STUDIES ON THE FAUNA OF CURAÇAO AND OTHER CARIBBEAN ISLANDS: No. 84.

HYDROIDS OF THE CARIBBEAN:

Sertulariidae, Plumulariidae and Aglaopheniidae

by

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CONTENTS

INTRODUCTION

The present report is based on the very extensive collections of Hydroidea from the Caribbean region which have been assembled by Dr. P. WAGENAAR HUMMELINCK during his scientific explorations of the fauna of that region. The study of the Sertulariidae, Plumulariidae and Aglaopheniidae, the results of which are contained in the present report, was carried out in the Rijksmuseum van Natuurlijke Historie, Leiden, the Netherlands, from October 1960 till February 1962.

Part of HUMMELINCK's hydroid material has already been studied and reported upon by LELOUP (1935). This material is in the collections of the Rijksmuseum van Natuurlijke Historie, except for some specimens from a small number of localities which are now in the collections of the Institut Royal des Sciences Naturelles de Belgique, Brussels. The material examined by LELOUP – in so far as it is still in the collections of the Rijksmuseum van Natuurlijke Historie and contains specimens of the three families studied – has been included in this survey, but it has only been discussed when the author reached a different conclusion. The present records must therefore be considered as supplementing those given in LELOUP's (1935) paper; together they illustrate the occurrence and distribution of the various species in the area visited by Dr. WAGENAAR HUMMELINCK [Table 1].

In the list of localities, I have used the same indications as were used by WAGENAAR HUMMELINCK in his 1953 publication. For the sake of comparison, the numbers used by LELOUP (1935) to indicate the various samples have also been added.

I am very grateful to Dr. W. VERVOORT, under whose supervision the work was carried out, for his kind and stimulating advice and for critically reading the manuscript.

Furthermore I should like to thank Dr. WAGENAAR HUMMELINCK, Zoölogisch Laboratorium of the State University, Utrecht, for his kindness in placing this valuable and rich collection at my disposal.

All the material described below is now to be found in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden.

LOCALITIES AND SPECIES

with station numbers

(cf. WAGENAAR HUMMELINCK, 1953; LELOUP, 1935)

South American mainland

s.n. – SUCRE, Morro de Chacopata, Araya (Ven.), 27.VI.1936. Cast ashore.
Aglaophenia latecarinata.

1203 – SUCRE, Puerto Santo, near Carúpano (Ven.), 12.VI.1936. Sandy debris of shales; 1–2 m deep.
Plumularia halecioides.

s.n. – LA GOAJIRA, Río Hacha (Col.), 20.I.1937. Sandy beach.
Thyroscyphus ramosus, Diphasia tropica, Sertularia turbinata.

Aruba

1001A – North of PUNTA BRABOE, 18.XII.1936. Sandy reef among *Porites*; lower zone.
Plumularia margaretta.

1005 – BOEKOETI (Bucuti), northern lagoon side, 25.VI.1930 (LELOUP: 53, 53a). On roots of *Rhizophora* in lagoon with soft, muddy sand; tidal and lower zone.
Dynamena crisioides.

1005a – Boekoeti, 17.VI.1949. As before (somewhat polluted by oil residue).
Dynamena crisioides.

1006 – Boekoeti, northern sea side, 25.VI.1930 (LELOUP: 51, 51a). Reef debris with muddy sand, some *Thalassia*; tidal zone, with small pools.
Diphasia tropica, Dynamena crisioides, Antennella diaphana diaphana.

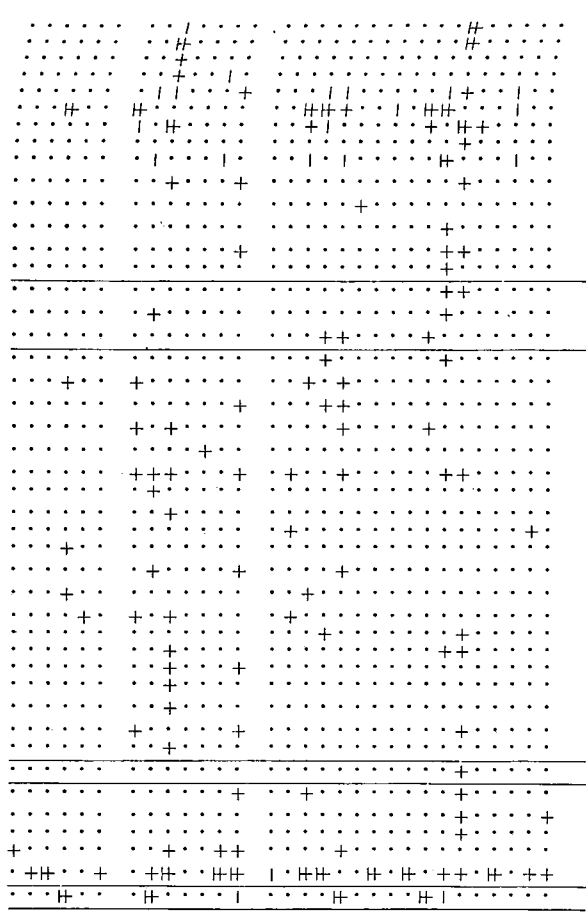
TABLE I

Geographical Distribution of Caribbean Hydroids

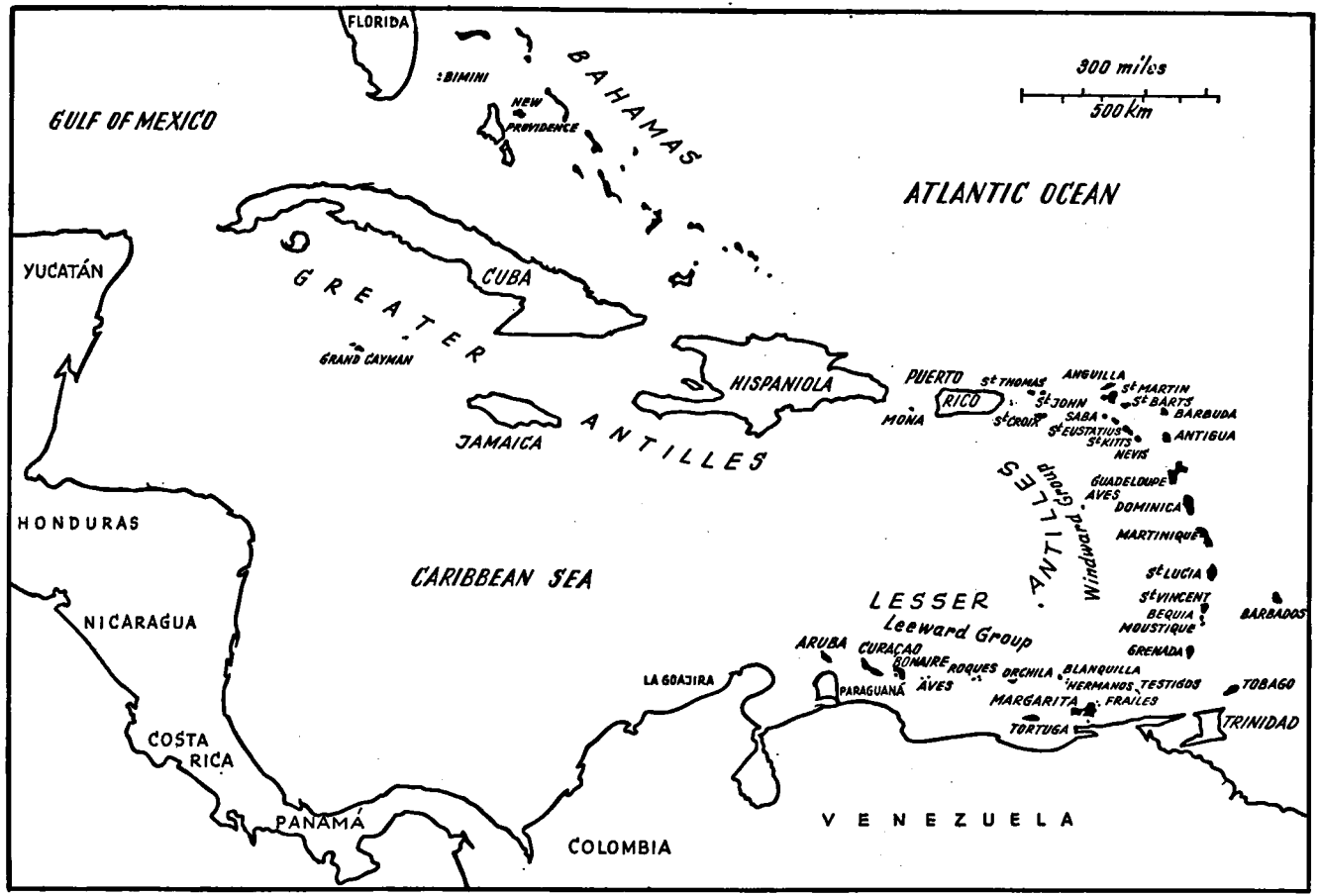
according to the material treated in this paper.
(with HUMMELINCK's Station numbers)

\+ new data
± data from LELOUP, 1935 and new data
− data from LELOUP, 1935

	Sucre (Ven.) Goajira (Col.)	Leeward: Aruba					Curaçao						Klein Curaçao	Klein Bonaire	Bonaire				
	1203	s.n.	1001	1005	1006	1011	1302	s.n.	1016	1017	1022	1023	1028	1029	1035	1039	1046	1049	1056	1057	1058	1059	1060	1061
Sertulariidae																								
Cnidoscyphus marginatus									+															
Thyroscyphus ramosus		+																						
Thyroscyphus intermedius																								
Idiellana pristis																								
Diphasia tropica		+			±																			
Dynamena crisioides					+	±	+			+				+	±	+		±	+		?	+	+	
Dynamena cornicina						±				−							+				±	+	±	
Dynamena quadridentata						±				±													+	
Dynamena mayeri																								
Sertularella tenella						−				−											±			
Sertularella conica																								
Sertularella minuscula																					−		±	
Sertularia distans						±				±											+		±	
Sertularia turbinata		+				±	+																+	
Sertularia marginata										±													±	
Sertularia inflata																								
Sertularia rathbuni																								
Plumulariidae																								
Antennella diaphana					±						+				+	+	+	+	±	−				−
Antennella secundaria								±																
Antennella curvitheca																								
Plumularia habereri										+														
Plumularia halecioides	+				−			+			+	?						±			?	+	
Plumularia sargassi					−		+	±															−	±
Plumularia margaretta			+		±			−															+	
Aglaopheniidae																								
Halicornaria hians																								
Lytocarpus philippinus																								
Aglaophenia latecarinata	+				±			±										+					±	−
Aglaophenia allmani																								
Aglaophenia elongata																								
Aglaophenia pluma																								



1062	Bonaire	Leeward Group	
1064			
1065			
1066			
1068			
1069			
1070			
1377			
1071			
1211	Tortuga		
1212	Centinela		
s.n.	Blanquilla		
1215	Los Frailes		
s.n.	Los Testigos		
1382	Trinidad		
1385	Tobago		
s.n.			
s.n.	Grenada	Windward Group	
1114	Aves		
1393	Antigua		
1394	Barbuda		
s.n.	Nevis		
1397	St. Kitts		
1398			
1116	St. Eustatius		
1117			
s.n.			
1121	St. Barts		
s.n.	Fourche		
1128	St. Martin		
1129			
1130			
1131			
1132			
1405	St. Croix		
1407	St. John		
1408			
1148	Jamaica		
1149	New Providence	Bahamas	
1151	Bimini		
1152			
1154			
s.n.	Tortugas		
s.n.	Atlantic		



Sketch map of the Caribbean, showing localities of West Indian hydroids treated in this paper.

1011 – Boca Prins, 28.VI. & 3.VII.1930 (Leloup: 49, 49a, 49b, 50, 50a). On *Sargassum*, cast ashore.
Dynamena cornicina, D. quadridentata var. *nodosa, Sertularia distans* var. *gracilis, S. turbinata, Plumularia margaretta, Aglaophenia latecarinata.*

1302 – Wharf of Arend Petroleum Co., 4.V.1955. Iron beam in open sea; 0–1.5 m.
Dynamena crisioides, Sertularia turbinata.

s.n. – Aruba, 3.V.1955.
Plumularia sargassi.

Curaçao

1016A – Boca Grandi, 2.V.1930 (Leloup: 44, 44a). On *Sargassum*, cast ashore.
Dynamena quadridentata var. *nodosa, Sertularia distans* var. *gracilis, S, marginata, Antennella secundaria, Plumularia halecioides, P. sargassi. Aglaophenia latecarinata.*

1017 – Knip Baai, S. side, 8.I.1949. Perpendicular rocky cliff; tidal and lower zone.
Cnidoscyphus marginatus, Dynamena crisioides.

1022 – Boca Santoe Pretoe, 12.III.1949. Rocky beach with *Dictyonema*, quartzite pebbles; mid- and low-tide zone.
Plumularia habereri.

1023a – Playa Hoeloe (Playa Hulu), 19.III.1949. Sandy reef, debris; low-tide and lower zone.
Antennella diaphana diaphana, Plumularia halecioides.

1028A – Piscadera Baai (inner bay), 2.II.1949. Rock debris and sand with soft blackish mud, near *Rhizophora*; tidal and lower zone.
? *Plumularia halecioides.*

1029 – Piscadera Baai (outer bay), swimming pool, 29.I.1949. Rocky shore with sand; tidal and lower zone.
Dynamena crisioides.

1029A – Piscadera Baai (outer bay), swimming pool, 29.I.1949. On fence and piles.
Dynamena crisioides.

1035 – Spaanse Water, Kabrietenbaai, 9.XII.1930 (Leloup: 48a, 48b). On *Rhizophora*, in muddy, landlocked bay; tidal and lower zone.
Dynamena crisioides.

1039 – Fuik Baai, S.E. of Newport Bath, 20.XI.1948. Muddy sand with some *Thalassia*; tidal and lower zone.
Dynamena crisioides, Antennella diaphana diaphana.

s.n. – Groot St. Joris, shore, 9.IV.1949.
Dynamena crisioides.

Klein Curaçao

1046 – WESTERN SHORE, 1.X.1948. Sandy beach with some beach rock, much *Sargassum*; tidal zone.
Dynamena cornicina, Antennella diaphana diaphana.

Klein Bonaire

1049a – East coast LANDING, 17.X. & 8.XI.1930. Sandy shore with reef debris; tidal and lower zone.
Dynamena crisioides.

1049B – East coast landing, 13.IX.1948. Reef debris on sandy beach; tidal and lower zone.
Dynamena crisioides, Antennella diaphana diaphana, Plumularia halecioides, Aglaophenia latecarinata.

s.n. – Northeast coast, 31.XII.1948.
Dynamena crisioides.

Bonaire

1056A – PALOE LECHI (Playa Lechi), 4.IX.1948. Beach rock; mid-tide zone.
Dynamena crisioides.

1056B – PALOE LECHI, 4.IX.1948. Beach rock; low-tide zone.
Antennella diaphana diaphana.

1057 – KRALENDIJK, Pasanggrahan, 3. & 5.IX.1930 (LELOUP: 6, 7). Beach rock; tidal zone.
Antennella diaphana diaphana.

1057b – Kralendijk, Pasanggrahan, 10. & 26.X.1930 (LELOUP: 10, 10a, 11, 12, 12a). Beach rock; tidal zone.
Sertularella tenella, Sertularia distans var. *gracilis.*

1057C – Kralendijk, Pasanggrahan, 20.IX.1948. Beach rock with sand; low tide and lower zone.
Dynamena cornicina.

1058 – DE HOOP, South of Kralendijk, 11, 12, 16 & 17.V.1930 (LELOUP: 16, 17, 17a, 17b). Limestone cliff with sandy reef; tidal and lower zone.
? *Dynamena crisioides.*

1058A – De Hoop, 10.IX.1948. Limestone cliff; upper and high-tide zone.
? *Plumularia halecioides.*

1058C – De Hoop, 10.IX.1948. Sandy reef; 1–3 m.
Dynamena cornicina.

1059A – PUNT VIERKANT, 9.IX.1948. Limestone cliff with debris, *Turbinaria* and *Sargassum*; mid- and low-tide zone.
Dynamena crisioides, D. cornicina, Plumularia halecioides, Aglaophenia latecarinata.

1059B – PUNT VIERKANT, 9.IX.1948. Sandy reef; 1–2 m.
Dynamena crisioides, D. cornicina, Aglaophenia latecarinata.

1060 – ORANJEPAN, 15.V.1930 (LELOUP: 20). On *Sargassum*, cast ashore.
Dynamena crisioides, D. quadridentata var. *nodosa, Sertularia distans* var. *gracilis, S. turbinata, S. marginata, Plumularia margaretta, Aglaophenia latecarinata.*

1060a – Oranjepan, 7.IX.1930 (LELOUP: 21, 22, 22a). On *Sargassum*, cast ashore.
Dynamena cornicina, Sertularella minuscula.

1061 – ZUIDPUNT, 27.X.1930 (LELOUP: 23). On *Sargassum*, cast ashore.
Plumularia sargassi.

1062 – LAC, SOEREBON, 26.X.1930 (LELOUP: 29, 30, 30a, 30b, 30c). On *Rhizophora*, sandy mud; tidal and lower zone.
Dynamena crisioides.

1064 – LAC, POEJITO, 12, 16, & 19.X.1930 (LELOUP: 31, 31a, 32, 32a, 33). On *Rhizophora*, soft mud; tidal and lower zone.
Dynamena crisioides, Plumularia halecioides.

1064c – Lac, Poejito, 17.IV.1955. On *Rhizophora*, soft mud; tidal zone.
Dynamena crisioides, Plumularia halecioides.

1065 – Lac, entrance to Poejito, 17.IX.1948. Mudflat with *Halimeda* and *Thalassia*; low-tide and lower zone.
Plumularia halecioides.

1066b – LAC, CAY, 19.III.1937. Shallow part of muddy lagoon near *Rhizophora* and *Avicennia*; tidal zone.
Plumularia halecioides.

1068a – LAC, BOCA, 1.X.1948. Sandy reef with debris, continuous wave action; 1–2 m.
Dynamena crisioides, Antennella diaphana diaphana.

1069 – BOCA WASHIKEMBA, 16.V.1930 (LELOUP: 35). On brown algae, cast ashore.
Dynamena cornicina, D. quadridentata var. *nodosa, Sertularia distans* var. *gracilis, S. turbinata, S. marginata, Plumularia margaretta, Aglaophenia latecarinata.*

1070c – LAGOEN, S.E. SHORE, 9.IV.1955. Rock debris between mangroves; tidal zone.
Plumularia halecioides.

1070A – Lagoen, S.E. corner, 28.X & 2.XI.1930 (LELOUP: 36, 36a, 37, 37a, 39, 39a, 40, 40a, 41, 42). On *Rhizophora* in muddy sand; low-tide and lower zone.
Diphasia tropica, Dynamena crisioides, Sertularia marginata.

1070Aa – Lagoen, 14.IX.1948. On *Rhizophora*, and in pool between mangroves and shore, with diabase rock and some mud; low tide and lower zone.
Dynamena quadridentata var. *nodosa.*

1377 – LAGOEN, N. COAST, 2.IV.1955. Sandy rock; lower zone.
Dynamena crisioides.

1071A – Boca Onima, 19.IX.1948. Rocky beach in heavy surf, sandy debris, with *Sargassum*; low-tide and lower zone.
Dynamena cornicina.

s.n. – Playa Grandi 23.X.1930. Among sea weeds, cast ashore.
Sertularia turbinata.

s.n. – Slagbaai, 12.IX.1930. Among sandy corals, depth 2 m.
Dynamena crisioides.

Tortuga

1211 – Southwestern coast of Tortuga, 1.VIII.1936. Sandy debris, and muddy sand with *Thalassia*, on *Rhizophora*; tidal and lower zone.
Dynamena crisioides, Antennella diaphana diaphana, Plumularia halecioides.

Centinela

1212 – Southwestern shore of Centinela (near Higuerote), 31.VII.1936. Rocky shore in heavy surf, cherts; tidal zone.
Sertularella minuscula.

Blanquilla

s.n. – Playa Valuchu, 21.VII.1936. Sandy debris; 2.5 m deep.
Dynamena cornicina.

Los Frailes

1215 – La Pecha, S.W. shore, 19.VI.1936. Sandy debris of igneous rock; 1–2 m deep.
Dynamena crisioides, D. cornicina, Antennella diaphana diaphana.

Los Testigos

s.n. – Puerto Tamarindo, 16.VI.1936. About 2 m deep.
Dynamena cornicina.

Trinidad

1382 – Monos, Avalon Bay, 10.I.1955. Among rock debris, about 1 m deep.
Dynamena crisioides, D. cornicina.

Tobago

1385 – Buccoo Bay, 16.I.1955. Among sandy coral debris; 2 m.
Dynamena cornicina, Plumularia sargassi.

s.n. – ROCKLEY BAY, 20.I.1955. Among weeds, cast ashore.
Dynamena quadridentata var. *nodosa*, *Sertularia distans* var. *gracilis*, *S. turbinata*.

