

*Antennella secundaria* – Vervoort 1967: 42, fig. 12a-e [not *Antennella secundaria* (Gmelin, 1791)].

MATERIAL EXAMINED. — Coral Sea. CHALCAL 1, stn P4, 19°07.37'S, 158°33.37'E, 50 m, 18.VII.1984, 1 damaged colony on sponge, no gonothecae (MNHN).

DISTRIBUTION. — *Halopteris polymorpha* is mainly known from the Indo-Pacific; in the Atlantic it is only known from the Brazilian coast (Schuchert 1997) and the Cape Verde region (Ansín Agís *et al.* 2001).

The material was obtained from a single locality in the Coral Sea at 50 m depth.

REMARKS

The material examined was much damaged (the colony was dried out), but it was identified as *Halopteris polymorpha* because in certain parts of the colony it has been possible to observe the characteristics of this species: shape of hydrotheca,

number of nematothecae and the presence of two axillar nematotheca behind the hydrotheca.

Genus *Monostaechas* Allman, 1877

*Monostaechas quadridens* (McCrary, 1859)

(Fig. 9; Table 9)

*Plumularia quadridens* McCrary, 1859: 199.

*Monostaechas dichotoma* Allman, 1877: 37, pl. XXII, figs 1-5.

*Monostaechas quadridens* – Nutting 1900: 75, pl. XIII, figs 1-4. — Mammen 1967: 302, figs 98, 99. — Vervoort 1968: 61, 108, fig. 28a, b. — Millard 1975: 365, fig. 117D-F. — Calder 1983: 17, fig. 9. — Hirohito 1995: 249, fig. 84a-g. — Migotto 1996: 50, fig. 9i. — Schuchert 1997: 130, fig. 47a-e. — Ansín Agís *et al.* 2001: 171, fig. 7a-e. — Vervoort & Watson 2003: 364, fig. 88H-J.

*Monostaechas fisheri* f. *simplex* Billard, 1913: 16, text-fig. 7, pl. 1, fig. 10.

*Monostaechas quadridens* f. *stechowi* Leloup, 1935: 2, figs 2, 3.

*Antennella diaphana diaphana* Van Gernerden-Hoogeveen 1965: 49 [not *Halopteris diaphana* (Heller, 1868)].

MATERIAL EXAMINED. — Chesterfield Islands. CHALCAL 1, stn CP 12, 20°34.30'S, 158°47.40'E, 67 m, 23.VII.1984, 1 fragment found between *Macrorhynchia phoenicia* (Busk, 1852), no gonothecae (MNHN). — Stn DC 39, 20°28.90'S, 158°48.70'E, 40 m, 23.VII.1984, several small stems, no gonothecae (MNHN).

Philippines. MUSORSTOM 3, stn DR 117, 12°31.2'N, 120°39.3'E, 92-97 m, 3.VI.1985, 1 colony and some fragments, no gonothecae (MNHN). — Stn CP 131, 11°36.6'N, 121°43.10'E, 111-113 m, 5.VI.1985, 2 mutilated stems *c.* 15 mm high, with male and female gonothecae (MNHN).

New Caledonia. BIOCAL 1, stn CP 108, 22°02.522'-22°02.735'S, 167°05.680'-167°06.050'E, 335 m, 9.IX.1985, many colonies some with gonothecae (MNHN). — Stn CP 110, 22°12.383'-22°13.315'S, 167°06.434'-167°09.936'E, 275-320 m, 9.IX.1985, 1 colony and 2 fragments, with male gonothecae and also 1 damaged female gonotheca (MNHN).

CHALCAL 2, stn DW 76, 23°40.50'S, 167°45.20'E, 470 m, 30.X.1986, 1 colony with 3 stems on sponge, no gonothecae (MNHN).

Norfolk Ridge. SMIB 4, stn DW 44, 24°56.0'-24°46.5'S, 168°08.2'-168°08.2'E, 270-300 m, 8.III.1989, bunch

TABLE 9. — Measurements of *Monostaechas quadridens* (McCrary, 1859) in  $\mu\text{m}$ .

	MUSORSTOM 3 SMIB 4	
	stn CP 131	stn DW 55
Height of colony (in mm)	21	
Axial segments:		
Length	1070-1750	650-900
Diameter at node	100-130	140-200
Hydrocladial internode:		
Length ahydrothecate	370-550	320-400
Length hydrothecate	460-500	400-510
Diameter at node	60-100	60-100
Hydrotheca:		
Length abcauline wall	240-270	210-320
Length free portion adcauline wall	150-160	150-200
Diameter at rim	220-300	240-260
Mesial infracalycine nematotheca:		
Length	60-70	70-80
Diameter at rim	50	30-50
Lateral nematotheca:		
Length	70-90	80-100
Diameter at rim	45-60	50-60
Nematotheca of ahydrothecate internode:		
Length	60-80	70-80
Diameter at rim	30-40	30-40
Female gonotheca:		
Length	490-620	
Maximum diameter	300-400	
Male gonotheca:		
Length	450-470	
Maximum diameter	200-260	

of *c.* 10 stems, some with a few hydrocladia, no gonothecae (MNHN). — Stn DW 55, 23°21.4'-23°21.4'S, 168°04.5'-168°04.8'E, 215-260 m, 9.III.1989, many colonies on sponge and many fragments, with male and damaged female gonothecae (MNHN). — Stn DW 56, 23°20.6'-23°21.1'S, 168°05.2'-168°04.7'E, 230-260 m, 9.III.1989, 20 mm high colonies on worm tube, no gonothecae (MNHN). — Stn DW 57, 23°21.5'-23°21.0'S, 168°04.6'-168°04.5'E, 210-260 m, 9.III.1989, 1 colony on *Eudendrium* sp. and 2 fragments, no gonothecae (MNHN). SMIB 5, stn DW 76, 23°41.2'S, 168°00.5'E, 280 m, 7.IX.1989, small fragment and 1 hydrocladia, no gonothecae (MNHN). — Stn DW 95, 22°59.7'S, 168°19.8'E, 200 m, 14.IX.1989, several stems *c.* 20 mm high, with damaged gonothecae (MNHN). — Stn DW 101, 23°21.2'S, 168°04.9'E, 270 m, 14.IX.1989, 2 fragments with male gonothecae (MNHN).

DISTRIBUTION. — *Monostaechas quadridens* is widely distributed in tropical, subtropical and temperate waters of the great oceans (Rees & Thursfield 1965; Schuchert 1997).

Our material was collected at Chesterfield Islands, Philippines, New Caledonia and Norfolk Ridge, between 40 and 470 m depth.

VARIABILITY

The material of SMIB 4, stn DW 44, DW 55, DW 56 and BIOCAL 1, stn CP 108 shows the axillar nematothecae displaced laterally towards left or right in the same hydrocladium (Fig. 9B).

Three internodes (one from material collected at CHALCAL 2, stn DW 76 and two at SMIB 4, stn DW 55) have two axillar nematothecae behind the adcauline hydrothecal wall; each of these axillar nematothecae is separately inserted on the internode and placed laterally.

REMARKS

In spite of the variations observed, the material examined has been included in *Monostaechas quadridens* because it agrees in morphology with that species: the branching pattern is a helicoid sympodium, the hydrothecae are cup-shaped and there is usually one axillar nematotheca.

*Monostaechas* sp.  
(Fig. 10; Table 10)

MATERIAL EXAMINED. — Norfolk Ridge. SMIB 4, stn DW 55, 23°21.4'-23°21.4'S, 168°04.5'-168°04.8'E, 215-260 m, 9.III.1989, 2 colonies on sponge and 3 fragments, no gonothecae (MNHN).

SMIB 5 stn DW 101, 23°21.2'S, 168°04.9'E, 270 m, 14.IX.1989, several fragments without gonothecae (MNHN).

DISTRIBUTION. — The colonies were collected at the Norfolk Ridge, between 215 and 270 m depth.

DESCRIPTION (COLONIES FROM SMIB 4, STN DW 55)

Hydrorhiza tubular, growing on sponge; hydrocaulus monosiphonic and sympodially branched.

Basal part of colony composed of several internodes separated by transverse nodes and without nematothecae; last internode with a variable number of nematothecae.

Each hydrocladium with one long, basal, ahydrothecate internode, with basal transverse and distal