Grenada

s.n. – Between GRENADA and Trinidad, 5.IV.1930. On floating piece of *Sargassum* (LELOUP: 61).
Dynamena cornicina, *Sertularia turbinata*.

Islote Aves (Bird Island)

1114 – Northern LAGOON, 12.V.1949. Sandy shore with some coral debris and beach rock; tidal and lower zone.
Sertularia distans var. *gracilis*, *S. marginata*, *Plumularia margaretta*, *Aglaophenia latecarinata*.

Antigua

1393 – DEEP BAY at Fort Barrington, 17.VII.1955. Sandy rock; tidal zone.
Sertularia distans var. *gracilis*, *S. turbinata*, *Antennella diaphana diaphana*.

Barbuda

1394 – MARTELLO TOWER BEACH, 8.VII.1955. Sandy rock; lower zone.
Dynamena quadridentata var. *nodosa*, *Sertularia distans* var. *gracilis*, *Plumularia halecioides*, *P. margaretta*.

Nevis

s.n. – FORT CHARLES, 28.VI.1949. Among sea weeds, cast ashore.
Antennella curvitheca.

St. Kitts (St. Christopher)

1397 – FRIGATE BAY, 20.VII.1955. Rocky coast with debris; tidal and lower zone.
Dynamena crisioides, *D. cornicina*, *Sertularia distans* var. *gracilis*, *S. inflata*, *Antennella diaphana diaphana*, *Plumularia halecioides*, *P. sargassi*, *P. margaretta*.

1398 – W. of BASSETERRE, 30.VI.1955. Rocky coast; tidal zone.
Plumularia sargassi.

St. Eustatius (Statia)

1116B – GALLOWS BAY, 15.VII.1949. Rocky beach; 1–2 m deep.
Plumularia halecioides.

1117 – DOWNTOWN, near Billy Gut. 13.VII.1949. Sandy rock; tidal zone.
Thyroscyphus ramosus, Sertularia inflata.

s.n. – SCHILDPADDENBAAI, 21.II.1949 (A. C. J. Burgers coll.), Sandy beach.
Aglaophenia latecarinata.

St. Barts (Saint-Barthélemy)

1121 – PUBLIC, 4.VI.1949. Rocky shore with sandy debris; tidal zone.
Sertularia distans var. *gracilis, Antennella diaphana diaphana, Plumularia sargassi.*

La Fourche (Five Island)

s.n. – FIVE ISLAND bay, 2.VI.1949. Sandy rock debris; 1–2 m.
Sertularia marginata, Aglaophenia latecarinata.

St. Martin (Sint Maarten)

1128 – GREAT BAY, N.E. shore, 16.V.1949. Sand beach; tidal zone.
Lytocarpus philippinus.

1128A – Great Bay, N.E. shore, 26.V.1949. Wooden wreck on sand beach; tidal and lower zone (pH 8.7).
Sertularia inflata.

1128Aa – Great Bay, 24.VI.1955. Remnant of same wreck.
Plumularia halecioides.

1128C – Great Bay, 14.VI.1949. Sand beach with *Thalassia*; about 2 m deep.
Plumularia margaretta.

1129 – SIMSON LAGOON bridge, 4.VIII.1949. On wooden piles in sand of lagoon entrance with *Thalassia*, strong tidal flow; tidal and lower zone.
Dynamena crisioides, Sertularia turbinata.

1130 – Simson Lagoon, outlet, 27.V.1949. Sandy lagoon with *Rhizophora* and *Thalassia*, tidal flow; tidal and lower zone.
Dynamena crisioides, D. cornicina, Plumularia halecioides.

1131 – Simson Lagoon, W. shore of Little Key, 2.VIII.1949. Muddy sand with some *Thalassia* and *Bathophora*, on *Rhizophora*; tidal and lower zone.
Antennella diaphana diaphana, Plumularia halecioides.

1132 – Simson Bay Lagoon, W. shore of Flamingo Pond, 8.VI.1949. Muddy lagoon with rocky shore, with *Bathophora*, on *Rhizophora* and *Avicennia*; tidal and lower zone (pH 8.6).
Plumularia halecioides.

1132A – Simson Bay Lagoon, Flamingo Pond, 8.VI.1949. Muddy lagoon with small *Thalassia*, and *Bathophora*; low-tide and lower zone.
Plumularia halecioides.

St. Croix

1405 – KRAUSSE LAGOON entrance, 15.VI.1955. Muddy sand with *Rhizophora* and *Thalassia*; lower zone.
Plumularia halecioides.

St. John

1407 – TURNER BAY, 18.VI.1955. Among rock debris, with *Turbinaria*; tidal and lower zone.
Dynamena crisioides, Antennella diaphana diaphana, Plumularia margaretta.

1408 – Bay S. of CRUZ Bay, 19.VI.1955. Sandy rock debris; tidal zone.
Plumularia halecioides.

Jamaica

1148 – Kingston Harbour, Myrtle Bank landing, 15.VIII.1949. On piles in sandy mud; tidal and lower zone.
Dynamena crisioides.

New Providence

1149 – Between HOG ISLAND and Athol Island, 16.VIII.1949. Sand with *Thalassia*; 2–3 m.
Dynamena crisioides, Sertularia marginata, Antennella diaphana diaphana.

Bimini

1151 – NORTH BIMINI, Laboratory Dock, 20.VIII.1949. Wooden piles in sandy mud with *Thalassia*; tidal and lower zone.
Cnidoscyphus marginatus, Dynamena crisioides.

1152 – NORTH BIMINI, Entrance Point, W. shore, 18.VIII.1949. Rocky beach with sand; rock pools, tidal zone.
Dynamena crisioides.

1154 – NORTH BIMINI, 1 km off shore W., 17.VIII.1949. Plankton catch.
Sertularia distans var. *gracilis, Antennella secundaria, Plumularia halecioides, Aglaophenia pluma pluma.*

Tortugas, Fla. (WALDO L. SCHMITT coll.)

Sta. 17 – 18.VII.1930 (LELOUP: 77).
Dynamena crisioides, Antennella diaphana diaphana, Plumularia halecioides.

Sta. 206 – 10.VI.1925 (LELOUP: 67).
Cnidoscyphus marginatus, Thyroscyphus ramosus, Idiellana pristis, Antennella diaphana diaphana, A. secundaria.

Sta. 207 – 10.VI.1925 (LELOUP: 68, 69).
Cnidoscyphus marginatus, Idiellana pristis, Aglaophenia allmani.

Sta. 210 – 10.VI.1925 (LELOUP: 70, 71).
Sertularella conica, Dynamena cornicina, D. mayeri, Antennella diaphana diaphana, Aglaophenia allmani, A. elongata, Halicornaria hians var. *balei.*

STA. 219 – 11.VI.1925 (LELOUP: 73, 74, 75), 25 fms depth.
Cnidoscyphus marginatus, Sertularella conica, Antennella diaphana diaphana; Plumularia sargassi, Aglaophenia allmani.

SOUTH OF LOGGERHEAD KEY, 22.VI.1925 (LELOUP: 76). From 20 feet.
Sertularia turbinata, S. marginata.

LOGGERHEAD KEY, 24.VII.1924 (LELOUP: 66).
Sertularia turbinata.

Atlantic

43°4′ N, 31° W, 21.XII.1930 (LELOUP: 63). On floating *Sargassum*; 15.5°C.
Dynamena quadridentata var. *nodosa, Sertularia distans* var. *gracilis, Plumularia sargassi, Aglaophenia latecarinata.*

35°7′ N, 63°35′ W, 4.XII.1930 (LELOUP: 63a). On floating *Sargassum*; 19°C (S.S. Alhena leg.).
Plumularia sargassi.

REPORT ON THE SPECIES

(Gonothecae always mentioned if present.)

Cnidoscyphus marginatus (Allman, 1877)

Obelia marginata ALLMAN, 1877, p. 9, pl. 6 figs. 1–2.
Cnidoscyphus marginatus, SPLETTSTÖSSER, 1929, p. 88, 125, figs. 83–88, map 2; LELOUP, 1937, p. 101.
Lytoscyphus marginatus, LELOUP, 1935, p. 31.

CURAÇAO: 1017. Some black, dirty, damaged colonies reaching a maximum height of 2 cm, on a stone with *Dynamena crisioides*; the hydrocauli have some short branches. Many unbranched and scarcely branched colonies on coral; stem brown, branches yellowish or colourless; height 2–2.5 cm. Some of the specimens are covered with algae and another hydroid.

BIMINI: 1151. Many well-developed hydrocauli, often and irregularly sending out long branches. The black colonies reach a max. height of 10 cm.
TORTUGAS: Sta. 206. Two unbranched fragments 3 cm and 2 cm in length, attached to a stone. — Sta. 207. A yellowish fragment. — Sta. 219. Some very damaged colonies on a spongy substratum.

The specimens, without gonothecae, agree in all respects with the extensive description by SPLETSTÖSSER (1929).

Measurements (in μ):	
branch, length internode	1,245–1,405
— diameter across node	200– 285
hydrotheca, height diaphragm – margin	1,060–1,220
— height apophysis – margin	1,220–1,330
— diameter at aperture (= max. diam.)	605– 780

SPLETSTÖSSER (1929, map 2) gives a list of localities from which the species has previously been recorded: Bermudas; Dry Tortugas, Loggerhead Key; coast of Florida, N. of Zoblos Island; St. Thomas, St. John; Sand Key, and Anguilla. LELOUP (1935) adds some localities near Tortugas; these are mentioned in the present paper. LELOUP (1937) also records the species from the coast of Venezuela, near Tortugilla Island. The present new localities, Curaçao and North Bimini, are situated in the narrow Western Atlantic area to which the distribution of this species seems to be restricted.

Thyroscyphus ramosus Allman, 1877

Thyroscyphus ramosus ALLMAN, 1877, p. 11, pl. 6 figs. 5–6; SPLETSTÖSSER, 1929, p. 54, 124, figs. 46–51, map 1; LELOUP, 1932, p. 158.

LA GOAJIRA (Col.): N.E. of Río Hacha, 20.I.1937. Many well-developed colonies, growing on shells and a stony substratum; max. height 16 cm.
ST. EUSTATIUS: 1117. Some branched colonies, without hydrothecae, reaching a maximum height of 5 cm, abundantly covered by algae.
TORTUGAS: Sta. 206. Two branched colonies 9.5 cm and 6 cm in length, and partly invested with algae.

Bushes of strong colonies covered by thick periderm, rising from confused masses of hydrorhizal fibres. The stem gives off branches at irregular intervals. These branches have secondary and tertiary branches. The stem and the main branches are brown, the other parts of the colonies are lighter or colourless.

The colonies correspond completely with the description by SPLETTSTÖSSER (1929).

Measurements (in μ):	
branch, length internode	1,180–1,640
— diameter across node	185– 345
hydrotheca, height diaphragm – margin	720– 935
— height apophysis – margin	1,090–1,330
— diameter at aperture	390– 470
— maximum diameter	515– 580

A complete list of previous records is given by SPLETTSTÖSSER (1929, map 1). All localities are in the tropical part of the Western Atlantic Ocean: Florida, Tortugas, Haiti, St.-Barthélemy, Testigos, Bahia. The only record from the Indian Ocean is from the Gulf of Manaar (LELOUP, 1932). The present new localities, St. Eustatius and La Goajira, do not alter the picture of the geographical distribution.

Idiellana pristis (Lamouroux, 1816)

Idia pristis, BALE, 1884, pl. 7 figs. 1–2, pl. 19 fig. 33; BILLARD 1925, p. 219.
Idiella pristis, STECHOW, 1925, p. 221; LELOUP, 1935, p. 37, figs. 19–21.
Idiellana pristis, PENNYCUIK, 1959, p. 193.

TORTUGAS: Sta. 206. Two pinnate colonies 4.5 cm and 2 cm in length, rising from the same place on the stolon. A pinnate colony 5 cm in length attached to a 2-cm-long fragment of another *I. pristis* specimen, which is covered with *Filellum serpens* and *Cnidoscyphus marginatus*. — Sta. 207. Two pinnate colonies 6 cm and 7.5 cm in length, and a 6 cm long fragment. All specimens are invested by a spongy mass, so that only the extreme parts are free.

Although this species has been recorded very often, I could not find a full description of Western Atlantic specimens. The present material agrees in most respects with BALE's description (1884) of Australian colonies.

Strong, pinnate colonies rise from a dense reticulum of hydrorhizal fibres. The unfascicled stem is not segmented or divided into internodes by a scarcely visible peridermal constriction beneath each branch. The branches alternate and form an angle of 90° with the longitudinal axis of the stem. The internodes of the stem above the branch bear an axillary hydrotheca and a pair of alternating hydrothecae. The branch is separated from the broad, large apo-

physis of the stem by a small transverse node or a peridermal constriction. The branch is generally not divided into internodes, but a transverse node may occasionally occur. The hydrothecae are arranged alternately in longitudinal rows.

The shape of the hydrothecae and their mode of contact with each other are described by BALE. Only the "slight angular ridge" is absent in my specimens. No undamaged operculum is present in the Tortugas material.

LELOUP (1935) has described extensively the way of insertion of one colony on another. The present specimens, from the same localities, also show this phenomenon.

Measurements (in μ):	
hydrotheca, lenght free abcauline wall	495–530
— diameter at aperture	185–325

The species is common in the Indian and Pacific Oceans, except for the west coast of America, and also occurs in the Atlantic Ocean. STECHOW (1925), BILLARD (1925) and LELOUP (1935) give a complete picture of its geographical distribution. Since 1935 the following new records from the Indo-Pacific area have been given: Indo-China (LELOUP, 1937a), Indonesia and New Guinea (VERVOORT, 1941, 1946), Queensland (PENNYCUIK, 1959). New records from the Atlantic Ocean are: French Guinea (LELOUP, 1937), several localities near the west coast of Africa between 13°48′ N and 17°23′ W and Bonny River, Niger Delta (VERVOORT, 1959); Bahia (VERVOORT, 1946), and Tortugas, Florida (LELOUP, 1935).

Diphasia tropica Nutting, 1904 Figs. 1–5

Diphasia tropica NUTTING, 1904, p. 110, pl. 30 fig. 1; LELOUP, 1935, p. 37, fig. 18; FRASER, 1943, p. 92; BUCHANAN, 1957, p. 365, fig. 19.
Diphasiella ornata VANNUCCI, 1949, p. 239, pl. 2 figs. 26–28.

LA GOAJIRA (Col.): N.E. of Río Hacha, 20.I.1937. About twenty fragments, two of them bearing one gonotheca each.
ARUBA: 1006. About twenty colonies 3–5 mm in length on reef debris.
BONAIRE: 1070A. Some damaged colonies on algae.

Extremely delicate, unbranched, colourless colonies, rising from long apophyses of a simple network of hydrorhizal fibres, creeping on coral or algae. The periderm of the colony is very thin. The stolon shows some slight constrictions, and does not have internal periderm ridges.

The hydrocaulus is attached to the apophysis and divided into regular internodes by means of hinges. Each internode carries halfway down its length, on the anterior part, two exactly opposite hydrothecae, deeply sunk into the stem. The distance between two consecutive pairs of hydrothecae is half their height. On the anterior part of the stem the members of a pair are contiguous for at least half their adnate adcauline walls, and for a more considerable length in younger parts of the colony. On the posterior part of the stem the hydrothecae remain separated by the internode.

The hydrotheca is deep, with the smallest diameter at the base,

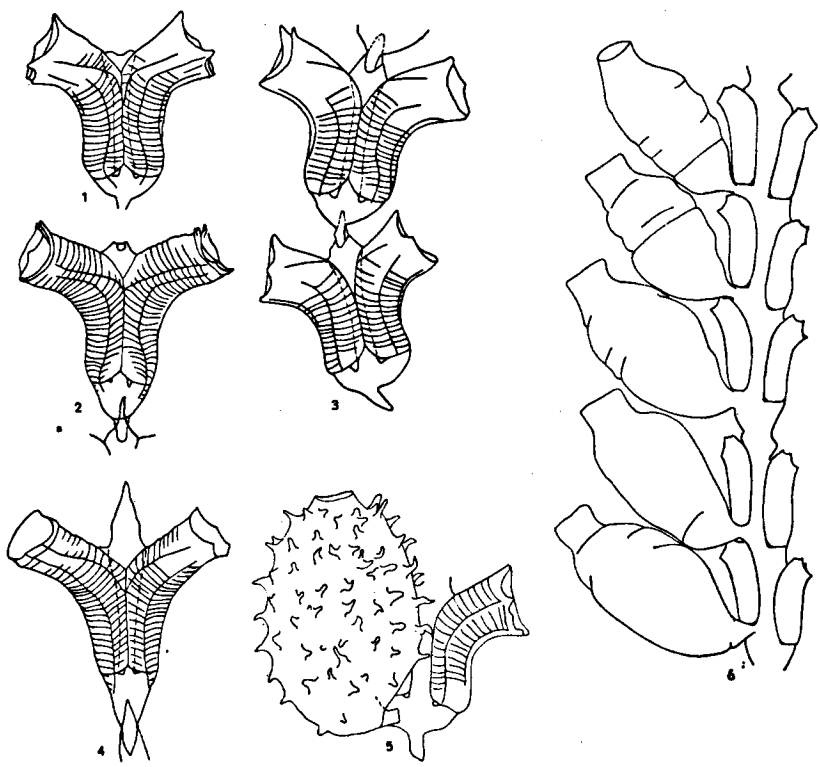


Fig. 1–5. *Diphasia tropica* Nutting. — La Goajira (Col.), Río Hacha: 1–3, hydrothecae from different hydrocauli in frontal view; 5, gonotheca. Aruba, loc. 1006: 4, hydrotheca in frontal view. (× 30)

Fig. 6. *Dynamena crisioides* Lamouroux. — Bonaire, loc. 1062: part of basal hydroclade with gonothecae. (× 15)

then gradually widening and becoming five-sided; the maximum diameter is at the aperture. Two thirds of the adcauline wall are adnate, one third is free; the free part is turned laterally at an angle of 60° or more to the longitudinal axis of the stem, at the same time bending slightly forward. The abcauline wall is more strongly curved than the adcauline wall. The plane of the aperture is inclined in adcauline direction. In lateral aspect, the aperture is pentagonal. The margin is set with a maximum of five very small teeth, but size and number vary strongly, and hence practically no margin is identical with another. From these teeth five thin longitudinal peridermal ribs run over the whole outer surface of the hydrotheca; one of these is situated on the adcauline side. The ribs are connected by many fine, closely packed transverse ridges, running parallel to each other. These small ridges may be absent on the more proximal and distal parts of the hydrotheca. This pattern may continue for some distance on the sides of the internode beneath the hydrothecae.

No undamaged operculum could be found in the present material. No intrathecal teeth or other peridermal thickenings occur near the

Measurements (in μ):	Aruba (1006)	Río Hacha	*Diphasiella ornata* (VANNUCCI 1949)
Hydrocaulus, length internode	545–625	480–550	780–790
— interval between 2 consecutive pairs	200–285	140–220	
— diameter at node	30–65	30–50	32–40
hydrotheca, length abcauline wall	280–425	250–330	
— length adnate part adcauline wall	310–410	295–360	290–320
— length contiguous part adcauline wall	155–315	185–265	
— length free part adcauline wall	170–280	170–220	295–350
— diameter at aperture	125–175	140–190	185–190
— maximum diameter across pair	590–815	515–640	
gonotheca, maximum length (excl. stalk)	–	700	785–790
— maximum diameter (excl. spines)	–	110	
— diameter at aperture	–	455	390–400
— length stalk	–	80	

margin. On the base of the hydrotheca there is a small peridermal tooth. Many hydrothecae are renovated. The hydranths are not preserved or are in bad condition.

The oval gonotheca originates dorsally at the base of the proximal hydrotheca of the fragment. It rises from a short stalk, and bends abruptly upwards. Its surface is wholly covered by curved spines of unequal length, apparently arranged in irregular, longitudinal rows. A circular, smooth aperture is present at the apex. Both gonothecae are empty, hence the sex cannot be determined.

The specimens from Aruba (1006) and Bonaire closely resemble the description and figure by LELOUP (1935), relating to material from the former locality. The colonies from Río Hacha are a little more compact. They differ – as LELOUP notes – from NUTTING's specimens in the shorter distance between two consecutive pairs of hydrothecae (NUTTING estimates this distance as equal to the height of the hydrotheca), and in the smaller free part of the hydrotheca. In the present material the ratio free part: adnate part of the hydrotheca is the same as that given by NUTTING for repeatedly renovated hydrothecae only (cf. Fig. 5).