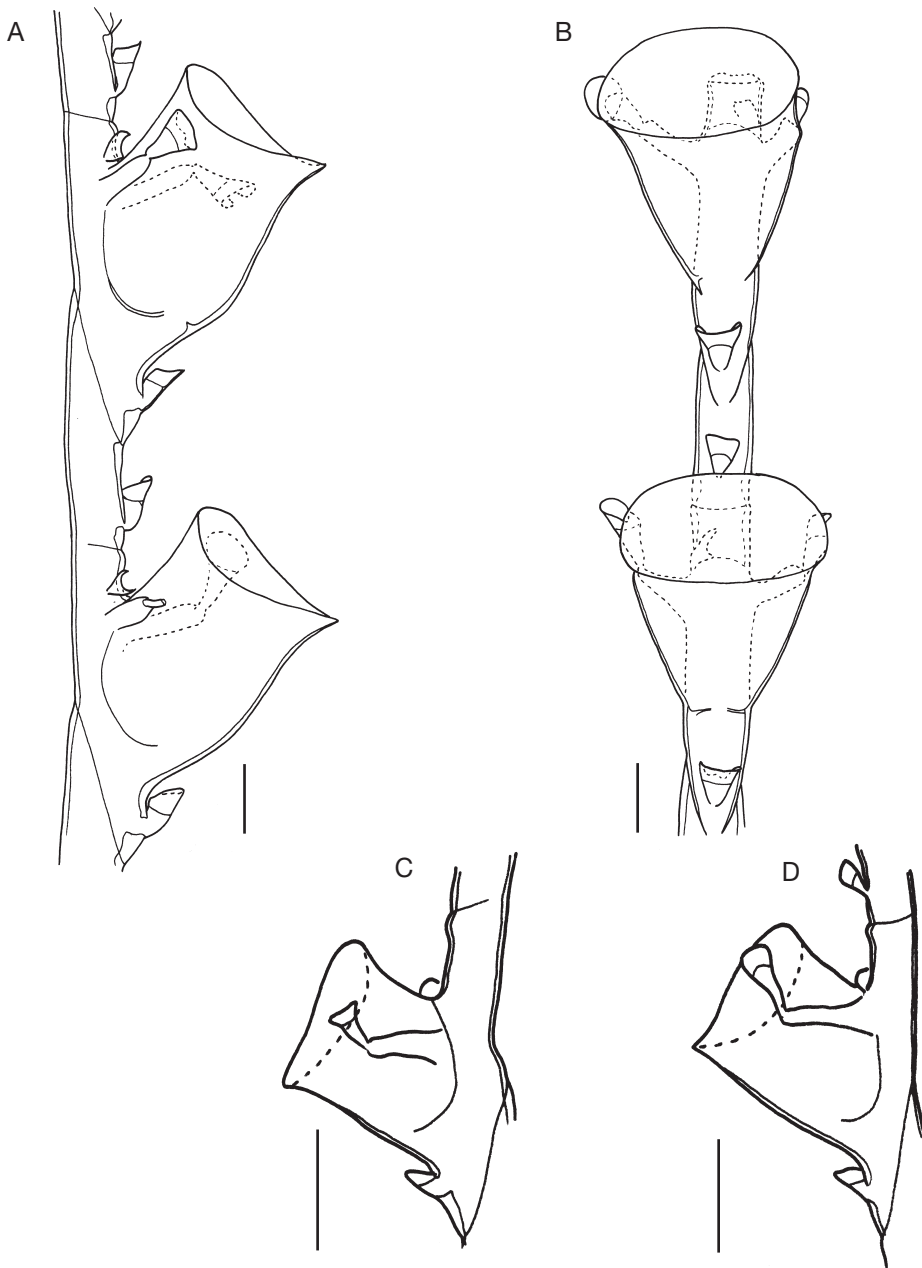


FIG. 9. — *Monostaechas quadridens* (McCrary, 1859): **A, B**, SMIB 4, stn DW 55, internodes; **A**, lateral view; **B**, frontal view; **C, D**, BIOCAL 1, stn CP 110, internodes with differently developed lateral nematothecae, lateral views. Scale bars: A, B, 0.1 mm; C, D, 0.2 mm.

oblique node and three to five nematothecae. Rest of hydrocladium composed of a succession of hydrothecate and athecate internodes. Thecate internodes

with basal oblique node and distal transverse node; athecate internodes reverse. Each thecate internode with one hydrotheca and four nematothecae: one

TABLE 10. — Measurements of *Monostaechas* sp. in  $\mu\text{m}$ .

	<b>SMIB 4 stn DW 55</b>
Height of colony (in mm)	19
Axial segments:	
Length	650-830
Diameter at node	120-190
Hydrocladial internode:	
Length ahydrothecate	270-350
Length hydrothecate	380-490
Diameter at node	50-100
Hydrotheca:	
Length abcauline wall	160-220
Length free portion adcauline wall	110-140
Diameter at rim	210-230
Mesial infracalycine nematotheca:	
Length	80
Diameter at rim	40-50
Lateral nematotheca:	
Length	120-160
Diameter at rim	45-50
Nematotheca of ahydrothecate internode:	
Length	80-90
Diameter at rim	30-35

mesial inferior, two laterals and one axillar behind adcauline hydrothecal wall.

Hydrotheca cup-shaped with abcauline wall slightly convex; adcauline wall adnate for half its length and free part slightly concave; hydrothecal rim circular and flat. Mesial nematotheca not reaching hydrothecal base; adcauline wall of upper chamber deeply scooped or absent. Lateral nematothecae conical, placed on well-developed apophyses on both sides of hydrotheca, surpassing the hydrothecal rim. One axillar nematotheca behind free part adcauline wall of hydrotheca, slightly displaced towards left or right side and sometimes placed in the middle.

Athecate internodes with one frontal nematotheca, resembling mesial inferior nematotheca but with the distal chamber better developed. All nematothecae bithalamic and movable.

Gonosome absent.

VARIABILITY

New secondary hydrocladia with identical structure develop on the first athecate internode, arising from a short apophyses placed on the opposite side of a normal hydrocladium.

The material from SMIB 4, stn DW 55 occasionally has two axillar nematothecae.

REMARKS

This material comes close to *Monostaechas quadridens*, but shows some differences. The colonies are characterized by the small size of the hydrothecae, the length of lateral nematothecae surpassing the hydrothecal rim and, as the most relevant feature, the shape of lateral nematothecae, that are conical. For these reasons, and because of the sterile condition of this material, it was not included into *M. quadridens*.

*Corbiza pauciarmata* n. sp.

(Fig. 11; Table 11)

TYPE MATERIAL. — **Norfolk Ridge**. SMIB 4, stn DW 55, 23°21.4'-23°21.4'S, 168°04.5'-168°04.8'E, 215-260 m, 9.III.1989, 1 colony with 3 damaged gonothecae, holotype (MNHN Hy 1296).

SMIB 5, stn DW 101, 23°21.2'S, 168°04.9'E, 270 m, 14.IX.1989, 1 colony with 4 hydrocladia, no gonothecae, paratype (RMNH-Coel. 31459).

ETYMOLOGY. — The species name is derived from Latin: *pauci*: poor and *armata*: armed. It indicates that the species has only three nematothecae around the hydrotheca; in the majority of *Corbiza* species the number of nematothecae on hydrothecate internodes is higher.

DISTRIBUTION. — The material originates from two stations on the Norfolk Ridge and was collected between 215 and 270 m.

DESCRIPTION (HOLOTYPE)

Colonies with a polysiphonic stem, unbranched, which hydrocladia arising at irregular distances on all sides of the stem.

Hydrocladia unbranched, inserted on well-developed apophyses. Basal part of hydrocladia with the first internode separated by transverse nodes and without nematothecae, followed by a long internode with two or three nematothecae and distal oblique node. Remainder of stem formed by a succession of hydrothecate and ahydrothecate internodes, alternately separated by oblique and straight nodes; hydrothecate internodes with basal oblique node and distal straight node; ahydrothecate internodes reverse.



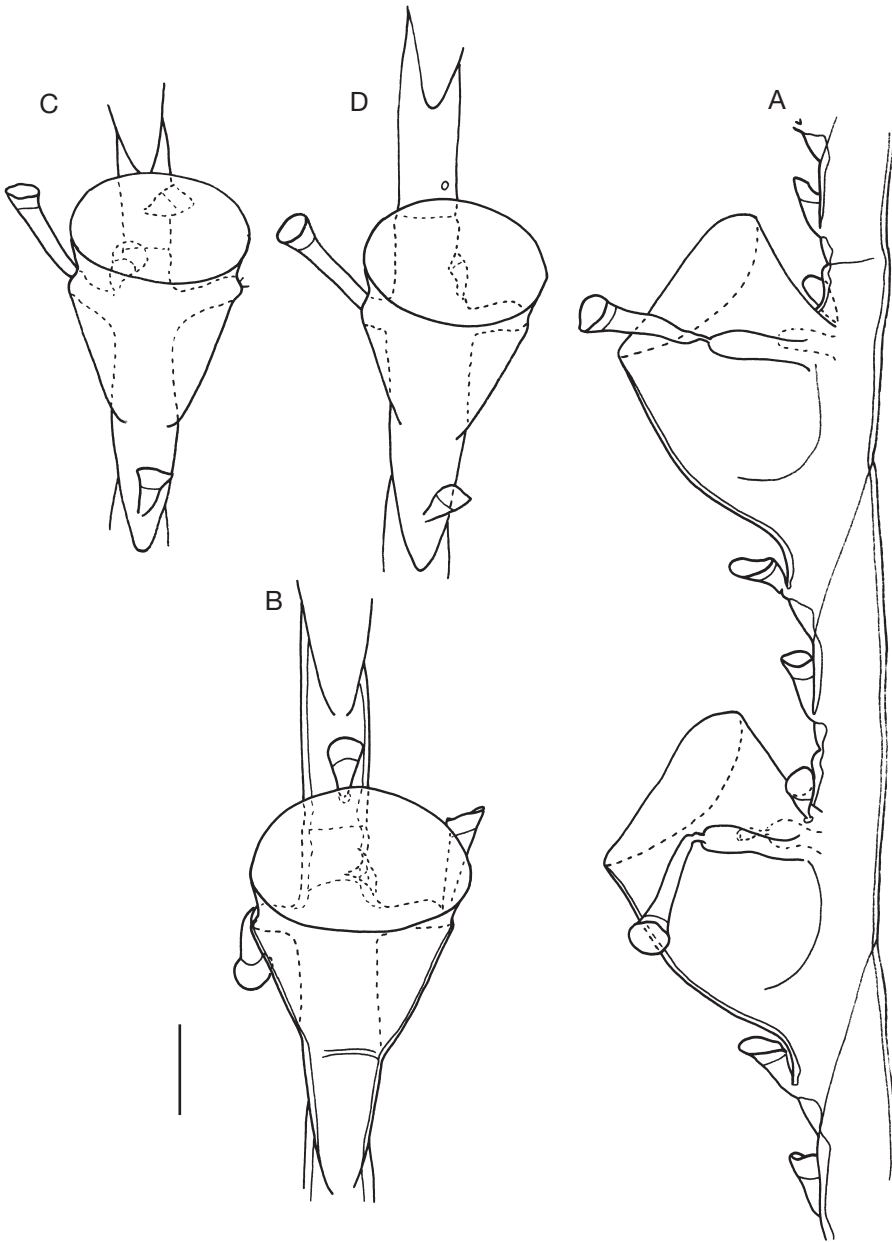


FIG. 10. — *Monostaechas* sp., SMIB 4, stn DW 55: **A**, internodes, lateral view; **B**, internode, frontal view; **C**, **D**, internodes from same hydrocladium with differently developed lateral nematothecae, frontal views. Scale bar: 0.1 mm.