The shape of the hydrothecal margin is very variable. Observations are hampered by the extreme delicacy of the colony, which is such that some "variations" may be due to deformation by pressure of the cover glass. But previous records also show a great variability in this respect. NUTTING (1904) describes and figures pentagonal hydrothecae with a smooth margin and circular aperture. LELOUP (1935) and BUCHANAN (1957) figure a pentagonal hydrotheca, the margin of which has five irregular, indistinctly developed teeth.

VANNUCCI (1949) describes a new species, *Diphasiella ornata*, which differs from NUTTING's species in three respects: the presence of four large marginal teeth, an irregular, quadrangular hydrothecal cross section, and different dimensions of the various parts. In all other characters (with the exception of the peridermal ridges in the stolon, which are not significant) it agrees completely with the present material – the gonothecae are absolutely identical; and hence I consider *Diphasiella ornata* Vannucci, 1949, to be synonymous with *Diphasia tropica* Nutting, 1904.

Diphasia tropica has only been found in the tropical parts of the Atlantic Ocean. In the eastern region it has been recorded from Prampram, Gold Coast (BUCHANAN, 1957), in the western region from between Eleuthera and Little Cat Island, Bahamas (NUTTING, 1904); from Trinidad, W. I. (FRASER, 1943); from Aruba (LELOUP, 1935); from Ilho do Frances, and 20°33′ S, 40°14′ W, Brazil (VANNUCCI, 1949). Two new localities are added here: Bonaire and La Goajira.

The species occurs in shallow waters, maximum depth 35 m, on various substrata.

Dynamena crisioides Lamouroux, 1824 Fig. 6

Dynamena tubuliformis MARKTANNER-TURNERETSCHER, 1890, p. 238, pl. 4 fig. 10; WAGENAAR HUMMELINCK, 1933, p. 305.

Dynamena crisioides, BILLARD, 1925, p. 181, fig. 36; LELOUP, 1935, p. 41, fig. 24; MILLARD, 1958, p. 183; VERVOORT, 1959, p. 260, figs. 27a–b.

Dynamena crisioides typica VANNUCCI, 1946, p. 557, pl. 3 figs. 24–25.

ARUBA: 1005. Numerous branched colonies 4–7 cm in height on pieces of coral and wood; they are dirty and covered with algae. One of the colonies bears gonothecae on all branches. — 1005a. Many branched specimens on wood; 3–7 cm. — 1006. Many branched and unbranched specimens 1–4 cm in length on coral, with some gonothecae. — 1302. Some branched, 1.5–2 cm high colonies.

CURAÇAO: 1017. Many unbranched specimens on coral, only about 0.5 cm in height. The hydrothecal margin is provided with an adcauline, intrathecal tooth, and sometimes also with an abcauline tooth. Some larger, branched colonies are attached to a shell. — 1029. Some specimens on coral, regularly branched and about 4 cm in height. The distal branches of a colony produce stolons 2.5–5 cm in length. One colony bears a few gonothecae. — 1029A. Some colonies growing on a shell; about 2 cm. — 1035. About ten unbranched and sparsely branched colonies of over 1 cm, on a shell. — 1039. Two unbranched specimens, each having only three pairs of subalternating hydrothecae, one pair to an internode; on algae. — Groot St. Joris, 9.IV.1949. A fragment 0.5 cm in length with extremely delicate hydrothecae.

KLEIN BONAIRE: 1049a. A fragment. — 1049B. Some damaged, irregularly branched colonies and a few feather-shaped colonies about 3 cm in length, on coral. — N.E. coast. Some branched and unbranched colonies reaching a height of 1.5 cm, on coral. One specimen bears gonothecae.

BONAIRE: 1056A. Some damaged, branched colonies on shells and coral; max. height 1.3 cm. — 1058?. Some branched hydrocauli, from a big stone; 1.5 cm. — 1059A. Some dirty, branched specimens on coral, three of them covered with *Hebella*. Some specimens have intrathecal peridermal teeth. — 1059B. Three unbranched specimens 0.4 cm in height. — 1060. Small fragment. — 1062. A piece of *Rhizophora* 20 cm long is densely covered with numerous feather-shaped colonies 7–8 cm in length, abundantly provided with gonothecae. The length of the branches is 0.5–0.9 cm. The specimens are partly covered with algae. – Five delicate, branched colonies, max. 5.5 cm, bearing many gonothecae. — 1064. Four branched hydrocauli 1–5 cm in length, with gonothecae; the largest has finely developed, long branches. — 1064c. Many colonies on wood, max. 2 cm, with gonothecae. — 1068a. A few

small specimens on coral. — 1070A. Many branched colonies growing on *Rhiz.*, max. height 3 cm. – Several branched and unbranched hydrocauli attached to stones and pieces of wood; 0.5–5 cm. — 1070B. A branched colony of 4 cm, and some fragments. — 1377. A few scarcely branched colonies on a stone; max. 1 cm. — Slagbaai. Some branched colonies on coral; max. 2.5 cm. One fragment bears a gonotheca.

TORTUGA: 1211. Branched colonies 4–5 cm in length, partly covered with algae, on *Rhiz.*

LOS FRAILES: 1215. Some small, unbranched colonies 3–5 cm in height, growing on *Sargassum* with *Dynamena cornicina*, and *Antennella diaph. diaphana.*

TRINIDAD: 1382. Some branched and many smaller unbranched specimens several mm in height, on coral debris.

ST. KITTS: 1397. An irregularly shaped, dirty colony and two delicate, branched specimens; 2–2.5 mm. They have intrathecal teeth.

ST. MARTIN: 1129. A number of branched, dirty, damaged colonies 4–5 cm in length, on a spongy substratum. Some specimens bear gonothecae. — 1130. Many regularly branched, dirty colonies, on *Rhiz.*; 2–6 cm. Gonothecae are abundantly present.

ST. JOHN: 1407. Some small colonies about 1 cm in length.

JAMAICA: 1148. About twenty feather-shaped colonies on coral debris and a sponge; max. height 2.5 cm.

NEW PROVIDENCE: 1149. Twenty large, branched, damaged and dirty colonies on coral; many gonothecae. Some specimens growing on a fir cone with *Antennella diaph. diaph.*

BIMINI: 1151. Numerous regularly branched colonies not more than 6 cm in height and a number of unbranched specimens measuring less than 1 cm, on *Rhiz.* Other colonies growing on worm tubes. Gonothecae are present. — 1152. A few young, scarcely branched colonies, up to 0.5 cm, on coral.

TORTUGAS: Sta. 17. Some specimens with a max. height of 1.5 cm. All hydrothecae have intrathecal peridermal teeth.

The strong colonies vary in size from 6–8 cm. They are often dirty and invested with algae. The smaller colonies are unbranched, the larger are branched.

The basal athecate part of the stem is longer than the internodes forming the remainder of the hydrocaulus, from which it is separated by means of an indistinct, transverse node. Each of the internodes, which are connected by more or less distinct transverse nodes, bears an apophysis for one branch, an axillary hydrotheca, and one or two pairs of subalternating hydrothecae. Between these internodes there is occasionally an internode with only two pairs of subalternating hydrothecae. At the distal end of the hydrocaulus one or more internodes may be present, each bearing 2–5 pairs of subalternating hydrothecae. The branches alternate; the stem is geniculate.

The proximal internode of the branch, which is very short and athecate, is separated from the apophysis by a constriction of the periderm, and from the rest of the branch by a distinct transverse node. The other internodes of the branch are of variable length and bear 2–3 pairs of subalternating hydrothecae. A distinct transverse node separates the internodes. The distance between two hydrothecae on the same side of the internode is very variable.

Sometimes the branch bears a stolon at its end. In the unbranched specimens the hydrocaulus presents several internodes, each bearing 1–3 pairs of subalternating hydrothecae. The hydrothecae of a pair, whether on a stem or on a branch, are not in contact with each other.

The shape of the hydrotheca does not differ from previous descriptions. The cylindrical hydrotheca has a short free part. The margin is provided with two small, blunt lateral teeth and a smaller adcauline tooth. The plane of the aperture runs nearly parallel to the longitudinal axis of the hydrotheca. The margin is slightly thickened on the abcauline side. A distinct peridermal tooth is present on the base of the hydrotheca, projecting downwards. The closing apparatus takes the form of an adcauline tectiform flap and an abcauline flap. This operculum is undamaged only in the material from Sta. 1006.

In the specimens from 1049B, the gonothecae are arranged on the hydrocaulus. In the other material they are only found on the branches, mostly on the proximal parts, and in the basal part of the colony. The gonotheca is inserted at the base of a hydrotheca on a short stalk. Each gonotheca is rather long, asymmetrical, narrow at the base, with its maximum width in the middle, and terminates in a long, narrow collar provided with a circular aperture. The wall of the gonotheca shows various transverse constrictions of a sort, but these are not present on the same places and in the same number in all gonothecae. The younger gonothecae are to be found on the more distal part of the branch. All gonothecae of the present material are identical in shape. Their sex could not be determined.

The periderm of the hydrocaulus, stolon and athecate proximal internode of each branch is thick.

In the material from Curaçao 1017, Bonaire 1059A, St. Kitts 1397,

and in the Tortugas specimens, intrathecal teeth are present at the margin of each hydrotheca. These intrathecal teeth show the variation in size, number and position as described by LELOUP (1935). Hydrothecae with and without intrathecal teeth may be present in one and the same colony; the latter are usually found in the basal parts of the hydrocaulus.

The material from Sta. 1062 (Bonaire) contains a peculiar branched specimen: from the distal internode of the stem two branches originate at the same height, one to the right and the other to the left. Two axillary hydrothecae are present. The hydrothecae of the consecutive pairs are opposite each other.

Measurements (in μ):	
Stolon, diameter	180–345
hydrocaulus, length internode	1,325–1,640
— diameter at node	155–345
branch, length athecate internode	215–280
— length hydrothecate internode	1,215–1,810
— diameter at node	110–170
hydrotheca, length abcauline wall	310–375
— length adnate part adcauline wall	470–560
— length free part adcauline wall	80–125
— diameter at aperture	125–155
— maximum diameter across pair	125–170
gonotheca, maximum length	750–1,090
— maximum diameter	235–470
— diameter at aperture	205–220

The geographical distribution of this species, which is common in the Atlantic, Pacific and Indian Oceans, has been specified by BILLARD (1925) and LELOUP (1935). The following records have since been published: in the Indo-Pacific region several localities in Ecuador, Colombia, Panama, Galapagos Islands, Mexico, Costa Rica (FRASER 1938, 1948); Low Isles, Great Barrier Reef (BRIGGS & GARDNER, 1931); some localities in Queensland and the Great Barrier Reef (PENNYCUIK, 1959); S. Australia (BLACKBURN, 1937); some localities in Indonesia (VERVOORT, 1941); in Japan (YAMADA, 1955); French Indochina (LELOUP, 1937a) and S.E. Africa (MILLARD, 1958). Atlantic records are Victoria, British Cameroons, (BUCHANAN, 1956); Conakry, Senegal (PICARD, 1951); Freetown, Sierra Leone (VERVOORT, 1959); about 20 localities in Brazil between 20°54′ S, 40°4′ W and 23°02′ S, 43°56′ W (VANNUCCI 1946, 1949, 1954); Key West and Trinidad (FRASER, 1943), and Martinique (LELOUP, 1937). LELOUP (1935) cites Florida and Bahamas from NUTTING (1904) and gives as further localities: Aruba, Curaçao, Klein Bonaire, Bonaire, and Dry Tortugas. The present material is from the same and new localities on these islands, and from Tortuga, Los Frailes, Trinidad, St. Kitts, St. Martin, St. John, Jamaica, New Providence, and North Bimini.

Dynamena cornicina McCrady, 1858

Sertularia cornicina, NUTTING, 1904, p. 58, pl. 4 figs. 1–5; DEEVEY, 1950, p. 346.
Dynamena cornicina, BILLARD, 1925, p. 188, fig. 40; 1926, p. 97; LELOUP, 1935, p. 39, figs. 22, 23; VERVOORT, 1941, p. 206, fig. 3; VANNUCCI, 1946, p. 562, pl. 4, figs. 33, 34.

ARUBA: 1011. Many colonies on *Sargassum*, 6 mm high. Some specimens with intrathecal peridermal teeth.
KLEIN CURAÇAO: 1046. Some small colonies on *Sarg.* with *Antennella diaph. diaphana.*
BONAIRE: 1057C. Three colonies on a small stone; 4 mm. — 1058C. A single 6 mm high colony. — 1059A. Some colonies 5–6 mm in length, on algae or detached. Many specimens about 3 mm in length, some of them with intrathecal marginal teeth. — 1059B. Five hydrocauli on coral; 3 mm. — 1060a. Some colonies on *Sarg.* with an athecate hydroid and *Campanularia.* The hydrothecae sometimes have intrathecal teeth at the margin. — 1069. Some 3 mm specimens on *Sarg.* — 1071A. A few 4 mm colonies on *Sarg.*, some of them with intrathecal teeth.
BLANQUILLA: Valuchu. Some specimens on wood fragments; max. length 5 mm.
FRAILES: 1215. Many colonies on algae, 3 mm, together with *Dynamena crisioides* and *Antennella diaph. diaph.*
TESTIGOS: Tamarindo. Numerous colonies on sea weed; 6–7 mm.
TRINIDAD: 1382. Numerous specimens on stones and shells.
TOBAGO: 1385. Many colonies, 2–7 mm, on coral and other substrata.
Between GRENADA and Trinidad: A fragment 3 mm in length on *Sarg.*
ST. KITTS: 1397. Rather small colonies, with a maximum of 8 pairs of hydrothecae, on algae with other hydroids. Some specimens have intramarginal teeth.
ST. MARTIN: 1130. Numerous 5–10 mm high colonies on algae.
TORTUGAS: Sta. 210. Nine 10-18 mm high colonies on shells and coral debris.

Only unbranched specimens 3–18 mm in height are present, without gonothecae.

The hydrorhiza has no internal peridermal teeth and does not become a dense mass. The basal athecate part of the hydrocaulus is long and terminates in one, or sometimes two, hinges. The remainder of the hydrocaulus is divided into internodes; the first one is short, while the other internodes are all of about equal length. The nodes are transverse and less distinct in the proximal than in the distal parts of the colony. The internode bears distally a pair of hydrothecae, which are connected anteriorly, with the exception of the (two) proximal pair(s). The interval between two consecutive pairs is as long as the adnate part of the adcauline hydrothecal wall.

The large hydrotheca is cylindrical. Two thirds of the adcauline wall are adnate to the internode; the free part curves laterally, so that the plane of the aperture runs about parallel to the longitudinal axis of the internode. In the younger parts of the stem the hydrotheca does not turn off so suddenly. The margin is provided with two strong lateral teeth and a very small adcauline tooth. The operculum is represented by an adcauline, roof-shaped flap and an abcauline flap. The periderm of the abcauline part of the margin is generally slightly thickened.

The margin of the hydrothecae in some specimens from localities 1011, 1059A, 1071A and 1397 shows a great number of variations in intrathecal peridermal teeth. LELOUP (1935) speaks of a forma *peculiaris* in cases in which strong intrathecal teeth are to be found. The following conditions occur: two adcauline teeth and one abcauline tooth; one adcauline tooth and one abcauline tooth; a distinct tooth and a mere thickening on the opposite side; a thickening on both sides; an unstrengthened adcauline margin and an abcauline thickening. All these combinations may be present in one colony at the same time, together with hydrothecae without strengthened margin. In the toothed forms a peridermal tooth is also present at the base of the hydrotheca, projecting downwards.

The sizes of the parts of the colonies are variable, as is demonstrated by the list given below of dimensions of material from different localities. The colonies from the Dry Tortugas have repeatedly renovated hydrothecae; this can be seen from the table.

Measurements (in μ):	Tortugas sta. 210	Bonaire 1058C	Testigos
Hydrocaulus, length basal athecate part	2,500	2,000–3,000	1,060–1,170
— length internode	840–1,015	530–765	590–875
— interval between two consecutive pairs	280–550	230–485	295–425
— diameter at node	200–220	60–80	75–95
hydrotheca, length abcauline wall	390–515	215–330	265–345
— length adnate part adcauline wall	390–485	265–315	310–345
— length free part adcauline wall	390–425	125–190	105–205
— diameter at aperture	140–175	90–125	105–125
— maximum diameter across pair	1,075–1,250	470–530	670–705

For the geographical distribution of this very common species reference may be made to the publication by BILLARD (1925) and VERVOORT (1941). The following records from the Indian and Pacific Oceans can be added: Bay of S. Francisco (FRASER, 1937); Mexico, N. of White Friars (FRASER, 1938); Lower California (FRASER, 1948); La Jolla and Pacific Grove (LELOUP, 1938); Australia (PENNYCUIK, 1959; BLACKBURN, 1938); JAPAN (LELOUP, 1938a); French Indochina (LELOUP, 1937a).

The species is also widely distributed in the Atlantic Ocean. Records, not mentioned by VERVOORT (1941), are: Portugal (DA CUNHA, 1944); Rio de Oro on the African coast, and Florida Straits (LELOUP, 1937); Sargasso Sea, 34° N, 38° W (VERVOORT, 1946); W. of Florida (FRASER, 1943); Brazil, Baía de Santos, I. de Sto. Amaro, Itanhaen (VANNUCCI, 1946), 20°33′ S, 40°14′ W (VANNUCCI, 1949), Cabo S. Tomé (VANNUCCI, 1950), Ilha de S. Sebastião (VANNUCCI, 1951a). LELOUP (1935) mentions several localities on Aruba, Curaçao, Bonaire and 35° N, 38°36′ W. The present material originates partly from the same localities as mentioned by LELOUP, partly from two new localities on Bonaire and from Klein Curaçao, Blanquilla, Los Frailes, Los Testigos, Trinidad, Tobago, between Trinidad and Grenada, St. Kitts, St. Martin and Dry Tortugas.

Only the unbranched form of the species is found in the present material. This fits with BILLARD's idea (1926) that in the Atlantic region the species occurs only in that form. VANNUCCI (1946) records branched specimens, but the branches are produced by regeneration of hydrothecae. According to literature (BILLARD, 1925; LELOUP, 1932, 1938a; FRASER, 1912, 1937; PICTET, 1893; STECHOW 1919; BROCH, 1933; VERVOORT, 1941, 1946; VANNUCCI, 1946) the unbranched condition often goes together with small size and occurrence in shallow water and on algae.

Dynamena quadridentata (Ellis & Solander, 1786) var. **nodosa** Hargitt, 1908

Pasythea nodosa HARGITT, 1908, p. 114, figs. 13–15.
Pasythea quadridentata, WARREN, 1908, p. 312, fig. 11; FRASER, 1912, p. 372, fig. 36.
Dynamena quadridentata var. *nodosa*, BILLARD, 1925, p. 194, fig. 42; LELOUP, 1935, p. 43, fig. 25; MILLARD, 1958, p. 186, fig. 6B.

ARUBA: 1011. Many small colonies, 2–3 mm, with other hydroids on *Sargassum*. Some of them are provided with intrathecal periderm teeth on the hydrothecal margin.
CURAÇAO: 1016A. Many specimens on *Sarg.*, sometimes with intrathecal teeth.
BONAIRE: 1060. About twenty damaged colonies, reaching a maximum height of 9 mm. — 1069. Some colonies on *Sarg.*, in part covered with algae. A few specimens have intrathecal marginal teeth. — 1070Aa. A great number of colonies on *Sarg.*, max. 6 mm; some of them with intrathecal marginal teeth.
TOBAGO: Rockley Bay. Many colonies on *Sarg.*, 2-4 pairs of hydrotheca.
BARBUDA: 1394. Numerous fragments with a max. length of 10 mm.
ATLANTIC: 43°4′ N, 31° W. Numerous colonies on *Sarg.* and barnacles; average height 5–6 mm, max. length 10 mm.

The specimens conform to the description by HARGITT (1908) and MILLARD (1958). No gonothecae are present.

The hydrorhiza is provided with peridermal teeth projecting into the interior, and gives off apophyses of variable length, which terminate in a strongly oblique joint.

The unbranched hydrocaulus is split up into athecate internodes, and internodes bearing 1–5 pairs of hydrothecae, by means of transverse and oblique nodes. As a rule two hydrothecate internodes and a shorter athecate internode follow the basal hinge; the remainder of the stem consists of alternating long hydrothecate and short athecate internodes; the hydrothecate internodes end in a transverse node, while the athecate internodes end in a hinge. The arrangement of internodes and nodes is subject to variation: the transverse node may be indistinct or indicated by a peridermal constriction, the hinge may be absent, or an extra athecate internode may be inserted by means of two hinges.

The basal internode generally bears one or two pairs of hydrothecae; the next internode has the same number or an additional pair; the other internodes bear 2–5 pairs, but the distal internode has one pair less than the preceding internode. Groups of three pairs prevail in the colonies from Curaçao (1016A), Barbuda (1394) and the Atlantic (43°4′ N, 31° W); groups of two pairs prevail in material from Bonaire 1069 and 1070Aa; groups of 1–2 pairs are mainly present in the specimens from Aruba 1011.