Hydrothecate internodes with one hydrotheca and three nematothecae: one mesial inferior and two laterals. Hydrotheca cup-shaped; abcauline

wall straight; adcauline wall adnate for nearly half its length; hydrothecal rim circular, smooth and slightly everted. Mesial inferior nematothecae not

TABLE 11. — Measurements of *Corhiza pauciarmata* n. sp. in  $\mu\text{m}$ .

	<b>SMIB 4 stn DW 55</b>
Hydrocladial internode:	
Length ahydrothecate	450-700
Length hydrothecate	370-420
Diameter at node	60-90
Hydrotheca:	
Length abcauline wall	310-370
Length free portion adcauline wall	240-270
Diameter at rim	260-310
Mesial infracalycine nematotheca:	
Length	70-80
Diameter at rim	35-40
Lateral nematotheca:	
Length	110-130
Diameter at rim	60-70
Nematotheca of ahydrothecate internode:	
Length	60-90
Diameter at rim	30-35

reaching hydrothecal base and with adcauline wall of upper chamber deeply scooped. Lateral nematothecae placed on well-developed apophyses, one on each side of hydrotheca, not reaching hydrothecal margin; upper chamber with the rim deeply scooped on both sides (spanner-like shape).

Ahydrothecate internodes with two frontal nematothecae, one placed in lower third, one in upper third; nematothecae with adcauline wall of upper chamber scooped.

All nematothecae bithalamic and movable.

The gonosome is damaged; a detailed description cannot be given. Gonothecae elongate, narrowing basally, inserted laterally at the hydrothecal base by means of a two-segmented pedicel. Apex truncate, with circular aperture closed by a lid; two nematothecae on basal third.

#### VARIABILITY

In several ahydrothecate internodes there was only one nematotheca on basal part of internode.

#### REMARKS

Schuchert (1997) in his review of the family Halopterididae agrees with the diagnosis of the genus *Corhiza* given by Millard (1975). Nevertheless he indicated that several species of *Antennella* and *Halopteris* can have a *Corhiza*-like mode of growth as

an alternative colony form; therefore in his opinion the scope of the genus must be revised.

Our material shows the typical colony form of *Corhiza*, with an erect, unbranched, polysiphonic stem, giving rise to hydrocladia; in consequence we include it in this genus.

The genus *Corhiza* comprises nine species. The main distinguishing features of eight species, *C. bellicosa* Millard, 1962, *C. complexa* (Nutting, 1905), *C. fascicularis* (Allman, 1883), *C. pannosa* Millard, 1962, *C. scotiae* (Ritchie, 1907), *C. sociabilis* Millard, 1980, *C. suenisoni* (Jäderholm, 1896) and *C. valdiviae* (Stechow, 1923), were summarised by Schuchert (1997). The ninth species, *C. splendens* Vervoort & Watson, 2003, was described later.

The presence of only one pair of lateral nematothecae and the absence of axillar nematothecae behind the adcauline wall of the hydrotheca distinguishes *C. pauciarmata* n. sp. from the majority of *Corhiza* species. *Corhiza bellicosa* has three pairs of lateral nematothecae and *C. pannosa*, *C. scotiae*, *C. sociabilis* and *C. splendens* two pairs; *C. complexa* and *C. valdiviae* have only one pair but carry axillar nematothecae.

Only *C. fascicularis* and *C. suenisoni* show the same number and the same disposition of nematothecae around the hydrotheca as is also found in *C. pauciarmata* n. sp.

*Corhiza fascicularis* has not been recorded since its original description, the type material is lost and, in consequence, it is a poorly known species (Schuchert 1997). This species differs from *C. pauciarmata* n. sp. because its stem is dichotomously branched, all nematothecae are conical and long, the lateral nematothecae surpassing the hydrothecal rim and the upper chamber is not scooped, there are three nematothecae on ahydrothecate internodes and the transverse node between hydrothecate and ahydrothecate internodes lies at the level of the hydrothecal rim.

*Corhiza suenisoni*, according to the original description given by Jäderholm (1896), has hydrocladia composed only of hydrothecate internodes, there are two or three unpaired nematothecae per internode (one mesial inferior and one or two distal), the lateral nematothecae surpass the hydrothecal rim and the margin of the upper chamber is not scooped. Moreover, Schuchert (1997) indicates that

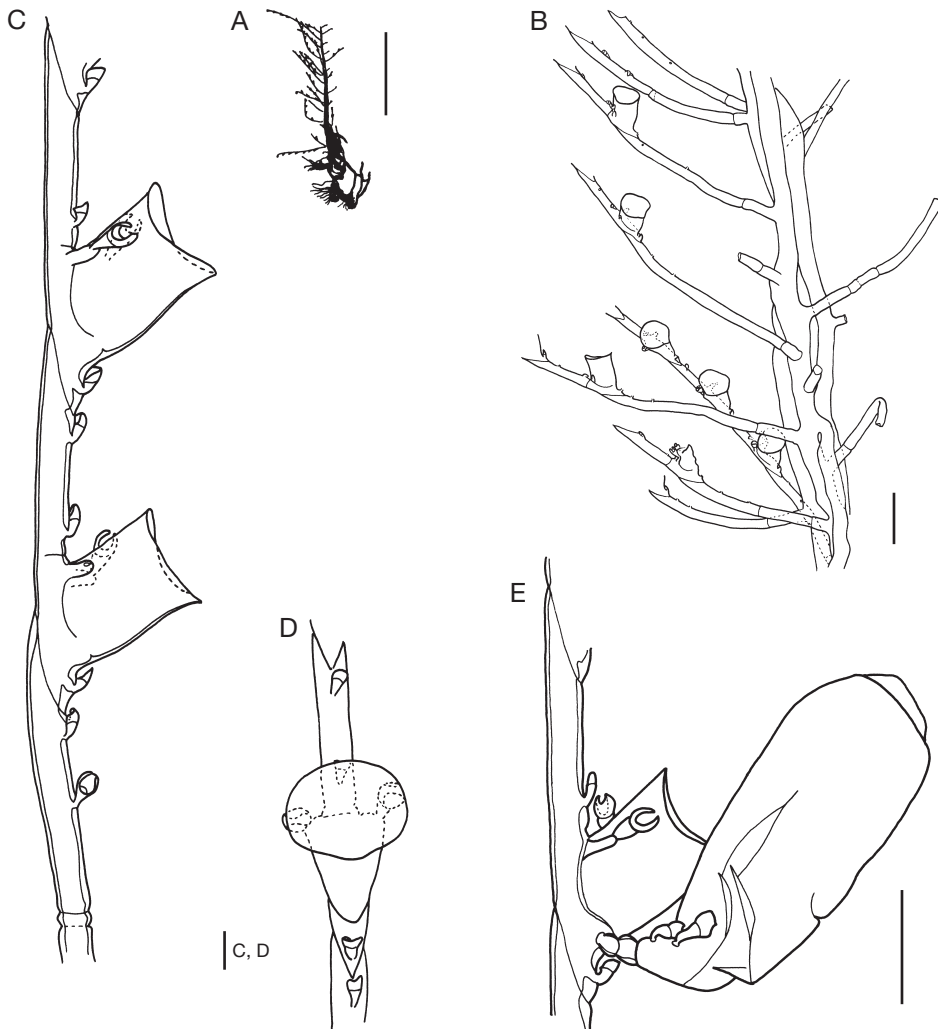


FIG. 11. — *Corhiza pauciarmata* n. sp., SMIB 4, stn DW 55: **A**, colony; **B**, fragment of colony, frontal view; **C**, hydrocladial internodes, lateral view; **D**, internode, frontal view; **E**, gonotheca, lateral view. Scale bars: A, 1 cm; B, 0.5 mm; C, D, 0.1 mm; E, 0.3 mm.

*C. suenisoni* is similar to *C. complexa*, but the former has no axillar nematotheca. In his opinion the type material of *C. suenisoni* should be re-examined to confirm the absence of the axillar nematotheca.

#### Acknowledgements

The authors wish to express their gratitude to Dr A. Crosnier (formerly MNHN, now retired) for providing the material for this study. The first

author also had financial support from the European Union PARSYST program to spend two weeks at the MNHN to work on plumulariid material.

#### REFERENCES

- ALLMAN G. J. 1877. — Report on the Hydroida collected during the exploration of the Gulf Stream by L. F. de Pourtalès, assistant United States Coast Survey. *Memoirs of the Museum of Comparative Zoölogy at*