The length of the internodes varies; there seems to be a relation between this length and the number of hydrothecae. The distance between two consecutive groups of hydrothecae appears to be more or less constant in a colony; the distance between the two basal pairs (or groups) of a hydrocaulus is much shorter. For a survey of the variability of the dimensions I refer to the list of measurements below.

The variety *nodosa* is distinctly characterized by the swollen base of both proximal hydrothecae of a group, although many intermediate forms between this variety and the typical form may occur.

Often a stolon is produced at the end of the hydrocaulus or in the upper hydrothecae of the distal group. Internal peridermal teeth are not always present in these stolons.

The periderm of the colourless colonies may vary in thickness. Many variations occur in the presence or otherwise of peridermal thickenings and teeth of the hydrothecal margin, as is shown in the following table. The form with one adcauline tooth and two abcauline teeth, described by LELOUP (1935), is not included in my material.

locality		margin not thickened	abcauline tooth or thickening	abcauline and adcauline thickening	abcauline and adcauline tooth
Aruba	1011	+			+
Curaçao	1016A		+		+
Bonaire	1060	+			
Bonaire	1069				+
Bonaire	1070Aa	+	+	+	+
Tobago	—		+		
Barbuda	1394		+		
Atlantic	43°4′ N, 31° W	+	+		

Measurements (in μ):		Bonaire 1070Aa	Barbuda 1394
Hydrocaulus,	length athecate internode	155–450	75–160
—	length thecate internode	470–1,250	440–1,090
—	interval between 1st and 2nd group	380–750	250–485
—	other intervals	545–1,482	435–765
hydrotheca,	length abcauline wall	140–205	215–235
—	length adnate part adcauline wall	200–235	265–300
—	length contiguous part adcauline wall	155–175	75–160
—	length free part adcauline wall	140–205	155–175
—	diameter at aperture	60–80	95–110
—	maximum diameter across pair	515–545	545–595

This species is common in the warm parts of the Atlantic, Pacific and Indian Oceans, and is often found on floating algae. The variety *nodosa* is recorded from Scottburgh, Natal (WARREN, 1908), from Delagoa Bay, Portuguese East Africa, and Kasi Bay Reef, Durban Bay, Natal (MILLARD, 1958), from Reunion Rock, Isipingo (VERVOORT, 1946), and from Sagami Bay, Japan (STECHOW, 1913). Atlantic records are: Woods Hole (HARGITT, 1908), Bogue Bank, N. Carolina (FRASER, 1912), Bonaire, Aruba, Curaçao, 39° N, 41° W, and 43°4′ N, 31° W (LELOUP, 1935). The present material yielded a few new localities: Barbuda, Tobago, and some places on Bonaire.

A Brazilian locality can probably be added to the list, as VANNUCCI (1946, p. 559, pl. 3 figs. 27–28, 31) wonders whether *Dynamena gibbosa* Billard, 1924, is synonymous with her "*D. quadridentata* (Ellis & Solander) f. *typica*", which prompts the supposition that she was confronted with the var. *nodosa* of *Dynamena quadridentata*.

Dynamena mayeri (Nutting, 1904)

Sertularia mayeri NUTTING, 1904, p. 58, pl. 5, figs. 1–4; RITCHIE, 1909, p. 81; VANHÖFFEN, 1910, p. 322; LELOUP, 1935, p. 49.
Dynamena mayeri, STECHOW, 1925a, p. 523; VERVOORT, 1959, p. 261, fig. 28.

TORTUGAS: Sta. 210. Two fragments 1.3 and 1.5 cm in length.

The material consists of only two, unbranched fragments without gonothecae: 1) a hydrocaulus, bearing ten pairs of hydrothecae; the stolon and the distal part are broken off, 2) a colony of which the basal part is lost. It is clear that differences between proximal and distal pairs of hydrothecae could not be studied.

The slender hydrocaulus has a long (1.3 mm) athecate part that is connected, by means of a strong hinge, to the distal part, which bears pairs of opposite hydrothecae at regular intervals. In the other fragment a faint transverse constriction of the periderm is visible above each pair. The distance between two consecutive pairs of hydrothecae is more than twice the height of the hydrotheca. This distance is great compared with the figures given by VERVOORT (1959; 500–590 μ) and RITCHIE (1909). The hydrothecae of a pair are not in contact, though the free space between them decreases in the distal part of the stem. This free space is smaller on the anterior part of the stem than on the posterior part, as the hydrothecae are situated on the anterior part.

The shape of the hydrotheca and the operculum agrees completely with VERVOORT's description of eastern Atlantic specimens.

Measurements (in μ):

Hydrocaulus, distance two consecutive pairs	810–940
— minimum distance 2 hydrothecae of a pair (anterior part)	30–80
— minimum distance 2 hydrothecae of a pair (posterior part)	110–140
— diameter at node above a pair of hydrothecae	140–160
— diameter at node below a pair of hydrothecae	250–265
hydrotheca, length abcauline wall	310–375
— length adnate part adcauline wall	340–375
— length free part adcauline wall	175–280
— diameter at aperture	75–160
— maximum diameter across pair	685–830

This species occurs in the tropical parts of the Atlantic Ocean: French Equatorial Africa (VERVOORT, 1959); Cape Verde Islands (RITCHIE, 1907); S. of the Canary Islands (RITCHIE, 1909); S. of the Azores (VANHÖFFEN, 1910); Tortugas, and Trinidad (FRASER, 1943); Bahamas and Gulf of Mexico (NUTTING, 1904); Tortugas (LELOUP, 1935, the same locality as is mentioned in the present paper). According to FRASER (1938) the species also occurs in the Pacific Ocean: Ecuador and Mexico, but he gives neither description nor figure.

Sertularella tenella (Alder, 1856)

Sertularella tenella, NUTTING, 1904, p. 83, pl. 18 figs. 1-2; STECHOW, 1923, p. 185, fig. A'b; FRASER, 1937, p. 158, pl. 36 fig. 190; LELOUP, 1938, p. 6.
Sertularella tenella f. *peculiaris* LELOUP, 1935, p. 45, figs. 26–27; LELOUP, 1938, p. 6.

BONAIRE: 1057b. Six unbranched hydrocauli on coral, 4–5 mm in height.

The excessively thin, colourless colonies are built as described by LELOUP (1935) from material of the same locality. Some notes can be added.

Single hydrothecae inserted immediately on the hydrorhiza are not present; only some apophyses are left. The hydrocaulus is divided into internodes by means of an oblique node above the hydrotheca. The hydrothecae of consecutive internodes are alternate, the stem is geniculated. The terminal hydrotheca of the hydrocaulus is completely free. The other hydrothecae are adnate with one-third of the adcauline wall. The hydrotheca is provided with 5–6 transverse annulations. The margin has four small teeth of equal size, and three intrathecal teeth.

Measurements (in μ):

Hydrocaulus, length internode	605–1,250
— diameter at node	60–80
— diameter below hydrotheca	125–140
hydrotheca, length abcauline wall	255–470
— length adnate part adcauline wall	125–150
— length free part adcauline wall	355–390
— diameter at aperture	185
height of the terminal hydrotheca	545

For the geographical distribution of this cosmopolitan species reference should be made to STECHOW (1923) and LELOUP (1935). More recent Indo-Pacific records are given by FRASER (1933, 1937, 1938, 1948) from the western coasts of the American

continent; by LELOUP (1938) from California; and by YAMADA (1950) from Japan. Recent records from the Atlantic Ocean include East Greenland (KRAMP, 1943); Isle of Man (MOORE, 1937); Florida (FRASER, 1943); S. of Cabo Frío, Brazil (VANNUCCI, 1951); and 49°43′ N, 6°08′ W (BILLARD, 1931).

Sertularella conica Allman, 1877 Fig. 7

Sertularella conica ALLMAN, 1877, p. 21, pl. 15 figs. 6–7; NUTTING, 1904, p. 79, pl. 15 figs. 1–2; STECHOW, 1925a, p. 473, fig. 33; LELOUP, 1935, p. 44; FRASER, 1937, p. 151, pl. 34 fig. 179.

TORTUGAS: Sta. 210. Many sparsely branched colonies 1.5–3.3 cm in length, some of them on shells. Several colonies are covered with *Filellum serpens*. Many fragments. — Sta. 219. Five sparsely branched colonies about 2.2 cm in height.

Fig. 7. *Sertularella conica* Allman. — DRY TORTUGAS, sta. 210: part of a colony in frontal view. (× 15)

Fig. 8–12. *Sertularella minuscula* Billard. — CENTINELA (Ven.), loc. 1212: 8–9, part of hydrocaulus; 10, single hydrotheca; 11–12, gonothecae. (× 30)

In general features the material agrees with the description by NUTTING (1904). Rather strong, colourless or brownish colonies, unbranched or sparsely and irregularly branched. They rise from a mass of strong hydrorhiza fibres, without internal thickenings of the periderm. The athecate basal part of the hydrocaulus is of variable length, and is connected to the hydrothecate part of the stem without any node. This part is divided into slender, regular internodes, each bearing a hydrotheca. The nodes are indicated by a very slight, oblique constriction immediately above the hydrotheca. The stem geniculates between the alternating, distant hydrothecae.

Occasionally, beneath a hydrotheca, a side branch is given off at a right angle to the stem. A transverse node may be visible at the origin of the branch. The branch has the same structure as the stem, including a proximal athecate part.

The hydrotheca is slender and urn-shaped. Half the adcauline wall is adnate; the free part curves laterally and obliquely upwards. The plane of the aperture is also directed in that way. The abcauline wall curves at the narrow distal region. The adcauline wall generally has several (3–6) corrugations, and the abcauline wall is smooth. The abcauline wall, however, may be more or less annulated. The margin is provided with four small teeth of equal size. The closing apparatus is composed of four valves. The margins usually show repeated renovations. No intrathecal teeth are present near the margin and the base of the hydrotheca.

The periderm on the stolon, hydrocaulus and branch is very thick, the periderm of the hydrotheca decreases in thickness towards the margin.

In one colony the distal end of the hydrocaulus produces a stolon.

Measurements (in μ):	
Hydrocaulus, diameter at node	125–250
— diameter beneath hydrotheca	295–470
— length internode	840–970
hydrotheca, length abcauline wall	575–625
— length adnate part adcauline wall	420–500
— length free part adcauline wall	420–470
— diameter at aperture	250–315
— maximum diameter	370–410

The colonies vary considerably in the following respects: size, diameter of the stem (flexuosity), distance between the hydrothecae, and annulation of the hydrotheca.

The species has been recorded from all oceans and from widely different geographical latitudes. Many localities from the eastern Pacific region, from Alaska to Ecuador, are given by FRASER (1912, 1937, 1938, 1948). The only Indian Ocean record is from Zanzibar (JARVIS, 1922). LELOUP (1935) gives a complete list of previous Atlantic records. His material originates from the same Tortugas localities as the present specimens. No new data have been published since.

Sertularella minuscula Billard, 1924 Fig. 8–12

Sertularella minuscula BILLARD, 1924, p. 648, fig. 2f; BILLARD, 1925, p. 139, fig. 9; LELOUP, 1932, p. 161, figs. 26–27; LELOUP, 1935, p. 45; PENNYCUIK, 1959, p. 195, pl. 6 fig. 2.

BONAIRE: 1060a. Some colonies 1–6 mm in height on shells and coral debris. CENTINELA: 1212. Many hydrocauli and single hydrothecae rising from a great quantity of hydrorhiza fibres creeping on algae and barnacles. The hydrocauli reach a height of 4 mm. Two gonothecae.

The stolon is composed of intertwined hydrorhizal tubes, forming a reticular mass with short apophyses, bearing either a single free hydrotheca with an oblique diaphragm, or a hydrocaulus with alternately arranged hydrothecae with straight bases. The hydrorhizal fibres are covered with thick periderm, frequently and irregularly constricted, without internal septa, at times very indistinctly separated from the hydrocauli. The apophysis of the stolon, supporting a single hydrotheca or a hydrocaulus, is constricted several times. The shape of the hydrocaulus, hydrotheca and operculum is as described by BILLARD (1925). The variability of my material appears from the following notes.

The stem is divided into internodes by means of a faint constriction of the periderm above the hydrotheca or, exceptionally, in the younger parts of the colony, by a distinct septum. This constriction may be followed by several more. The intervals between the hydrothecae are of irregular lengths, and are smaller in the present material than in the specimens described by BILLARD (1925; 230–

630 μ.) The stems are frequently branched, the branches developing directly from the hydrothecae by regeneration. The hydrocaulus bears not more than 6–7 hydrothecae.

No intrathecal teeth or peridermal knobs of the margin are present in the hydrotheca. The periderm of the hydrothecal wall is smooth and thin, the periderm of the base is stronger. In one of the colonies, all hydrothecae have undergone three or four renovations. Though the hydranths are generally in good condition the material is unfit for observations on the presence or otherwise of a blind sac.

In the isolated hydrothecae the pedicel sometimes grows further upwards along the hydrotheca, which from free becomes sessile, with the base no longer oblique but straight. Such hydrothecae are identical with those of the normal colonies. All hydrothecae, whether free or sessile, have the same dimensions.

The two gonothecae are inserted on the same stolon, each on a short stalk, but not at a special place. The gonotheca is nearly twice as long as broad, symmetrical, with the maximum diameter in the middle. A distinct narrow collar is present at the apex; it is not provided with teeth. The entire surface has transverse corrugations (probably 7–9) but the number could not be established as the cover glass of the slide caused an inevitable deformation of this delicate material. Both gonothecae are female.

Heteromorphosis of the hydrocaulus, as described by LELOUP (1935) from the same locality on Bonaire, is also present in my material: in the place of a hydrotheca a stolon develops, which may give rise to one or more new hydrocauli and single hydrothecae.

Measurements (in μ):	
Hydrorhiza, diameter	90–160
hydrocaulus, diameter above hydrotheca	60–110
— interval between 2 hydrothecae	105–175
hydrotheca, length adnate part adcauline wall	105–190
— length free part adcauline wall	170–235
— length abcauline wall	230–330
— diameter opening	105–125
gonotheca, maximum length	1,060–1,220
— maximum diameter	575–720
— diameter of collar	60–80

This species was originally described by BILLARD (1924, 1925) from Haingsisi, Indonesia. It was subsequently recorded by LELOUP (1932) from the Gulf of Mannar, and by PENNYCUIK (1959) from Lupton Reef, Heron Island, and Low Island, Australia. Atlantic records are likewise scarce: LELOUP (1935) mentions specimens from two localities on Bonaire (Kralendijk and Oranjepan). The present material originates from Bonaire, Oranjepan, and from the isolated islet of Centinela.

I could not find a previous description of a gonotheca. It may have described by FRASER (1944), whose description of *Sertularella minuscula* was not available to me.

Sertularia distans (Lamouroux, 1816) var. **gracilis** Hassall, 1848

Sertularia distans var. *gracilis*, BILLARD, 1925, p. 175, fig. 33; BILLARD, 1933, p. 12, fig. 4; LELOUP, 1935, p. 47, figs. 28–29; MILLARD, 1957, p. 221, fig. 12.

ARUBA: 1011. Many colonies 2–2.5 mm in height, on *Sargassum*.
CURAÇAO: 1016A. Many specimens 2–3 mm in height, on *Sarg.* together with other hydroids.
BONAIRE: 1057b. Some damaged colonies on wood fragments. — 1060. Many colonies several mm in height, on *Sarg.* together with other hydroids. — 1069. Some colonies on *Sarg.*
TOBAGO: Rockley Bay. Many colonies with a maximum of 6 pairs of hydrothecae, on *Sarg.*
ISLOTE AVES: 1114. Some colonies about 2 mm in length.
ANTIGUA: 1393. A number of colonies bearing 3–4 pairs of hydrothecae, with other species of hydroids, on *Sarg.*
BARBUDA: 1394. Five fragments about 3 mm in length.
ST. KITTS: 1397. Many colonies consisting of 3–4 pairs of hydrothecae, with other hydroids on *Sarg.*
ST. BARTS: 1121. Some leaves of *Sarg.* densely covered by small colonies.
BIMINI: 1154. Some 1.5-2 mm high colonies on substrate of vegetable origin.
ATLANTIC: 43° N, 31° W. Many fragments max. 6 mm, on *Sarg.*

The present material consists of unbranched colonies without gonothecae 2–6 mm in height and agrees almost completely with the description by MILLARD (1957) of South African specimens. It differs slightly on the following points:

The transverse nodes are very distinct in my material, except, sometimes, as regards the basal nodes of the colony.

An athecate internode is inserted after each hydrothecate internode (for instance in the colonies from 43° N, 31° W), or after 2–3 hydrothecate internodes (e.g., 1011), or does not occur at all (e.g., 1121).

The abcauline wall of the hydrotheca is more strongly curved than in MILLARD's material. This is well shown in LELOUP's (1935) figure.

The peridermal teeth projecting into the interior of the hydrorhiza are present in all my material, but are particularly clearly visible in the specimens from 1393 and 1114.

The periderm of the hydrotheca is irregular and fairly thick. Three peg-like peridermal processes in the basal part of the hydrotheca are present in MILLARD's specimens. Some variations in the presence of these teeth as found in the present colonies are described below. A strongly developed tooth, projecting from the adcauline wall downwards into the interior of the internode, is always present. In the specimens from 1011 and 1114, a second tooth is rising from the base and projecting upwards into the cavity of the hydrotheca. Besides these teeth a third tooth, projecting from the basal parts of the abcauline wall into the interior of the hydrotheca, often occurs in the colonies from 1016A, 1060, 1121, 1393, and 43° N, 31° W. The last-mentioned tooth is not easily distinguishable.

Some variation in the peridermal thickenings of the hydrothecal margin is also found. The abcauline part of the margin is usually thickened, but often produced into a distinct intrathecal tooth. The adcauline part may be thickened too, but no real tooth is developed. All combinations of teeth and mere thickenings occur in the material from various localities, and sometimes even in the same colony. I did not notice one adcauline tooth with two abcauline teeth, as recorded by LELOUP (1935).

The distance between two consecutive pairs of hydrothecae varies strongly, as appears from the following measurements of colonies from various localities: 43° N, 31° W: 280–390 μ; 1121: 90–175 μ; 1011: 295–360 μ. The measurements of other parts are in accordance with each other.

Measurements (in μ):

Hydrocaulus, length basal athecate part	235–285
— length hydrothecate internode	405–485
— length athecate internode	90–125
— diameter across oblique node	45–65
— interval between two consecutive pairs	90–390

hydrotheca,	length abcauline wall	125–175
—	length adnate part adcauline wall	140–160
—	length free part adcauline wall	105–190
—	length contiguous part adcauline wall	60–140
—	diameter at margin	45–80
—	maximum diameter across pair	325–470

The geographical distribution of *Sertularia distans* (Lamouroux) var. *gracilis* Hassall was extensively described by BILLARD (1933). This variety is well known from the temperate and tropical parts of the Atlantic Ocean. Since 1933 it has been recorded from False Bay, South Africa (MILLARD, 1957); Inhaca Island, Portuguese East Africa (MILLARD, 1958); Jersey, England (VERVOORT, 1949); 32°7′ N, 66°35′ W, Sargasso Sea (LELOUP, 1937); several localities on Bonaire, Curaçao and Aruba, and 39° N, 41° W (LELOUP, 1935). New localities are 43° N, 31° W, North Bimini, St. Barts, St. Kitts, Barbuda, Antigua, Islote Aves, Tobago and two places on Bonaire.

Sertularia turbinata (Lamouroux, 1816)

Desmoscyphus brevicyathus VERSLUYS, 1899, p. 40, figs. 9–10.
Sertularia turbinata, BILLARD, 1925, p. 177, fig. 34; LELOUP, 1935, p. 50; VANNUCCI, 1949, p. 244, pl. 2 figs. 38–41; MILLARD, 1958, p. 197, fig. 8E; VERVOORT, 1959, p. 275, figs. 35–36.

LA GOAJIRA: Río Hacha. Some unbranched specimens on algae.
ARUBA: 1011. Numerous branched colonies about 7 mm in height on *Sargassum*. — 1302. Numerous, unbranched, well-developed colonies, rising in tufts from the hydrorhiza.
BONAIRE: 1060. Many unbranched colonies. Maximum height 8 mm, average 5–6 mm. — 1069. Many unbranched specimens 3–8 mm in height. — Playa Grandi, 23.X.1930. Many colonies on *Sarg.*
TOBAGO: Rockley Bay. Many small colonies on *Sarg.*
Between GRENADA and Trinidad. A fragment 2 mm high.
ANTIGUA: 1393. Numerous unbranched colonies on algae and on a sponge, together with *Sertularia distans* var. *gracilis*, *Antennella diaph. diaphana* and an athecate hydroid. Maximum height 5 mm.
ST. MARTIN: 1129. A colony on algae.
TORTUGAS: Loggerhead Key. Some unbranched colonies on algae; 5–6 mm. — S. of Loggerhead Key. Some fragments.

The material represents only the unbranched form of this species, without gonothecae. The colonies agree with the description by VERVOORT (1959). The following notes can be added:

The hydrorhiza forms a regular network. The periderm of the hydrorhiza is generally provided with internal teeth. Occasionally a small athecate internode, connected proximally by means of a

transverse node and distally by a hinge, is present between the normal internodes. The hydrothecae of the proximal pair often do not touch each other; the hydrothecae of following pairs are in contact to an increasing extent. The distance between two consecutive pairs is about twice their height. Not only is the adcauline wall of each hydrotheca slightly thickened at the margin, but the periderm of the abcauline wall from the margin to the transverse fold is also thicker. The stem frequently stolonizes, as, for instance, in material from locality 1393.

The internodes of a colony are of variable length, the proximal generally being shorter than the others.

Measurements (in μ):	
Hydrorhiza, diameter	125–175
hydrocaulus, length basal athecate part	390–625
— length internode	545–1015
— interval between two consecutive pairs	450–765
— diameter at node	75–110
hydrotheca, length adnate part adcauline wall	250–285
— length contiguous part adcauline wall	0–250
— length free part adcauline wall	155–220
— length abcauline wall	140–235
— diameter at opening	105–140
— maximum diameter across pair	465–705

The wide distribution of this species in the tropical and subtropical parts of the three oceans was extensively discussed by BILLARD (1925) and VERVOORT (1959). Records from the Atlantic area are: Branco, Cape Verde Islands (VERSLUYS, 1899, as *D. brevicyathus*); Setté Cama, Kinsembo (BROCH, 1914a); Bissagos Isles (BILLARD, 1931a); Freetown (VERVOORT, 1959); Sao Thomé (BILLARD, 1907a); Ponta da Fruta, between Ponta do Jaguanum and Marambaia, and I. de Itacurussá, Brazil (VANNUCCI, 1949); Challenger Bank and Agar's Island (BENNITT, 1922, as *S. brevicyathus*); Cay Sal Bank (LELOUP, 1937); Bermudas (CONGDON, 1907); between Eleuthera and Little Cat Islands, and off Spanish Wells, Bahamas (NUTTING, 1904). LELOUP (1935) mentions Bonaire, Aruba and Tortugas. The present material is from new localities on these islands and from the coast of Colombia, Tobago, between Grenada and Trinidad, Antigua and St. Martin.

Sertularia marginata (Kirchenpauer, 1864) Fig. 13–17

Dynamena marginata KIRCHENPAUER, 1864, p. 13, fig. 8a–c.
Sertularia marginata, TOTTON, 1930, p. 204, fig. 48b; LELOUP, 1935, p. 49; MILLARD, 1957, p. 224, fig. 13.

CURAÇAO: 1016A. Some branched and unbranched colonies reaching a maximum height of 3 mm, growing on *Sargassum*.
BONAIRE: 1060. Some small branched colonies 3–4 mm in height; three of them bear a gonotheca. — 1069. Many branched and unbranched specimens, with other hydroids on *Sarg.*; 3–6 mm. Some colonies with a gonotheca. — 1070A. Ten branched and unbranched colonies on *Sarg.*, max. 2 mm.
ISLOTE AVES: 1114. A single fragment.
FOURCHE: Five Island Bay. A fragment of a pinnate colony, 4 mm in height.
NEW PROVIDENCE: 1149. About 20 branched colonies, max. 15 mm, growing with *Antennella diaph. diaphana* and *Sertularia turbinata* on seaweed. Some branches produce an extremely long stolon. One colony bears two gonothecae in the basal part of the stem.
TORTUGAS: S. of Loggerhead Key. Many branched colonies, 5–20 mm, on *Sarg.*, with some gonothecae.

The following description concerns the colonies from the stations 1016A (Curaçao), 1060, 1069, 1070A (Bonaire) and Fourche.

Gracefully built, colourless, unbranched and pinnate colonies, reaching a height of 2–6 mm, rising from a simple, regular reticulum of thin hydrorhizal fibres that have no internal peridermal ridges.

The apophysis of the stolon is short (250–390 μ) and connected to the hydrocaulus by means of a conspicuous hinge. Between this node and the pinnate part of the stem one to three internodes (but generally one) are present, each bearing a pair of opposite or subopposite hydrothecae; the members of the proximal internode are more nearly opposite than those of the following pairs. The distal part of the colony may be built like the proximal part, with some internodes that only bear a pair of hydrothecae; the members of consecutive pairs gradually change from subalternate to more nearly opposite. The intermediate internodes are proximally provided with a long apophysis which gives rise to a branch; with an axillary hydrotheca; and, above this theca, with a pair of subalternating hydrothecae. The internodes of the stem are connected by means of transverse nodes, which are less distinct in the lower part of the colony, and occasionally by a hinge. The periderm of the hydrocaulus is poorly developed and of irregular thickness. The stem geniculates between the alternating branches. The hydrothecae are arranged on the anterior part of the stem, and partially adnate to it. Those of a pair are only in contact in the distal region of the stem; they remain separated dorsally.

The apophyses of the stem are alternately directed to the right

and the left, and are arranged in one plane, forming an angle of about 70°–80° (maximally 90°) with the longitudinal axis of the internode. The apophysis is connected to the branch by means of a distinct hinge, so that the branch can apparently move forward. Beneath this node one or (occasionally) two transverse nodes or peridermal constrictions are visible.

The branches are divided into regular internodes by means of hinges or less distinct nodes. The internode bears distally a pair of opposite hydrothecae. The plane of the hydrothecae is vertical. The interval between two consecutive pairs is 1–1.5 times their height. The hydrothecae of a pair are contiguous frontally, the contiguous part increasing in length towards the distal end of the branch; dorsally they are separated.

The unbranched colony has a basal part similar to that of pinnate colonies. The hydrocaulus is split up into regular internodes (maximally 8), by means of transverse nodes and sometimes by a hinge. Each internode bears a pair of opposite hydrothecae on the anterior distal part. The members of a pair are separated in the basal region, and frontally gradually become more contiguous in the distal part of the stem.

The hydrotheca is swollen basally and strongly curved laterally, so that a transverse fold is present on the abcauline wall; it is narrowed near the aperture, which is directed anteriorly. The free part of the adcauline wall is shorter than the adnate part, except in the axillary hydrothecae. The margin is provided with a big posterior lateral tooth, a smaller anterior lateral tooth, and an indistinct adcauline tooth. A basal and abcauline marginal thickening of the periderm may be present. For the exact shape of the hydrotheca reference should be made to Fig. 13–16, which expresses more than verbal description can do.

In some fragments gonothecae are present with a maximum length of 1,325–1,585 μ and a maximum diameter of 980–1,170 μ. The one or two gonothecae are borne on a very short stalk above the proximal axillary hydrotheca of the fragment, or below a hydrotheca of a non-branching basal internode. The gonotheca is more or less drum-shaped, with a flattened ventral part. The entire surface is covered by six (sometimes five) elevated transverse annular

ridges; the insertion of the lowest three is curved slightly downwards. The thickened apex bears two small horns, inserted laterally on the flattened part of the gonotheca, and directed upwards. The aperture on the apex is lens-shaped and provided with a denticled margin. The free part of the ridges forms a sort of frill. Some gonothecae are of the male sex, as histological sections show; the other gonothecae are empty.

The colonies from New Providence (1149) and the Dry Tortugas differ slightly from the previous description, partly on account of their greater size. The differences are as follows:

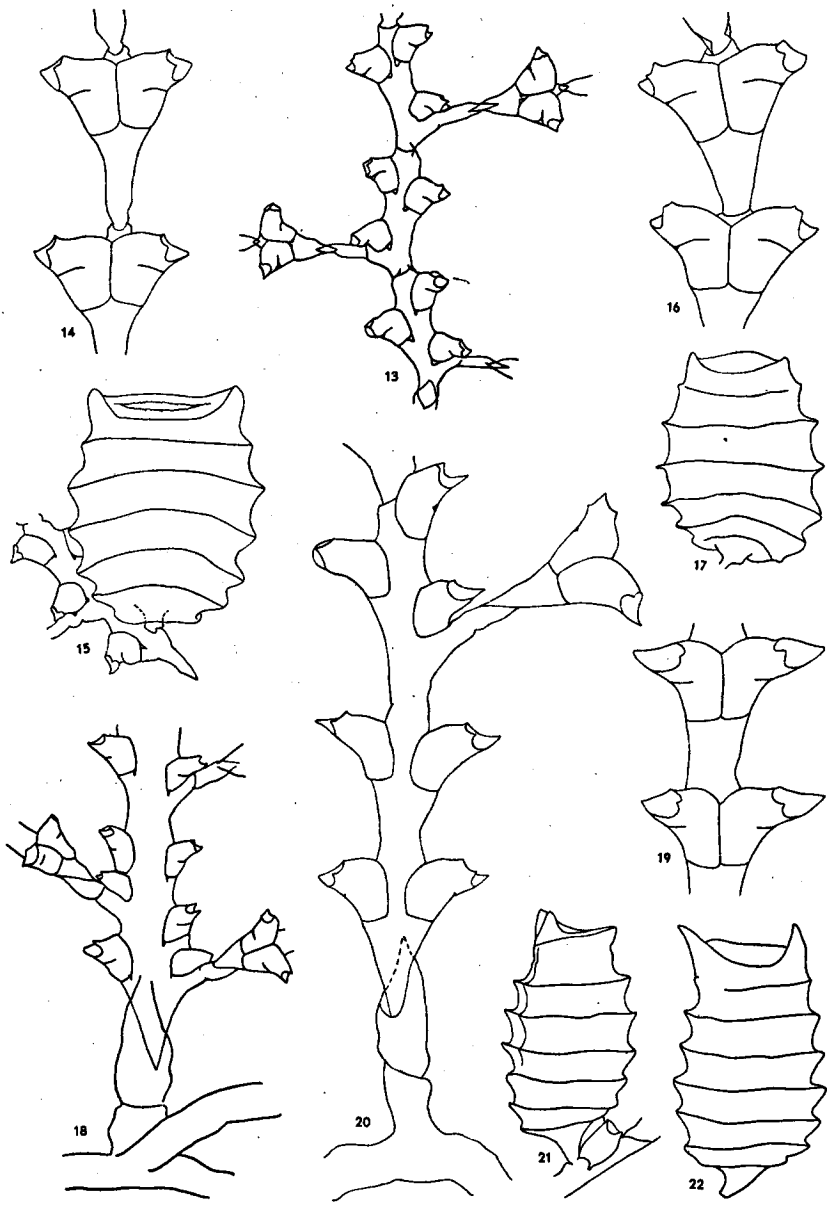
The colonies reach a greater maximum height, of 15–20 mm. The apophyses of the stolon are longer, 600–1,250 μ, the shorter apophyses occur in smaller colonies. The network of stolons is sometimes more complicated; the stolon branches several times at the place where the apophysis is given off.

The smaller colonies (5–10 mm) have 1–3 unbranched internodes between the basal hinge and the pinnate part of the stem. These internodes are absent in bigger colonies: branching internodes immediately follow the basal hinge. Hydrocauli with and without basal unbranched internodes rise from the same stolon. The specimens with basal, unbranched internodes may also have these internodes in the distal end of each hydrocaulus.

The branches are sometimes broken off in the basal part of the bigger colonies, so that only the apophyses are present, as a sort of spine, marked by the transverse septum or constriction. The apophyses that give rise to branches are not strictly arranged in one plane; the branches turn slightly forward. Usually the branch is attached to the apophysis in such a way that it seems to be movable

Fig. 13–17. *Sertularia marginata* (Kirchenpauer). — ARUBA, loc. 1069: 13, part of colony in frontal view; 14, hydrothecae on hydroclade in frontal view; 15, gonotheca. DRY TORTUGAS, Loggerhead Key: 16, hydrothecae on hydroclade in frontal view; 17, gonotheca. (13, × 15; 14–17, × 30)

Fig. 18–22. *Sertularia inflata* (Versluys). — ST. MARTIN, loc. 1128A: 18, basal part of big colony in frontal view; 19, two pairs of hydrothecae on hydroclade of big colony in frontal view; 20, basal part of young colony; 21, gonotheca in ventral view; 22, gonotheca in lateral view. (18, 21 and 22, × 15; 19 and 20, × 30)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forward, but in several cases the branch seems to be movable upwards. (Hence the plane of the hydrothecae of the branch is usually vertical, but it may also be horizontal.) The branch is divided by more or less complete hinges, transverse septa, or, in larger colonies, it may be unsegmented, but this is rare. The members of the proximal pair of hydrothecae may be subopposite. The interval between two consecutive pairs of hydrothecae is 1.5 times the height or less, but it always exceeds the length of the hydrotheca.

Here, too, there are not more than two gonothecae to a colony; in this case they are inserted above two basal axillary hydrothecae. Maximum length of the gonotheca 1,245–1,545 μ, and maximum diameter 855–1,015 μ. On each gonotheca two horns are present, which are variable in size. One of the gonothecae is provided with five annular ribs and has only two indistinct, scarcely visible teeth. This is probably a young gonotheca, as in the same colony – inferiorly – a gonotheca is inserted which has six annular ribs and two distinct horns. The contents are damaged, and hence the sex could not be established.

In spite of the above-mentioned differences I have identified this material as *Sertularia marginata* (Kirchenpauer, 1864), since the shape of the hydrothecae and the gonothecae is identical.

Measurements (in μ):	1069 & 1060	1149 & Tortugas
Apophysis of stolon, length	250–390	600–1,250
hydrocaulus, diameter at node	45–160	170–205
— length unbranching internode	465–550	600–665
— length branching internode	590–860	855–970
hydroclade, length apophysis	250–330	340–390
— diameter at node	30–65	90–140
— length internode	390–470	515–610
— interval between two consecutive pairs	230–285	295–345
hydrotheca, length abcauline wall	125–175	280–300
— length adnate part adcauline wall	125–185	200–220
— length free part adcauline wall	105–160	90–110
— length contiguous part adcauline wall	155–185	155–250
— diameter at aperture	65–95	75–110
gonotheca, maximum length	1,325–1,585	1,245–1,545
— maximum diameter	980–1,170	855–1,015
maximum diameter across pair (branch)	420–455	495–530

For the separation of *Sertularia marginata* (Kirchenpauer, 1864) from *Sertularia inflata* (Versluys, 1899), reference should be made to the remarks made in this report under the latter species.

Sertularia marginata is distributed in the Atlantic and Pacific Oceans: False Bay, 34°25′ S 18°35′ W, S. Africa (MILLARD, 1957); Bonaire, Curaçao, and Tortugas (LELOUP, 1935); off North Cape, New Zealand (TOTTON, 1930). A Pacific record without accurate locality is given by Kirchenpauer, 1864: his material was extensively described (MILLARD, 1957). LELOUP's material and two slides of TOTTON's material were available to me.

It seems likely that the material studied by the following authors also belongs to *S. marginata* (Kirchenpauer), though the descriptions published with these records are not detailed enough to guarantee certainty: *Sertularia inflata* (Versluys) VANHÖFFEN, 1910, p. 321, fig. 389; *S. marginata* (Kirchenpauer), BILLARD, 1931c, p. 391, fig. 1; *S. marginata* (Kirchenpauer), LELOUP, 1939, p. 421, fig. 4; *S. versluysi* Nutting p.p., NUTTING, 1904, p. 53, pl. 1 figs. 4–9; *S. marginata* (Kirchenpauer) p.p., VANNUCCI, 1946, p. 567, pl. 3 fig. 31a, pl. 4 figs. 36–37, and *S. marginata* (Kirchenpauer) f. *laxa* VANNUCCI 1949, p. 248, pl. 3 fig. 46. The following localities can also be added: S. of the Azores (VANHÖFFEN, 1910); Raz Beyrouth (BILLARD, 1931b); Landana, Congo (LELOUP, 1939); Bermuda (NUTTING, 1904); Baía de Santos, I. de Sto. Amaro, Itanhaen, Cayobá, Brazil (VANNUCCI, 1946) and between Ponta do Jaguanum and Marambaia, Brazil (VANNUCCI, 1949). This list of geographical records is certainly not complete. — New localities are Islote Aves, La Fourche, and New Providence.

Sertularia inflata (Versluys, 1899) Fig. 18–22

Desmoscyphus gracilis ALLMAN, 1888, p. 71, pl. 34 fig. 2–2c.
Desmoscyphus inflatus VERSLUYS, 1899, p. 42, figs. 11–13.
Sertularia versluysi, RITCHIE, 1907, p. 505, fig. 144, pl. 24 figs. 2–6.
Sertularia marginata, VANNUCCI, 1946, p. 567, pl. 3 fig. 31a, pl. 4 figs. 36–37.
Sertularia inflata, VERVOORT, 1959, p. 281, figs. 39–41.

ST. KITTS: 1397. Numerous branched colonies on algae, reaching a maximum height of 2.5 cm, with many gonothecae. The specimens are covered with athecate hydroids and Tunicata.
ST. EUSTATIUS: 1117. Many branched colonies, max. height 3.5 cm. Many specimens have two rows of gonothecae along the stem.
ST. MARTIN: 1128A. Numerous branched rust-covered colonies, max. 1.9 cm, attached to an iron pan. Large numbers of gonothecae along the hydrocaulus of many colonies.

Though, at first sight, these specimens are distinctly different from *Sertularia marginata* (Kirchenpauer), clear points of difference are not easily established, as there are intermediate forms between the small colonies of *Sertularia inflata* and the larger colonies of

Sertularia marginata (Kirchenpauer) from localities 1149 and Tortugas. In the enumeration which follows, *all* differences between *Sertularia inflata* and the previous species are mentioned.

Pinnate, more rigid colonies with shorter branches reaching maximum heights of 3.5 cm (1117), 1.9 cm (1128A) and 2.5 cm (1397), and long apophyses rising from the stolon: 3–8 mm (1117), 1–3 mm (1128A), 1–5 mm (1397). The colonies emerge from strikingly dense masses of hydrorhizal fibres; even more than one hydrocaulus may originate from the same place on the stolon.

In the apophysis, 1–2 transverse nodes or a hinge may be present. Unbranched internodes are not present either between the basal hinge and the pinnate part of the stem, or in the distal part of the stem. The basal hinge is immediately followed by branched internodes. The basal part of the hydrocaulus often has a spiny appearance, as the branches are broken off and only the apophyses are left. The hydrocaulus geniculates only in the distal region; its other part is straight. The stem is only segmented in the distal region by means of indistinct, transverse nodes; the remainder is undivided. These transverse nodes may be absent. The periderm of the colony is thick.

The alternating apophyses of the stem are directed distinctly forward, so that the branches are not arranged in one plane. The apophysis forms an angle of 60°–70° with the longitudinal axis of the internode. The apophysis is connected to the branch by means of a hinge, so that the branch seems movable upwards and, occasionally, forward. Hence the plane of the hydrothecae of the branch is horizontal, occasionally vertical. The members of the (two) proximal pairs may be subopposite. The branch is not segmented proximally; in the distal part, irregularly oblique septa are visible in lateral aspect, running from the anterior distal part to the posterior proximal part of the branch. The interval between two consecutive pairs of hydrothecae on the branch is equal to the height of the hydrotheca or less.

The shape of the hydrothecae is different, as also appears from Fig. 18–20. The difference in size between the two lateral teeth in this species is greater; the posterior tooth is larger than the anterior. The abcauline intrathecal ridge is often not present in the younger hydrothecae.

The shape and arrangement of the gonothecae are also quite otherwise than in *S. marginata.*

The diameter is smaller in relation to the height: the maximum height varies from 1,245 to 1,485 μ, and the maximum diameter from 545 to 940 μ. The gonothecae are arranged in two rows along the hydrocaulus; they are inserted above each axillary hydrotheca, beginning with the proximal hydrotheca. In some colonies gonothecae are also present at the base of the hydrothecae of proximal branches. As many as 18–22 gonothecae occur to one colony. On the surface of the gonotheca seldom 6, generally 7, strong, elevated annular ribs are present, the proximal ribs not curved downwards. The horns, situated laterally at the flattened apical part, are larger, and project obliquely upwards. In some colonies, gonothecae are present in all stages of development; the older (= proximal) gonothecae show the largest terminal horns. Histological sections have proved that all gonothecae are of the male sex.

In the material from locality 1117 some small hydrocauli rise from a stolon creeping on another, more developed hydrocaulus. These hydrocauli are about 2 mm high; the length of the apophysis of the stolon is 470 μ; 2–4 pairs of hydrothecae are present between the basal hinge and the pinnate part of the stem; the stem is not segmented or divided by means of transverse nodes. See Fig. 20.