- Harvard College* 5 (2): 1-66, 34 pls.
- ALLMAN G. J. 1883. — Report on the Hydroida dredged by H.M.S. *Challenger* during the years 1873-76. Part I. Plumulariidae. *Report on the Scientific Results of the Voyage of H.M.S. Challenger, Zoology* 7 (20): 1-55, 3 figs, 20 pls.
- ANSÍN AGÍS J., RAMIL F. & VERVOORT W. 2001. — Atlantic Leptolida (Hydrozoa, Cnidaria) of the families Aglaopheniidae, Halopterididae, Kirchenpaueriidae and Plumulariidae collected during the CANCAP and Mauritania-II expeditions of the National Museum of Natural History, Leiden, the Netherlands. *Zoologische Verhandelingen*, Leiden, 333: 1-268, 97 figs.
- ANSÍN AGÍS J., RAMIL F. & VERVOORT W. 2004. — *Cladoplumaria anomala* gen. nov., sp. nov., a new genus and species of the family Halopterididae (Cnidaria: Hydrozoa) from the Chesterfield Islands region (Pacific Ocean). *Cahiers de Biologie marine* 45: 313-324.
- BALE W. M. 1882. — On the Hydroida of South-Eastern Australia, with descriptions of supposed new species, and notes on the genus *Aglaophenia*. *Journal of the Microscopical Society of Victoria* 2 (1): 15-48, pls 12-15.
- BALE W. M. 1884. — *Catalogue of the Australian Hydroid Zoophytes*. Australian Museum, Sydney, 198 p.
- BALE W. M. 1888. — On some new and rare Hydroida in the Australian Museum collection. *Proceedings of the Linnean Society of New South Wales* (2) 3 (2): 745-799, pls 12-21.
- BALE W. M. 1914. — Report on the Hydroida collected in the Great Australian Bight and other localities. Part 2. *Fisheries Zoological (Biological) results of the Fishing Experiments carried on by the F.I.S. "Endeavour", 1909-1914*, 2 (4): 164-188, pls 35-38.
- BEDOT M. 1921. — Notes systématiques sur les plumularides. 2<sup>e</sup> partie. *Revue suisse de Zoologie* 29 (1): 1-40.
- BILLARD A. 1911. — Note préliminaire sur les espèces nouvelles de Plumulariidae de l'expédition du *Siboga*. *Archives de Zoologie expérimentale et générale* (5) 8, notes et revue 3: lxii-lxxi, 16 figs.
- BILLARD A. 1913. — Les hydroïdes de l'expédition du *Siboga*. I. Plumulariidae. *Siboga-Expeditie, Monographie* 7a: 1-114, 6 figs.
- BILLARD A. 1933. — Les hydroïdes des golfes de Suez et d'Akaba, in Mission Robert Ph. Dollfus en Égypte (décembre 1927-mars 1929). *Mémoires de l'Institut d'Égypte* 21: 1-30, 9 figs, 1 pl.
- BUSK G. 1852. — An account of the Polyzoa and sertularian zoophytes collected in the voyage of the *Rattlesnake* on the coast of Australia and the Louisiade Archipelago, in MACGILLIVRAY J., *Narrative of the Voyage of H.M.S. Rattlesnake Commanded by the Late Captain O. Stanley During the Years 1846-1850*, London, 1, Appendix IV: 343-402, 1 pl.
- CALDER D. R. 1983. — Hydroida from estuaries of South Carolina, USA: families Sertulariidae and Plumulariidae. *Proceedings of the Biological Society of Washington* 96 (1): 7-28, figs 1-13, tab. 1.
- GMELIN J. F. 1791. — Vermes, in LINNAEUS C., *Systema naturae*. 13th edition, edited by J. F. Gmelin. Vol. 1, part 6. G. E. Beer, Lipsiae (Leipzig): 3021-3910.
- HIROHITO 1969. — Some hydroids from the Amakusa Islands. *Publications of the Biological Laboratory, Imperial Household*, Tokyo 1969 (9): 1-32, 18 figs.
- HIROHITO 1974. — Some hydrozoans of the Bonin Islands. *Publications of the Biological Laboratory, Imperial Household*, Tokyo, 1974 (11): i-iii, 1-55, frontispiece, 20 figs, map.
- HIROHITO 1983. — Hydroids from Izu Ōshima and Niijima. *Publications of the Biological Laboratory, Imperial Household*, Tokyo, 1983 (6): 1-83, figs 1-41.
- HIROHITO 1995. — The hydroids of Sagami Bay. II, Thecata. *Publications of the Biological Laboratory, Imperial Household*, Tokyo, 1995: i-vii, 1-355, 106 figs, 13 pls.
- JÄDERHOLM E. 1896. — Ueber aussereuropäische Hydroiden des zoologischen Museums der Universität Upsala. *Bihang till Kungliga svenska Vetenskaps-Akademiens Handlingar* 21, Afd. 4 (6): 1-20.
- LELOUP E. 1935. — Hydropolypes calyptoblastiques et siphonophores récoltés au cours de la croisière (1934-1935) du navire-école belge «Mercator». *Bulletin du Musée royal d'Histoire naturelle de Belgique* 11 (34): 1-6, 3 figs.
- LELOUP E. 1938. — Quelques hydropolypes de la baie de Sagami, Japon. *Bulletin du Musée royal d'Histoire naturelle de Belgique* 14 (28): 1-22, 14 figs, 1 pl.
- LENDENFELD R. VON 1885. — The Australian Hydromedusae. *Proceedings of the Linnean Society of New South Wales* 9: 206-241, 345-353, 401-420, 467-492, 581-634, pls 6-8, 12-17, 20-29.
- MCCRADY J. 1859. — Gymnophthalmata of Charleston Harbor. *Proceedings of the Elliott Society of Natural History* 1: 103-221, pls 8-12.
- MAMMEN T. A. 1967. — On a collection of hydroids from South India. III. Family Plumulariidae. *Journal of the Marine Biological Association of India* 7 (2): 291-324, figs 90-112, tab. 3.
- MIGOTTO A. É., 1996. — Benthic shallow-water hydroids (Cnidaria, Hydrozoa) of the coast of São Sebastião, Brazil, including a checklist of Brazilian hydroids. *Zoologische Verhandelingen*, Leiden, 306: 1-125, 16 figs.
- MILLARD N. A. H. 1975. — Monograph on the Hydroida of southern Africa. *Annals of the South African Museum* 68: 1-513, colour plate, 143 figs.
- MILLARD N. A. H. & BOUILLON J. 1973. — Hydroids from the Seychelles (Coelenterata). *Annales du Musée royal de l'Afrique Centrale*, Série in 8<sup>o</sup>, Sciences zoologiques, 206: 1-106, 11 figs, 5 pls.
- MULDER J. F. & TREBILCOCK R. E. 1916. — Notes on Victorian Hydroida. Part VI. *Geelong Naturalist* (2)