Measurements (in μ):	
Apophysis of stolon, length	1,000–8,000
hydrocaulus, diameter at node	140–300
— length (branching) internode	545–780
hydroclade, length apophysis	310–410
— diameter at node	75–125
— length internode	370–500
— interval between two consecutive pairs	140–285
hydrotheca, length abcauline wall	90–160
— length adnate part adcauline wall	155–205
— length free part adcauline wall	75–175
— length contiguous part adcauline wall	140–190
— diameter at aperture	60–95
gonotheca, maximum height	1,245–1,485
— maximum diameter	545–940
maximum diameter across pair (branch)	355–530

In this species, the following are variable characters: the structure of the hydrorhizal network, the length of the apophysis of the stolon, the presence of unbranched basal internodes, the segmentation of the stem and branches, the angle between branch and stem, the plane of the hydrothecae on the branch, and the interval between two consecutive pairs of hydrothecae on the branch. But – in my opinion – the shape of the hydrothecae, and the shape and arrangement of the gonothecae, are characters of value in distinguishing *Sertularia marginata* (Kirchenpauer) from *Sertularia inflata* (Versluys).

Since the species are so difficult to separate, it is not possible to classify the specimens recorded in the literature as one of either species if no detailed description is given, if the figures are not very distinct, and if no gonotheca is described. I presume that the following material belongs to *Sertularia inflata* (Versluys):

Sertularia amplectens ALLMAN, 1885, p. 141, pl. 16 figs. 3–4; JÄDERHOLM, 1896, p. 13, pl. 1 fig. 9.

Sertularia versluysi p.p. NUTTING, 1904, p. 53, pl. 1 figs. 4–9.

Sertularia versluysi, FRASER, 1912, p. 375, fig. 40 A–B.

The species is found in the tropical parts of the Atlantic Ocean: Bermuda (ALLMAN, 1888); Branco, Cape Verde Islands (VERSLUYS, 1899); Porto Praya, Cape Verde Islands (RITCHIE, 1907); Baía de Santos, I. de Sto Amaro, Itanhaen, Cayobá, Brazil (VANNUCCI, 1946; part of this material probably really belongs to *Sertularia marginata*); off French Guinea and off Sierra Leone (VERVOORT, 1959).

The following localities can probably be added: Gulfstream, near Cape Hatteras (JÄDERHOLM, 1896); Atlantic Ocean, without accurate locality (ALLMAN, 1885); and Bogue Bank (FRASER, 1912).

As this list is certainly not complete, it is not permissible to conclude that the geographical distribution of *Sertularia inflata* (Versluys) is restricted to the Atlantic Ocean.

New localities in my material are: St. Martin, St. Eustatius, and St. Kitts.

The following records may refer either to specimens of *S. marginata* (Kirchenpauer) or to *S. inflata* (Versluys): BILLARD, 1907a, p. 275; CONGDON, 1907, p. 481; BENNITT, 1922, p. 251; FRASER, 1938, p. 55 (all as *S. versluysi*); BALE, 1913, p. 125, pl. 12 fig. 9; JARVIS, 1922, p. 340, pl. 24 fig. 7; BLACKBURN, 1938, p. 319 (all as *S. marginata*); VANNUCCI, 1949, p. 248; VANNUCCI, 1954, p. 115 (as *S. marginata* f. *typica*); FRASER, 1943, p. 93; FRASER, 1948, p. 249 (as *S. inflata*).

Antennella diaphana diaphana (Heller, 1868) Fig. 23–28

Plumularia alternata NUTTING, 1900, p. 62, pl. 4 figs. 1–2.
Schizotricha diaphana, LELOUP, 1932, p. 163; VANNUCCI, 1949, p. 251.
Antennella diaphana f. *typica* BROCH, 1933, p. 24; LELOUP 1935, p. 52; LELOUP, 1937a, p. 45.
Thecocaulus diaphanus, VANNUCCI, 1946, p. 576, pl. 5 figs. 46–47.
Halopteris diaphana PENNYCUIK, 1959, p. 177.

ARUBA: 1006. Some branched colonies on coral fragments; maximum height 1 cm.
CURAÇAO: 1023a. A few branched colonies on coral. — 1039. Two 3 mm high, unbranched colonies on *Sargassum* and other substrata, with athecate hydroids.
KLEIN CURAÇAO: 1046. A few branched specimens 3 mm in length, with *Dynamena cornicina*, on *Sarg.*
KLEIN BONAIRE: 1049B. Numerous branched colonies, together with *Plumularia halecioides* and an athecate hydroid, on *Sarg.*, a sponge, and a stone; 3–7 mm high.
BONAIRE: 1056B. Five plume-shaped colonies, 3–5 mm, on a sponge. — 1057. A single colony 4 mm in height. — 1068a. Some small branched specimens on algae.
TORTUGA: 1211. Five fragments, 5–6 mm in length.
FRAILES: 1215. A few small branched and unbranched colonies on *Sarg.*, with *Dynamena corn.* and *Dynamena crisioides*.
ANTIGUA: 1393. Some small, branched colonies on algae and other substrata.
ST. KITTS: 1397. Some small specimens.
ST. BARTS: 1121. Some small branched specimens.
ST. MARTIN: 1131. About twenty branched and unbranched specimens on algae, together with *Plumularia hal.*; height varying from 5–15 mm.
ST. JOHN: 1407. Some small colonies on *Turbinaria*.
NEW PROVIDENCE: 1149. Many colonies on fir cone, together with *Dynamena cris.*, with many gonothecae. The small specimens are not branched, the larger, over 1.5 cm, have many branches.
BIMINI: 1154.
TORTUGAS: Sta. 17. A branched colony, 1.1 cm. — Sta. 210. Many branched colonies up to 5 cm high, with gonothecae. — Sta. 219. About twenty branched colonies, max. 3.2 cm.

Some very small specimens are not branched, but they rise from the same stolon as branched forms, and hence are not classified as f. *siliquosa* Broch, 1933.

The material shows much variation. The branches are irregularly arranged, either alternately or opposite. The specimens from Tortugas, sta. 210 and 219, and the specimens from New Providence (1149) differ from each other and from the other material in several

distinct respects, and are therefore described separately. They may even be specifically different.

The following description concerns the colonies from all localities, with the exception of Tortugas, sta. 210 and 219, and New Providence, loc. 1149.

Between the apophysis of the stolon, which is of variable length, and the hydrothecate part of the colony 1–3 internodes are present, each bearing 0–2 nematothecae. These internodes are separated from the apophysis and from each other by means of transverse nodes or constrictions; the distal internode is connected to the hydrothecate part of the stem by means of an oblique node. The hydrothecate part of the stem is split up into internodes by means of oblique septa, which may be incomplete in the proximal part.

Each internode is provided with a hydrotheca and 4–5 nematothecae: a mesial nematotheca below the hydrotheca, two lateral nematothecae, and 1–2 mesial nematothecae above the hydrotheca. Between the latter and the hydrotheca a constriction of the periderm is often present at about the level of the hydrothecal margin or lower.

The branch rises from the internode, laterally to the hydrotheca. The branches generally rise alternately from the consecutive hydrothecate internodes, but there are also intermediate, unbranched internodes. The alternation is not strictly maintained in all specimens. The branch presents: a short athecate internode with a proximal transverse and a distal oblique end; an internode bearing one mesial nematotheca, also with an oblique end; and, alternately, an internode bearing a hydrotheca with a mesial nematotheca below the hydrotheca and two lateral nematothecae, and an internode bearing one mesial nematotheca. Beneath the mesial nematotheca under the hydrotheca an oblique node is present; above the hydrotheca a transverse node occurs, which is sometimes not complete.

The hydrotheca is about as deep as broad. One-half to one-third of the adcauline wall is adnate to the internode. The angle between the plane of the aperture and the internodal longitudinal axis is about 120°. The adcauline and abcauline walls are approximately parallel. The margin is smooth and slightly everted. The abcauline

wall is not particularly thick, but it has a thickening near the base.

The periderm of the anterior aspect of the internodes is thickened, but not as strongly as in *A. secundaria* (Gmelin).

The lateral nematothecae, inserted on long apophyses of the internode, do not reach the hydrothecal margin. They are larger than the other nematothecae; the margin of the upper chamber has a deep adcauline and a small abcauline incision. The mesial nematothecae are smaller; the margin is only hollowed on the adcauline side. The mesial nematotheca below the hydrotheca ends below the hydrothecal base. All nematothecae are bithalamic. No reduced, monothalamic nematotheca occurs in the axil of the hydrotheca and the internode, as it does in *A. secundaria.*

Gonothecae are not present.

The colonies have a faint yellowish colour.

Description of the material from Tortugas, sta. 210 and 219.

The colonies reach a greater maximum height: 5 cm and 3.2 cm, instead of 1.5 cm as in the previous specimens.

The non-hydrothecate part of the stem, between the long apophysis and the hydrothecate part of the stem, is divided into 1–2 internodes of varying length, each internode bearing 2–10 nematothecae, more or less arranged in two rows. The nodes between these internodes, and the connection with the hydrothecate part of the stem, are as described above. The hydrothecate part of the stem is alternately divided into a short hydrothecate internode with a proximal oblique node and a distal transverse node, and a long non-hydrothecate internode bearing a varying (4–6) number of nematothecae.

The hydrothecate internode of the stem is provided with a hydrotheca and five nematothecae: one nematotheca below the hydrotheca; two lateral nematothecae; and two nematothecae above the hydrotheca, both at the same height. Laterally to each hydrotheca of the stem, two opposite branches rise; sometimes only one branch is given off. They are inserted on apophyses of the internode. At the base of the branch 1–2 peridermal constrictions or a distinct, short athecate internode are present. The remainder of the branch is composed of short hydrothecate internodes with a proximal oblique

and a distal transverse node, and longer, non-hydrothecate internodes. The two types of internodes alternate. The transverse node above the hydrotheca is usually not a complete septum in stem or branch.

The hydrothecate internode of the branch carries a hydrotheca, a mesial nematotheca below the hydrotheca, two lateral nematothecae, and behind the hydrotheca a small, reduced but bithalamic nematotheca, which is often absent. The non-hydrothecate internode is usually provided with one mesial nematotheca, but sometimes there are two. The transverse (incomplete) septum between both internodes is situated a variable distance above the adnate part of the hydrotheca. The number of mesial nematothecae between two consecutive hydrothecae is always three. The position of the transverse node seems to determine whether or not the small, reduced nematotheca lies on the hydrothecate internode. The non-hydrothecate internode may bear only one nematotheca, or it may bear a total of two nematothecae and the preceding internode will then have one nematotheca less. The proximal non-hydrothecate internode of the branch bears two nematothecae.

The hydrotheca is slightly deeper than broad; it agrees in all respects with the description given above, as also do the lateral nematothecae. The mesial nematothecae and the nematothecae on the gonotheca are smaller and of equal size; the margin of the upper chamber shows a large adcauline and an indistinct abcauline incision. The nematotheca behind the hydrotheca is remarkably small, but not monothalamic and not, as in *A. secundaria*, placed exactly in the axil of the hydrotheca and the internode, but higher. The lower mesial nematotheca does not reach the base of the hydrotheca.

The gonotheca is attached at a point lateral to the lower mesial nematotheca of the hydrothecate internode. Its shape and size are variable, so that it is not easily distinguished from those of *A. secundaria* (Gmelin); but the characteristic shape of both nematothecae at the base of the gonotheca, with the hollowed abcauline and adcauline margins, is a distinct point of difference. The gonothecae occur on all branches and on the stem. There is generally one gonotheca to a hydrotheca, but sometimes two are present. The

stalk is two-segmented. The margin of the gonotheca is slightly thickened.

The thickness of the periderm of the colony is as described above.

The stem and branches are brown or dark-coloured, the other parts are yellowish.

The branching may be more complicated: instead of a simple branch rising from the hydrothecal internode, this internode may produce branches in the same way as the main stem. As a rule such secondary branches are rarely observed in a colony.

The material from New Providence, loc. 1149, shows another way of branching. The branch is not inserted on an apophysis laterally to the hydrotheca, but below the oblique basal node of the hydrothecate internode an apophysis is produced which gives rise to a branch that begins with two transverse peridermal constrictions and a non-hydrothecate internode, bearing in general 4 mesial nematothecae. Near each hydrotheca, only a single branch rises; the various branches alternate. The branches may produce secondary branches in the same way. Between two bifurcations a non-hydrothecate internode is usually present, bearing 4–7 nematothecae.

In other respects this material does not differ from the Tortugas specimens, except for the number of mesial nematothecae present between two consecutive hydrothecae of a simple branch: this

Measurements (in μ):	Klein Bonaire, 1049B	Tortugas, sta. 210, 219	New Providence, 1149
Hydroclade, distance between two oblique nodes	465–530	700–860	670–875
— length non-hydrothecate internodes	230–315	280–470	230–550
hydrotheca, length abcauline wall	185–220	200–250	185–235
— length free part adcauline wall	75–95	105–140	75–110
— total height	200–220	250–265	185–220
— diameter at margin	230–250	230–265	230–285
female gonotheca, maximum height		480–625	530–595
— — maximum diameter		310–375	310–410
— — diameter at margin		200–250	185–265

number varies from 4 to 2. In the last-mentioned case the small, reduced nematotheca is absent. The maximum height of the hydrotheca is as in the specimens first described, e.g. from 1049B.

The geographical distribution of *Antennella diaphana diaphana* (Heller) has been recorded by STECHOW (1919, p. 115) and LELOUP (1932, p. 164). The species occurs in the tropical and temperate parts of all oceans. More recent records are: Mediterranean (BROCH, 1933); Baie de Nha Trang, Caûda, Thuy Trien, Poulo Condore (LELOUP, 1937a); Baía de Santos, I. de Sto. Amaro, Brazil (VANNUCCI, 1946); Heron Island, Henning Reef, Hardy Reef, Curtis Island, Low Islands, Australia (PENNYCUIK, 1959). LELOUP (1935) records this form from: Bonaire, Aruba, Tortugas and between the Bermudas and Azores. The present material comes partly from the same localities, partly from other localities on these islands, as well as from new islands: Curaçao, Klein Curaçao, Klein Bonaire, Tortuga, Los Frailes, Antigua, St. Kitts, St. Barts, St. Martin, St. John, and New Providence.

Antennella secundaria (Gmelin, 1791) Fig. 29–31

Antennella natalensis WARREN, 1908, p. 318, fig. 14a–c.
Antennella secundaria, RITCHIE, 1910a, p. 14; BILLARD, 1913, p. 8, fig. 1, pl. 1 figs. 1–3; STECHOW, 1925a, p. 493; BROCH, 1933, p. 19; LELOUP, 1935, p. 53; MILLARD, 1958, p. 199; PENNYCUIK, 1959, p. 176, pl. 3 figs. 4–5.

CURAÇAO: 1016A. Many branched colonies some mm in height, with gonothecae, growing with *Aglaophenia latecarinata* and an athecate hydroid on *Sargassum*.
TORTUGAS: sta. 206. A small colony carrying only two hydrothecae, on Bryozoa.
BIMINI: 1154. About twenty unbranched colonies, max. 6 mm, growing on a piece of wood.

Various types of colonies are found: single hydroclades (1154 and Tortugas), and irregularly branched specimens (1016A).

The simple form agrees completely with the description of *A. natalensis* by WARREN (1908).

A gently undulating, irregularly branched stolon without peridermal teeth gives off single hydroclades. The basal part of the hydroclade consists of 1–3 internodes of variable length bearing a variable (1–5) number of nematothecae; the nodes are marked by constrictions of the periderm or by transverse septa. The remainder of the hydroclade is divided into hydrothecate internodes by means of strongly oblique nodes. An oblique node also connects the basal part of the stem to the hydrothecate part.

Each internode bears a hydrotheca and five nematothecae: one mesial nematotheca below the hydrotheca, two lateral nematothecae, one reduced nematotheca behind the hydrotheca in the axil of the internode, and two mesial nematothecae above the hydrotheca. The oblique node is situated just below the lower mesial nematotheca. An indication of a node – a peridermal constriction or an incomplete transverse septum – is present between the reduced nematotheca and the upper mesial nematothecae, at about the level of the adcauline hydrothecal margin. But these septa are often complete, so that the hydroclade is then distinctly divided into internodes of alternating heteronomy.

In the branched specimens from locality 1016A the basal non-hydrothecate part of the stem passes into three hydroclades, which may branch dichotomously. These secondary hydroclades may also branch again. The branch is produced immediately under the oblique node below the lower mesial nematotheca of the internode. At the base of the branch a peridermal constriction is present. Between two bifurcations an internode bearing only 2–4 nematothecae is usually present, but some normal hydrothecate internodes may also occur. The arrangement of the internodes on the hydroclade is as in the simple form described above.

The hydrotheca is a little broader than deep; it is adnate to the internode with about half its adcauline wall. The plane of the aperture forms an angle of 150° with the longitudinal axis of the stem. The margin is smooth and not everted; the walls are smooth. The hydrotheca widens gradually but slightly towards the aperture. The periderm of the abcauline wall, like the periderm of the anterior aspect of the colony, is remarkably thick.

The lateral nematothecae, the lower mesial nematothecae, and the nematothecae of the gonotheca are bithalamic and of equal size; the bithalamic upper mesial nematothecae are slightly smaller; the reduced nematotheca behind the hydrotheca is extremely small and monothalamic. The upper chamber of the bithalamic nematothecae is shallow; the ventral part of the margin is hollowed. The lateral nematothecae are inserted on long apophyses of the internode, and reach the hydrothecal margin. The lower mesial nematotheca reaches or extends slightly beyond the base of the hydrotheca.

Only female gonothecae, full as well as empty, are present in the material from locality 1016A. The gonotheca is inserted laterally to the lower mesial nematotheca, on a two-segmented stalk. The base is provided with two nematothecae on the adcauline side. The gonotheca is swollen, curved, longer than broad, with a circular aperture and an operculum at the apex. The surface and the margin are smooth. The specimens vary greatly in size, partly depending on the stage of development. A gonotheca may be inserted near each hydrotheca, so that a colony can bear as many as 10–20 gonothecae.

The colonies are colourless.

Measurements (in μ):	
Hydrocaulus, interval between two oblique nodes	355–655
— length intermediate non-hydrothecate internode	155–175
hydrotheca, length abcauline wall	140–175
— length free part adcauline wall	75–125
— total height	185–205
— diameter at margin	250–265
female gonotheca, maximum height (excluding stalk)	560–625
— — maximum diameter	450–485
— — diameter at margin	250–265

This species occurs in the tropical and temperate parts of the three oceans. The geographical distribution was extensively recorded by RITCHIE (1910a) and STECHOW (1925a). Since then the species has been recorded from the Mediterranean (BROCH, 1933; LELOUP, 1934); Accra, W. Africa (BUCHANAN, 1957); Delagoa Bay, Portuguese East Africa (MILLARD, 1958); eight localities in Queensland, Australia (PENNYCUIK, 1959); and in the western Atlantic from Bonaire, Curaçao and Tortugas (LELOUP, 1935). The present material originates from the two last-named localities; North Bimini can be added as a new one.

PENNYCUIK (1959) drew attention to the "Sargassum-form" of the species, characterized by the thick abcauline hydrothecal wall and ventral wall of the hydrocaulus. This character is conspicuous in my West Indian material.

Antennella curvitheca Fraser, 1937 Fig. 32–33

Antennella curvitheca FRASER, 1937a, p. 4, pl. 2 fig. 7; FRASER, 1944, p. 315, fig.

NEVIS: Fort Charles. Some colonies, consisting of a few unbranched hydroclades 3 mm in height, with three gonothecae.

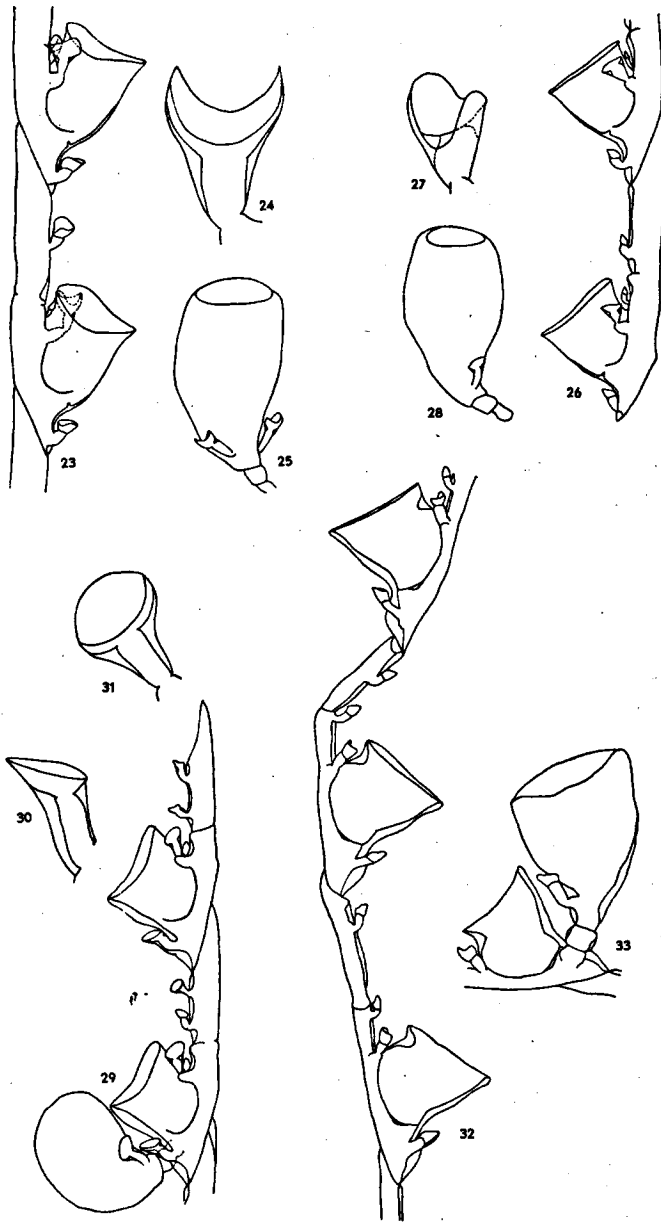
Extremely delicate, yellowish and transparent colonies. A flattened, undulating hydrorhiza, which is sparsely branched and provided with many strong internal peridermal processes, is attached to a substratum of undefinable origin and gives off single hydroclades at regular distances from each other.