- 6 (4) (48): 73-84, pls 10-11.
- NUTTING C. C. 1900. — American hydroids. Pt. 1. The Plumulariidae. *Special Bulletin of the United States National Museum* 4 (1): 1-285, 34 pls.
- RALPH P. M. 1961. — New Zealand thecate hydroids. Part IV. The family Plumulariidae. *Transactions of the Royal Society of New Zealand, Zoology* 1 (3): 19-74, 10 figs.
- RAMIL F. & VERVOORT W. 1992. — Report on the Hydroida collected by the "BALGIM" expedition in and around the Strait of Gibraltar. *Zoologische Verhandelingen*, Leiden, 277: 3-262, 68 figs, 83 tabs.
- REDIER L. 1966. — Hydraires et bryozoaires, in Contribution à l'étude des rivages coralliens d'après les récoltes de Yves Plessis, en Océanie (Mission Singer-Polignac). *Cahiers du Pacifique* 9: 78-122, 12 figs on 3 pls.
- REES W. J. & THURSFIELD S. 1965. — The hydroid collection of James Ritchie. *Proceedings of the Royal Society of Edinburgh* (B) 69 (1-2): 34-200.
- REES W. J. & VERVOORT W. 1987. — Hydroids from John Murray Expedition to the Indian Ocean, with revisory notes on *Hydrodendron*, *Abietinella*, *Cryptolaria* and *Zygophylax* (Cnidaria: Hydrozoa). *Zoologische Verhandelingen*, Leiden 237: 1-209, 43 figs.
- RYLAND J. S. & GIBBONS M. J. 1991. — Intertidal and shallow water hydroids from Fiji. II. Plumulariidae and Aglaopheniidae. *Memoirs of the Queensland Museum* 30 (3): 525-560, 24 figs.
- SCHENCK D. A. VON 1965. — Die Kormentektonik der Plumulariiden (Coelenterata, Hydrozoa). *Revue suisse de Zoologie* 72 (44): 885-1021, 35 figs, 5 tabs.
- SCHUCHERT P. 1997. — Review of the family Halopterididae (Hydrozoa, Cnidaria). *Zoologische Verhandelingen*, Leiden, 309: 1-162, 51 figs.
- TOTTON A. K. 1930. — Coelenterata. Part V. Hydroida. British Antarctic ("Terra Nova") Expedition, 1910. *Natural History Report (Zoology Series)* 5: 131-252, 70 text-figs, 3 pls.
- VAN GEMERDEN-HOOGEVEEN G. C. H. 1965. — Hydroids of the Caribbean: Sertulariidae, Plumulariidae and Aglaopheniidae, in Studies on the fauna of Curaçao and other Caribbean Islands, 22 (84). *Uitgaven van de Natuurwetenschappelijke Studiekering voor Suriname en de Nederlandse Antillen* 40: 1-87, 45 figs.
- VAN PRAËT M. 1979. — Les types de polypes d'Hydrides conservés au Muséum national d'Histoire naturelle de Paris. *Bulletin du Muséum national d'Histoire naturelle* 4<sup>e</sup> série, section A, 1 (4): 871-940, 113 figs.
- VERVOORT W. 1966. — Bathyal and abyssal hydroids. Galathea Report. *Scientific Results of the Danish Deep-Sea Expedition, 1950-1952*, 8: 97-173, 66 figs.
- VERVOORT W. 1967. — The Hydroida and Chondrophora of the Israel South Red Sea Expedition, 1962, in Israel South Red Sea Expedition, 1962, Reports, No. 25. *Bulletin of the Sea Fisheries Research Station Israel* 43: 18-54, 16 figs.
- VERVOORT W. 1968. — Report on a collection of Hydroida from the Caribbean region, including an annotated checklist of Caribbean hydroids. *Zoologische Verhandelingen*, Leiden, 92: 1-124, 41 figs.
- VERVOORT W. 1993. — Cnidaria, Hydrozoa, Hydroida: Hydroids from the Western Pacific (Philippines, Indonesia and New Caledonia) I: Sertulariidae (Part 1), in CROSNIER A. (ed.), Résultats des campagnes MUSORSTOM, volume 11. *Mémoires du Muséum national d'Histoire naturelle* 158: 89-298.
- VERVOORT W. & VASSEUR P. 1977. — Hydroids from French Polynesia with notes on distribution and ecology. *Zoologische Verhandelingen*, Leiden, 159: 3-98, 36 figs, 1 tab.
- VERVOORT W. & WATSON J. E. 2003. — The marine fauna of New Zealand: Leptothecata (Cnidaria: Hydrozoa) (Thecate Hydroids). *NIWA Biodiversity Memoir* 119: 1-538, 108 figs.

Submitted on 23 August 2007;  
accepted on 3 March 2008.