The basal part of the hydroclade is divided into internodes of irregular length by means of straight septa. The number of internodes varies from 3 to 7. None of them bear hydrothecae and nematothecae except the distal internode, which may have one or two nematothecae. A strongly oblique node separates the basal part from the hydrothecate part of the stem. The latter part consists of: alternately arranged internodes, of which the proximal end is oblique and the distal end is straight, each bearing a hydrotheca and four nematothecae; and shorter internodes with a nematotheca. A hydroclade has not more than 5 hydrothecal internodes; the first of these immediately follows the basal part of the stem.

The hydrotheca is placed halfway up the internode; it is cup-shaped, with a wide aperture and a smooth margin. The plane of the aperture forms an angle of 60° with the longitudinal axis of the internode. Two-thirds of the adcauline wall are adnate to the internode; the free part is excavated and provided with a conspicuous peridermal tooth, projecting into the cavity of the hydrotheca. The periderm of the hydrotheca, particularly of the abcauline wall, is thick. This wall may have a small internal tooth near the base. The base itself is provided with a peridermal thickening.

The nematothecae are bithalamic; the margin is hollowed at one side. The mesial nematotheca immediately beneath the hydrotheca, and the lateral nematothecae, are of equal size. The lateral nematothecae are borne on distinct apophyses just below the free part of the adcauline wall of the hydrotheca. Two nematothecae slightly smaller in size are placed in the mesial line, one on the distal end of the hydrothecate internode, the other on the distal end of the intermediate internode.

Just as on the abcauline wall of the hydrotheca, the periderm is remarkably thick on the thecate surface of the internodes, especially in the part between the lower mesial nematotheca and the oblique node.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One or two proximal hydrothecate internodes bear a gonotheca. A long apophysis of the internode between the lower mesial nematotheca and the hydrotheca gives rise to the peduncle of the gonotheca. This stalk is covered by thick periderm, divided into two parts by means of a transverse septum; the distal part, broadening towards the gonotheca, carries a nematotheca on the upper side. The stalk is excentrically attached to the base of the gonotheca, so that the gonotheca is asymmetrical and curved upwards. The gonotheca is about as broad as deep; the maximum diameter is at the circular aperture of the apex. The surface is smooth. In the biggest gonotheca the male contents are still present.

Measurements (in μ):	
Hydrorhiza, diameter	60–80
athecate internode, length	125–550
hydrothecate internode, length	265–360
— — diameter below hydrotheca	90–110
intermediate internode, length	140–235
hydrotheca, maximum height	185–205
— diameter at aperture	185–205
gonotheca, maximum height	215–390
— diameter at margin	200–220
— peduncle and apophysis, length	155–190

The present material agrees with the short description of *Antennella curvitheca* by FRASER (1937a) in all the details he mentions: size, presence of single hydroclades with a basal athecate part and a distal part consisting of heteronomous internodes, shape of the nodes, arrangement and number of nematothecae. Concerning the

Fig. 23–28. *Antennella diaphana diaphana* (Heller). — DRY TORTUGAS, sta. 210: 23, part of hydroclade in lateral view; 24, lateral nematotheca in ventral view; 25, gonotheca; 26, part of hydroclade in lateral view; 27, lateral nematotheca, ventrally; 28, gonotheca in lateral view. (23, 25, 26 and 28, × 30; 24 and 27, × 120)

Fig. 29–31. *Antennella secundaria* (Gmelin). — CURAÇAO, loc. 1016A: 29, part of hydroclade in lateral view, with two hydrothecae and one gonotheca; 30, lower mesial nematotheca in lateral view; 31, lateral nematotheca in ventral view. (29, × 30; 30 and 31, × 120)

Fig. 32–33. *Antennella curvitheca* Fraser. — NEVIS, Fort Charles: 32, part of hydroclade; 33, gonotheca in lateral view. (× 45)

hydrotheca he remarks: "Hydrotheca nearly equal in depth and breadth; the abaxial border is regularly convex but the adaxial border has a distinct concavity. Margin entire". He does not mention an adcauline intrathecal tooth, nor the strongly developed periderm on the abcauline wall of the hydrotheca and the anterior surface of the internodes, which are such remarkable features in the present material but which may prove to be of variable nature. His indistinct figure does not clear up these points; the swollen internode below the hydrotheca in FRASER's figure may be due to such a peridermal thickening. There is little doubt, however, that the present material and the specimens of FRASER belong to the same species.

At first sight there is a confusing resemblance between the present material and the simple form of *Plumularia filicaulis* Kirchenpauer, 1876, as appears from the descriptions by BALE (1884, p. 134 pl. 11 figs. 6–7, and pl. 19 figs. 41–42; var. *indivisa*) and by MILLARD (1958, p. 209, fig. 13 D–E). Both species have in common a strong concavity and an intrathecal tooth in the free adcauline wall, and extremely developed periderm on the anterior surface of the internodes. But *P. filicaulis* has an ovate gonotheca, attached to the hydrorhiza; no upper mesial nematotheca is present in the hydrothecate internode; and – to judge from the figures – the free part of the adcauline wall is longer, the concavity stronger.

The only previous record is from north of Puerto Rico (FRASER, 1937a). I have not seen FRASER's 1944 record of this species, but it is probably from the same locality. Unless the gonotheca is described in that paper, this is the first description.

Plumularia habereri Stechow, 1909 Fig. 34–36

Plumularia habereri STECHOW, 1909, p. 77, pl. 6 fig. 4; STECHOW, 1913, p. 91, figs. 59–60.

CURAÇAO: 1022. Four branched colonies 23–30 mm in length, three of these partly covered with Zoantharia, so that only the distal parts of stem, branches and hydroclades are free. Another specimen 9 cm in length, also branched.

A dense clew of strong hydrorhizal fibres gives rise to the 2–6 mm thick stems of remarkably rigid, repeatedly and irregularly branched colonies without gonothecae, that are 7–10 cm wide.

The fascicled stem, showing a slight torsion, gives off branches at irregular intervals to different sides, although more or less alternately; the branches generally are not arranged in one plane, although they sometimes happen to be. They are produced by the secondary tubes of the stem. The hydrocladial tube of the stem gives off alternating hydroclades at regular intervals; the hydroclades of both sides are strictly arranged in one plane. The branches are of the same structure as the stem; their secondary tubes may again produce branches, their hydrocladial tube regularly gives rise to alternating hydroclades.

The hydroclades of the basal part of the colony are mostly lost. The stem and the proximal parts of the branches are brown, the other parts are yellowish.

Only in the distal, less fascicled and unfascicled, parts of the stem and the branches is a segmentation of the hydrocladial tube visible. Transverse septa or peridermal constrictions separate internodes of variable length, each bearing one to three hydroclades. The secondary tubes are provided with nematothecae, without a definite arrangement.

The apophysis which gives rise to a hydroclade is accompanied by two axillary nematothecae, by a nematotheca on the internode above the axil, and by a mamelon on the adcauline part of the apophysis at the level of the distinct, slightly oblique node that connects the apophysis to the hydroclade. On the opposite side of the internode a nematotheca may be present below the branch.

The hydroclade is split up into regular internodes by means of strong, slightly oblique nodes. Each internode bears a hydrotheca in the middle, two lateral nematothecae which insert on distinct apophyses and reach slightly above the hydrotheca, and a mesial nematotheca situated below the hydrotheca on a conspicuous projection. Very occasionally an internode bearing only a nematotheca is present between the normal hydrothecate internodes. The internode has not more than six peridermal ridges projecting from the hydrothecate side of the internode into its interior: above the proximal node (often a complete septum), above the processus of the mesial nematotheca, at the base of the hydrotheca (often absent), at the middle of the hydrotheca (often absent), at the insertion of the

lateral nematothecae, and below the distal node (often a complete septum). These ridges are less developed in younger internodes.

All nematothecae of the colony have the same shape, stalked, bithalamic, with an oblique diaphragm and hollowed ventral margin of the upper chamber.

The hydrotheca occupies the greater part of the internode; it is deep, cylindrical and narrowed at the base. The adcauline wall is adnate. The anterior part of the margin is smooth and forms an angle of 90° with the internodal longitudinal axis; the posterior part curves down towards the bases of the lateral nematothecae. Although, in the above-mentioned details, the shape of the hydrotheca agrees with previous descriptions, it is not exactly identical with any one of the varieties described by BILLARD (1913, p. 42, var. *attenuata* (= STECHOW's typical form), var. *elongata*, var. *subarmata*, var. *mediolineata*, and var. *mucronata*), as there are two points of difference:

1) The margin of each side, before curving down in the posterior part, is produced in a small, but distinct, blunt tooth, directed upwards.
2) A large peridermal tooth projects into the interior of the hydrotheca from the hydrothecal wall, at the base of the lateral nematothecae.

Fig. 34–36. *Plumularia habereri* Stechow. — CURAÇAO, loc. 1022: 34, fragment of distal region of colony; 35, hydrocladial internode, with the lateral nematothecae removed; 36, mesial nematotheca in lateral view. (34 and 35, × 45; 36, × 120)

Fig. 37–38. *Plumularia sargassi* Vanhöffen. — ST. BARTS, loc. 1121: a, fragment of stem and hydroclade. DRY TORTUGAS, sta. 219: 38, fragment of stem and hydroclade. (× 30)

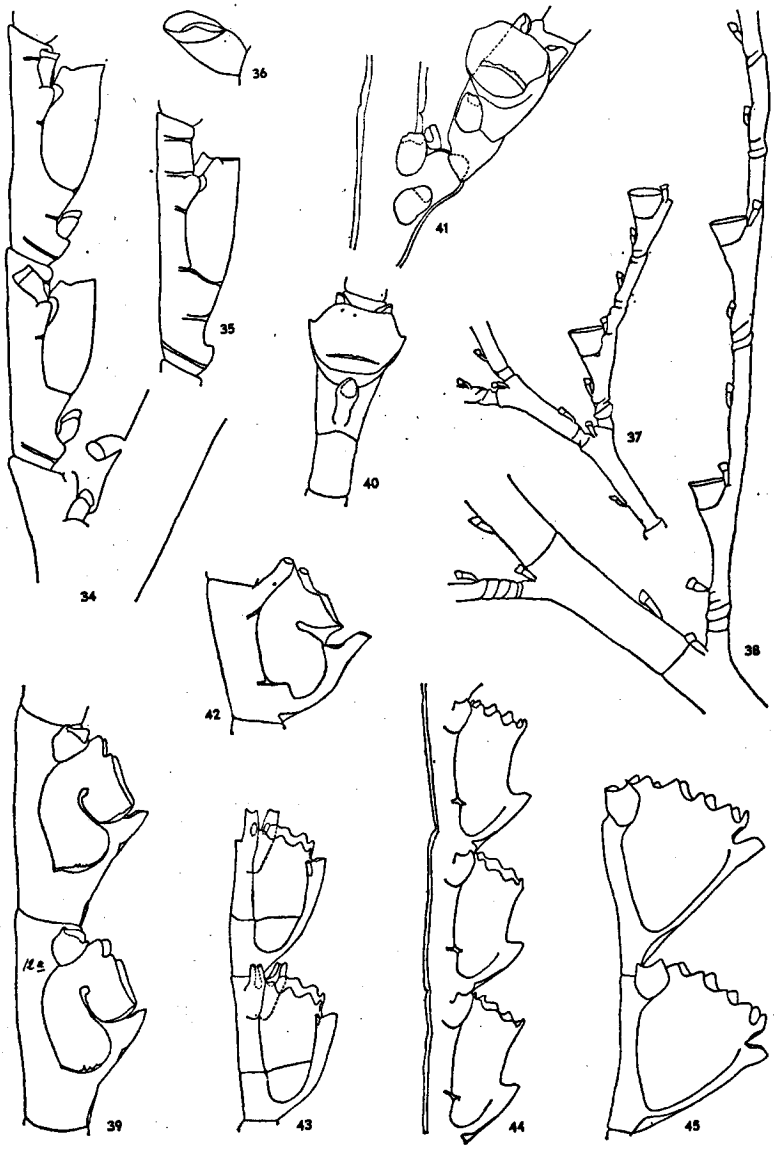
Fig. 39–41. *Halicornaria hians* var. *balei* Billard. — DRY TORTUGAS, sta. 210: 39, two distal internodes of hydroclade in lateral view; 40, hydrocladial internode in ventral view; 41, stem and proximal internode of hydroclade, frontal view. (× 30)

Fig. 42. *Lytocarpus philippinus* (Kirchenpauer). — ST. MARTIN, loc. 1128: proximal internode of a hydroclade in lateral view. (× 450)

Fig. 43. *Aglaophenia allmani* Nutting. — DRY TORTUGAS, sta. 207: distal internode of a hydroclade in lateral view. (× 30)

Fig. 44. *Aglaophenia elongata* Meneghini. — DRY TORTUGAS, sta. 210: part of hydroclade in lateral view. (× 30)

Fig. 45. *Aglaophenia pluma pluma* (Linnaeus). — BIMINI, sta. 1154: hydrothecae on distal hydroclade in lateral view. (× 60)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My West Indian specimens may represent a new variety of this exceedingly polymorphic species.

Measurements (in μ):	
Hydroclade, length internode	435–515
— diameter at node	60–80
hydrotheca, total height	215–265
— diameter at margin	75–95

The species was originally described from Sagami Bay, between Ito and the island of Hatsushina (STECHOW, 1909). Other Japanese records are from Wagumura, Shishigahana and Misaki, Sagami Bay (STECHOW, 1913); Ito, Sagami Bay (TISCHBIEREK, 1929); Ebisina, Misaki (CARLGREN, 1935). BILLARD (1913) recorded five varieties originating from eleven localities in Indonesian waters: N. of Salomakiëe (Damar), N. of Ubian, Pulu Missa near Makassar, and Borneo Bank. The present record from Curaçao is the first Atlantic record of this species. It is curious to find that the present specimens are also covered with Zoantharia, since the association of *Plumularia habereri* Stechow 1909 with a zoanthid occurs more frequently, as appears from a survey of the literature: TISCHBIEREK (1929, *Epizoanthus cnidosus*), CARLGREN (1935, *Parazoanthus gracilis* (Lwowsky)), STECHOW (1913, his "Schwamm" and "sponge" are probably Zoantharia).

This species does not occur in very shallow water, but at a depth of 10–50 m.

Plumularia halecioides Alder, 1859

Plumularia halecioides, HINCKS, 1868, p. 306, pl. 67 fig. 2; BILLARD, 1904, p. 185; VANNUCCI, 1949, p. 255.

Plumularia inermis NUTTING, 1900, p. 162, pl. 5 figs. 1–2a; FRASER, 1912, p. 382, fig. 50; WAGENAAR HUMMELINCK, 1933, p. 305; FRASER, 1938, p. 64, pl. 15 fig. 74; VANNUCCI, 1946, p. 581, pl. 5 fig. 52.

Ventromma halecioides, LELOUP, 1935, p. 51.

SOUTH AMERICAN MAINLAND: 1203. Some small colonies.

CURAÇAO: 1016A. A colony 0.5 cm in height, on *Sargassum*, together with *Aglaophenia latecarinata*. — 1023a. A few small specimens on coral debris. — 1028A. Colonies on algae, wood, shells and muddy substrata, 1–3 cm in height. Some gonothecae are present.

KLEIN BONAIRE: 1049B. Many small colonies, 5 mm high, growing on a sponge, together with *Antennella diaph. diaphana*, *Campanularia*, and an athecate hydroid.

BONAIRE: 1058A. Probably this species. — 1059B. Some small colonies with other hydroids on algae. — 1064. A small colony on wood, and a fragment 3 cm in length. — 1064c Several colonies on wood, about 1 cm — 1065. Many colonies 0.5–1.5 cm in height, on *Thalassia*. — 1066b. Numerous specimens on wood and algae; 0.5–3 cm in length. Many gonothecae. — 1070c. Some colonies on wood. — 1070A. Several tufts of well-developed colonies, 1–3 cm

high, with many gonothecae, and some smaller colonies, 0.5 cm in length, growing on wood and rock debris.
TORTUGA: 1211. About twenty delicate colonies on *Rhizophora* and coral debris. Gonothecae are present.
BARBUDA: 1394. A few colonies with *Plumularia margaretta* and *Campanularia*, on algae.
ST. KITTS: 1397. Some colonies, 5 mm high, on algae and a sponge.
ST. EUSTATIUS: 1116B. Two small fragments.
ST. MARTIN: 1128Aa. Many colonies on wood; gonothecae are present on hydrocaulus and branches. — 1130. Unbranched colony; 0.5 cm. — 1131. Some specimens on *Rhiz.*, together with *Antennella diaph. diaph.* and an athecate hydroid. Some colonies on algae. — 1132. Some pieces of mangrove densely covered by well-developed colonies, at least 1 cm high. Several specimens on barnacles. Many gonothecae. — 1132A. A few colonies with gonothecae, about 1.5 cm in height.
ST. CROIX: 1405. Small colonies on *Thal.*
ST. JOHN: 1408. Small colony on *Sarg.*
BIMINI: 1154. Six damaged colonies on *Sarg.*
TORTUGAS: sta. 17. Two fragments, 0.5–1 cm.

In structure, this abundant material agrees closely with that described by HINCKS (1868) from the coast of England. The height of the colonies varies from 3 mm to 3 cm. The smaller forms are unbranched with unfascicled stem, as described by NUTTING (1900). In the bigger forms the fascicled stem is composed of a hydrocladial tube and two or more secondary tubes. The fascicled branch has the same structure; its hydrocladial tube is produced by the hydrocladial tube of the stem or by a secondary tube.

The hydroclades rise from a distinct projection of the stem, usually beginning with one, but sometimes with two, very small athecate internodes. The rest of the hydroclade may consist of a series of consecutive hydrothecate internodes, but rarely: these internodes are usually separated by one to three athecate internodes, which are generally shorter than the hydrothecate internodes. The number of hydrothecae to a hydroclade varies from one to six.

The gonothecae are placed in clusters of 10–15 at the base of the colony. They rise from the hydrorhizal tubes, the secondary tubes of the stem, and from the hydrocladial tube of the basal part of the stem; in the last-mentioned case the gonotheca is attached in the axil of a hydroclade. The shape and transversely corrugated surface of the gonotheca is in complete accordance with HINCKS' description,

and differs from FRASER's (1938) account of the gonotheca of *Plumularia inermis* Nutting, which shows a smooth surface.

Measurements (in μ):	
Branch, internode, length	370–440
hydroclade, intermediate internode, length	140–235
— thecate internode, length	230–390
hydrotheca, total height	60–80
— diameter at margin	90–125
gonotheca, total height	1,245–1,435
— diameter at apex	450–500

Although the species occurs in all oceans, the localities recorded in the literature from the Indo-Pacific area are scarce: Queensland (PENNYCUIK, 1959); Galapagos Islands? (FRASER, 1938; this material may prove to belong to another species, as the gonotheca is quite different); Trinity Islands, Gulf of Alaska, off Klashwan Point, and off Virago Sound (FRASER, 1937). The only Indian record is from Madras harbour (LELOUP, 1932).

In the tropical and temperate parts of the Atlantic the species is more frequently found, as appears from the following (incomplete) list: England (HINCKS, 1868; VERVOORT, 1949); France (BILLARD, 1904); Portugal (DA CUNHA, 1944); Mediterranean (BILLARD, 1904; STECHOW, 1923; LELOUP, 1934); Senegal (PICARD, 1951); Cape Verde Islands (RITCHIE, 1907); Isla de Sto. Amaro and I. de S. Sebastião, Brasil (VANNUCCI, 1946 and 1949); Barracuda Rocks (NUTTING, 1900); Bogue Bank (FRASER, 1912); Tortugas Islands (WALLACE, 1909); Bermuda Islands (BENNITT, 1922, see LELOUP (1935)). LELOUP (1935) mentions: Klein Bonaire, Bonaire, Aruba and Tortugas. There are consequently the following new localities: several places on these latter islands, and Curaçao, Tortuga, Puerto Santo (Sucre, Ven.), Barbuda, St. Kitts, St. Eustatius, St. Martin, St. Croix, St. John, and North Bimini.

Plumularia sargassi Vanhöffen, 1910 Fig. 37–38

Plumularia sargassi VANHÖFFEN, 1910, p. 333, fig. 46; LELOUP, 1935, p. 55, fig. 32.

ARUBA: A tuft of simple plumes on algae; nearly 1 cm
CURAÇAO: 1016A. Some colonies on *Sargassum*.
BONAIRE: 1061. Some colonies, 3–5 cm, on *Sarg.*, with an athecate hydroid.
TOBAGO: 1385. About twenty colonies on coral debris, up to 5 mm.
ST. KITTS: 1397. Some colonies 3 mm in length, on a sponge, together with *Campanularia*. — 1398. A few specimens on shells.
ST. BARTS: 1121. A few colonies, 3-5 cm on *Sarg.*
TORTUGAS: Sta. 219. Some colonies on *Sarg.*
ATLANTIC: 35°7′ N, 63°35′ W. Many colonies on *Sarg.*, with *Aglaophenia latecarinata*; 5 mm. — 43°4′ N, 31′ W. A few specimens on *Sarg.*, with *Aglaophenia lat.*, *Dynamena quadridentata* var. *nodosa* and *Campanularia*. No gonothecae are present in this material.

The following notes are given here to supplement VANHÖFFEN's (1910) description.

The shape of the colony is in general a single plume, but it may at times be branched. The stolon usually bears internal peridermal ridges, but these may also be absent. Nematothecae are sometimes attached to the hydrorhiza at irregular intervals. A short athecate internode forms the base of the stem, the rest of which is divided into hydrocladed internodes. The internode of the stem distally bears a hydroclade on a distinct projection, a nematotheca in the axil of this apophysis, and inferiorly a second nematotheca on the opposite side of the hydroclade. In rare cases, a third nematotheca occurs above the second nematotheca, at the level of the apophysis.

The nodes of the hydrocaulus are more or less transverse. They are preceded and followed by one to five complete or incomplete peridermal septa placed close together, so that there are consequently up to four annulations; in the same manner, the hydroclade is connected to the stem and the internodes of the hydroclade are attached to each other.

The hydroclade consists of internodes bearing a hydrotheca and three nematothecae, and intermediate internodes with one nematotheca (sometimes two), arranged alternately, but occasionally an intermediate internode is followed by a second internode. The length of the internodes varies, depending on the number of annulations. The base of the hydrotheca is provided with a peridermal tooth, which may project transversely into the interior of the internode. The lateral nematothecae reach considerably beyond the margin of the hydrotheca.

Measurements (in μ):

Stolon, diameter	75–95
hydrocaulus, internode, length	250–315
hydroclade, hydrothecate internode, length	230–360
— intermediate internode, length	140–190
hydrotheca, height	75–110
— diameter at margin	90–125

So far this species has only been found in the tropical part of the Atlantic Ocean, mainly on *Sargassum*. VANHÖFFEN (1910) records the Sargasso Sea. LELOUP (1935)

mentions several localities on Bonaire, Curaçao, Aruba, between the Bermudas and the Azores, W. of Madeira, N. of the Bermudas, and N. of the Azores. In 1936 he recorded the species from 23°57′ N, 57°45′ W and 27°13′ N, 62°16′ W. The present material is partly from the same localities as those mentioned by LELOUP (1935), partly from new localities on Aruba, Tobago, St. Kitts and St. Barts.

The species is not so rare as is suggested here by the short list of previous records, for it has probably been recorded several times under other specific names (VANHÖFFEN, 1910).

The following colony is described separately, as it differs in some respects from the specimens recorded above (Fig. 38).

> TORTUGAS: sta. 219. A fragment of an unbranched, plume-shaped colony: the stolon is present, but the distal part is broken off. Total height 1.4 cm.

The fragment resembles *Plumularia sargassi* Vanhöffen in the following respects
a) The plume-shaped colony.
b) The short basal athecate internode of the stem followed by hydrocladial internodes, alternately directed left and right.
c) The connection of the hydroclade to the apophysis of the stem by means of four or five annulations.
d) The connection of the hydrocladial internodes by means of one or two annulations.
e) The alternation of longer hydrothecate internodes and shorter intermediate internodes on the hydroclade.
f) The number and the arrangement of the nematothecae on the hydrocladial internodes.
g) The shape of the hydrotheca with two overtopping lateral nematothecae.

Points of difference are:
a) The greater size of the whole fragment, of the diameter of the stolon, of all types of internodes, while the size of the hydrotheca is the same as in *P. sargassi* Vanhöffen, so that the ratio length of hydrothecate internode: height hydrotheca is about 5 instead of about 3.
b) The internodes of the hydrocaulus bear three nematothecae, two axillary nematothecae are present (instead of one);
c) The nodes, represented merely by thin, transverse septa, sometimes have an annulation only in the upper part;
d) The stolon has neither peridermal internal teeth nor nematothecae.

Measurements (in μ):	
Stolon, diameter	150–160
hydrocaulus, internode, length	515–550
hydroclade, hydrothecate internode, length	435–500
— intermediate internode, length	265–315
hydrotheca, height	75–110
— diameter at margin	90–110

Identification is impossible, particularly because of absence of gonothecae. If this is not a form of *Plumularia sargassi*, it may represent *Plumularia setacea* (Linnaeus, 1758).

Plumularia margaretta (Nutting, 1900)

Monotheca margaretta NUTTING, 1900, p. 72, pl. 11 figs. 1–3; FRASER, 1912, p. 380, fig. 47; PICARD, 1951, p. 113.
Plumularia margaretta, LELOUP, 1935, p. 54, fig. 31.
Monotheca margaretta f. *typica* VANNUCCI, 1946, p. 578, pl. 5 fig. 48, pl. 6 fig. 54.
Monotheca margaretta f. *curta* VANNUCCI, 1946, p. 578, pl. 5 figs. 49–50, pl. 6 fig. 55.

ARUBA: 1001A. Some fragments of *Thalassia* densely covered by unbranched hydrocauli not more than 5 mm in height. — 1011. Five small fragments, 2 mm high.
BONAIRE: 1060. Five small fragments; 2 mm. — 1069. Numerous colonies, up to 4 mm, on *Sargassum*. Gonothecae are abundantly present. The majority of the hydrocauli not branched; irregularly and sparsely branched specimens also occur.
ISLOTE AVES: 1114. Small group of ten unbranched hydrocauli growing on algae.
BARBUDA: 1394. Some small unbranched specimens, growing on algae together with *Plumularia halecioides* and other hydroids.
ST. KITTS: 1397. Eight unbranched specimens on algae.
ST. MARTIN: 1128C. Numerous unbranched colonies on algae, 4 mm in length
ST. JOHN: 1407. Three small unbranched colonies on *Turbinaria*.

The material generally agrees with the specimens described by NUTTING (1900). The following notes can be added:

The colonies are usually unbranched. The hydrorhizal fibres frequently show internal peridermal teeth; they form a delicate network, and bear nematothecae at irregular intervals. The basal internode of the stem is short and athecate. The other internodes each carry three nematothecae, two in the axil of the hydroclade and an inferior one on the opposite side. The nodes of the hydrocaulus are conspicuous; the end of the lower internode is very broad compared with that of the upper internode.

The arrangement and shape of the gonothecae do not differ from the description by LELOUP of material from the same locality. The number of transverse ridges varies from seven to nine. Not more than one gonotheca to a hydrocaulus has been found. The sex could not be ascertained.

Measurements (in μ):		f. *typica* Vannucci, 1946	f. *curta* Vannucci, 1946
Hydrocaulus, internode, length	230–550	220–315	179–181
— internode, maximum diameter	30–50	39–47	50–58
hydroclade, athecate internode, length	75–95	60–105	58–66
— athecate internode, maximum diameter	15–35	39–47	46–70
hydrotheca, maximum height	105–125	110–125	89–113
— diameter at margin	105–140	120–140	109–121
gonotheca, maximum height	780–915	–	390–675
— diameter at margin	590–815	–	405–550

VANNUCCI (1946) distinguishes two forms: the f. *curta* differs from the f. *typica* in having shorter and broader internodes and thicker periderm. These characters, however, are so variable that they do not seem sufficient to separate the two forms.

The geographical distribution of *P. margaretta* (Nutting) is restricted to the Atlantic Ocean: Fann, Senegal (PICARD, 1951); Little Cat Island, Bahamas (NUTTING, 1900); Bogue Bank (FRASER, 1912); Baía de Santos, I. de Sto. Amaro, Baía de Guanabara, Baía de Guaratuba, I. de S. Sebastião, Banco Jaseur, Banco S. Tomé, Brazil (VANNUCCI 1946, 1949, 1950 and 1951); Bermuda islands and Sargasso Sea (BENNITT, 1922 and VANHÖFFEN, 1910, cited by LELOUP, 1935); Bonaire, Curaçao, Aruba (LELOUP, 1935).

The present material originates partly from the same localities as those mentioned by LELOUP, partly from new places on these islands, and from Islote Aves, Barbuda, St. Kitts, St. Martin and St. John.

The only Pacific record is that given by FRASER (1938) – La Plata Island, Ecuador – but this cannot be checked because of the complete lack of description.

Halicornaria hians (Busk, 1852) var. **balei** Billard, 1913 Fig. 39–41

Aglaophenia balei MARKTANNER, 1890, p. 272, pl. 7 figs. 19–20.
Halicornaria flava NUTTING, 1906, p. 955, pl. 6 fig. 2, pl. 13 figs. 11–12.
Halicornaria balei, RITCHIE, 1910a, p. 22.
Halicornaria balei var. *flava*, RITCHIE, 1912, p. 23, pl. 4 fig. 12.
Halicornaria hians var. *balei* BILLARD, 1913, p. 70, fig. 56.

TORTUGAS: Sta. 210. a) Two small colonies 11 mm and 3 mm in height, on a naked stem of a hydroid. A fragment of a more developed colony, 2.5 cm long and 1.5 cm wide. – b) Two pinnate hydrocauli 3.5 cm and 2.5 cm in length, and a colony including three hydrocauli 1.5 cm in length, all growing on the stem of a hydroid, without gonothecae. Identified as *Aglaophenia allmani* Nutting, by LELOUP (1935, p. 57, No. 71).

A smooth stolon, without internal periderm thickenings, is attached to a fragment of another hydroid, and gives off pinnate hydrocauli at irregular intervals.

The unfascicled hydrocaulus is split up into internodes by means of transverse septa which may be less distinct or absent in the distal region. In most colonies an internode bears a hydroclade on the distal, anterior part. Near the apophysis three cauline nematothecae are arranged: a smaller nematotheca on the base of the apophysis, and two nematothecae in the axil of the apophysis. The hydroclades of consecutive internodes alternate; they are directed slightly upwards and forward. In the fragment of an older colony there are two hydroclades to an internode; in the basal part these hydroclades alternate, in the distal part they are opposite.

The hydroclade is distinctly segmented; transverse nodes connect the internodes of equal length. The back of the internode is slightly convex. No septa are present in the internode. The hydrothecae are so arranged on the hydroclade that their apertures are directed towards the anterior aspect of the colony.

The adcauline wall of the hydrotheca is strongly convex, and adnate for the greater part. The abcauline wall is provided with a strong septum, projecting halfway into the cavity of the hydrotheca, curved upwards at the end, and bearing some minute teeth. The aperture of the hydrotheca is nearly parallel with the longitudinal axis of the hydroclade. The margin has two distinct lateral teeth, curved towards the back of the hydrotheca, and two indistinct, blunt adcauline undulations. Moreover, a pair of very small abcauline teeth may be present, but rarely so. The shape and size of the teeth are variable.

Small denticles are present on the bottom of the hydrotheca, not easily visible as the hydranths are still present. The abcauline wall from margin to intrathecal ridge has thickened periderm.

In the proximal internode (or the two proximal internodes) of the hydroclade the mesial nematotheca does not reach the margin of the hydrotheca, and its adnate part does not reach the hydrothecal ridge. The other mesial nematothecae extend a little beyond the margin of the hydrotheca, and are adnate to the hydrothecal wall to a little below the margin. A small abcauline tooth is present. There

is one terminal aperture, extending from the apex to the hydrotheca.

In lateral view the lateral nematothecae do not reach the margin of the hydrotheca; on the anterior aspect they are partly visible. The lateral nematotheca is fairly broad for its height, and has a curved margin: a large aperture runs from the apex over to the lateral side, which is directed towards the hydrotheca. The cauline nematothecae are of the same shape.

In older colonies the stem is brown, the higher parts and younger colonies are yellowish.

Measurements (in μ):	
Hydroclade, length internode	545–610
— diameter at node	185–235
hydrotheca, maximum height	390–410
— diameter at aperture	215–250

The identification is doubtful, as there is not sufficient material and the gonothecae are absent. There are no previous Atlantic records. The following notes concern the synonyms of *Halicornaria hians* (Busk) var. *balei* Billard; these have been taken from the text and figures of the various papers in order to illustrate the variability of this form.

The descriptions of *Halicornaria hians* (Busk) by BALE (1884, p. 179, pl. 13 fig. 6, pl. 16 fig. 7) and MILLARD (1958, p. 219, fig. 15 G–H) differ from the present material only in mentioning the presence of three large teeth on each side of the hydrothecal margin.

BILLARD (1913) mentions a great variability of the marginal teeth of the hydrotheca of *H. hians* (Busk): in the proximal part of the hydroclade the abcauline teeth are often reduced, and become gradually more developed in the distal region. BILLARD considers *Aglaophenia balei* Marktanner, 1890, to be a variety of *H. hians* (Busk): this *H. hians* (Busk) var. *balei* is characterized by reduced or obsolete abcauline teeth in most hydrothecae.

On reading the description by MARKTANNER (1890) of *A. balei* I cannot find important points of difference between that species and the Tortugas material. MARKTANNER (1890, p. 272) describes the hydrothecal margin as possessing: "jederseits einen stark vor-

springenden, weit auswärtsgebogenen Zipfel." He does not speak of other teeth, and they are not represented in his drawing.

Halicornaria balei (Marktanner), described by RITCHIE (1910a), differs slightly from MARKTANNER's original specimens as "the median lobe of the hydrotheca is less long and less pointed, and occasionally a second indistinct lobe appears on the margin" (p. 22).

Unfortunately, NUTTING (1906) gave indistinct drawings with his description of *Halicornaria flava*. The only distinct point of difference between his description and the Tortugas material is the presence of "two strong, broad cauline nematophores at the front of the base of each hydroclade" (l.c., p. 955). The hydrotheca of NUTTING's species had a "margin with a single broad lateral lobe on each side, and one in front and another behind" (l.c., p. 955). It is impossible to draw definite conclusions from these remarks, but *H. flava* may be identical with the present material.

H. balei (Marktanner) var. *flava* Nutting as described by RITCHIE agrees largely with the Tortugas material, as appears from the drawing by RITCHIE (1910). RITCHIE remarks that these specimens differ from NUTTING's type in the proximity of the hydrothecae, but he does not find differences which are sufficient to separate both forms. He noticed variations in the number and prominence of the lateral lobes, while the large lateral lobe is sometimes accompanied by a smaller one. BILLARD (1913) considered the *H. balei* (Marktanner) var. *flava* Nutting recorded by RITCHIE (1910) to be *H. hians* (Busk, 1852) var. *balei*.

Halicornaria hians (Busk, 1852) is distributed over the Indian and Pacific Oceans. For the localities recorded before 1941 I refer to VERVOORT (1941, p. 222, fig. 78). MILLARD (1958) published the first record from S.E. Africa: off Umkomaas River. A new locality from Australia has been published by PENNYCUIK (1959): Wistary Reef. BALE (1884) recorded *H. haswelli* from Port Curtis, Australia (as PENNYCUIK, 1959, p. 186, points out, *Halicornaria hians* (Busk, 1852) and *H. haswelli* Bale, 1884, are identical). BILLARD (1913) recorded *H. haswelli* Bale, 1884, from Pulu Jedan, Aru Islands.

H. hians (Busk) var. *balei* Billard has been found at the following localities: Muaras, near the E. coast of Borneo; Sanguisapo, Sulu Archipelago (BILLARD, 1913); Andaman Islands (RITCHIE, 1910, as *H. balei* (Marktanner) and *H. balei* (Marktanner) var. *flava* Nutting); Red Sea (MARKTANNER, 1890); and Hawaiian Islands (NUTTING, 1906).

Lytocarpus philippinus (Kirchenpauer, 1872) Fig. 42

Aglaophenia urens BALE, 1884, p. 155, pl. 14 fig. 6, pl. 17 fig. 9.
Lytocarpus philippinus, NUTTING, 1900, p. 112, pl. 31 figs. 4–7; BILLARD, 1913, p. 78, fig. 63; BRIGGS & GARDNER, 1931, p. 193, fig. 4; VERVOORT, 1946, p. 329.
Lytocarpus crosslandi RITCHIE, 1907, p. 511, pl. 24 fig. 11, pl. 26 figs. 2–4.
Macrorhynchia philippina, VANNUCCI, 1946, p. 587, pl. 6 fig. 71, pl. 7 fig. 65.

ST. MARTIN: 1128. Numerous small fragments with a maximum length of 9 mm.

No colony is complete; in the fragments, without gonothecae, both monosiphonic and fascicled stems are present. The unfascicled stems are not branched; they are simply feather-shaped. The basal part of the fragments bears only large nematothecae, and is connected to the part bearing hydrocladia by means of a conspicuous hinge.

The fascicled fragment exhibits some nematothecae-bearing tubes, running along a feather-shaped structure as mentioned above. From these tubes rise irregularly unfascicled stems, which start with a short nematothecae-bearing part and then have a pinnate part; the two parts are connected by an oblique joint. The basal part of the stem is not segmented; the distal part may be divided into internodes by means of more or less transverse septa.

The internode of the stem bears, on its anterior aspect, a hydroclade and three nematothecae; one in the axil of the apophysis of the hydroclade, another below the apophysis, and a reduced one on the base of the apophysis. The hydroclades are distinctly segmented. The internode has two incomplete peridermal septa; one at the base of the lateral nematothecae, and a second at the base of the hydrotheca.

The shape of the hydrotheca is in complete accordance with the description by BILLARD (1913). There is no intrathecal ridge on the adcauline wall. The margin has a faint, blunt tooth on each side, and a small acute abcauline tooth.

The mesial nematotheca is adnate to the hydrothecal wall as far as the level of the intrathecal, abcauline ridge. Its free part is of very variable length; it reaches the level of the margin of the hydrotheca, but may be much shorter, or overtop the margin considerably. This

length does not depend on the place on the hydroclade. The mesial nematotheca has at least two apertures, one terminal and one corresponding with the interior of the hydrotheca; a third, adcauline, aperture may also be present.

Both lateral nematothecae are completely adnate to the hydrotheca, sometimes slightly overtopping its margin. They have a lateral and a terminal aperture.

The fragments are yellowish, with darker stems.

Measurements (in μ):	
Stem, internode, length	280–390
— internode, diameter at node	185–235
hydroclade, internode, length	280–315
— internode, diameter at node	60–80
hydrotheca, total height	265–285
— diameter at aperture	105–140

This species has been recorded many times in the literature, but I could find only one complete description of western Atlantic specimens: that by NUTTING (1900). As the present material differs from his description in several respects, I have described it rather extensively.

BILLARD (1913) remarks that there are two forms, which are probably geographical varieties:

1. A "Pacific" form, occurring in the Pacific and Indian Oceans, and in the Mediterranean, recorded by KIRCHENPAUER (1872), PICTET (1893), BILLARD (1907, 1913) and BALE (1884, 1888). Hydrotheca without an adcauline peridermal ridge, and with a narrowing in the base.

2. An "Atlantic" form, occurring in Atlantic waters, recorded by NUTTING (1900), FRASER (1912) and RITCHIE (1907, as *Lytocarpus crosslandi*) Hydrotheca with peridermal adcauline ridge and without a narrowing in the base.

But the "Pacific" form also occurs in the Atlantic Ocean, as appears from the record by VANNUCCI (1946, *Macrorhynchia philippina* Kirchenpauer) from the Brazilian coast, and the present material from St. Martin.

Lytocarpus philippinus (Kirchenpauer) is very common in the tropical and subtropical parts of the three oceans and in the Mediterranean. For its distribution reference should be made to RITCHIE (1910), BILLARD (1913), FRASER (1938) and VERVOORT (1941, 1946). It has since been recorded from the S.E. coast of Africa by MILLARD (1958), and from Australian waters by PENNYCUIK (1959).

In the Atlantic Ocean, the following localities are known: Cape Verde Islands (RITCHIE, 1907); Jamaica; Panama; Bahia in Brazil (NUTTING, 1900); Bogue Sound in the Gulf of Mexico (FRASER, 1912), and Baía de Santos, Brazil (VANNUCCI, 1946). St. Martin fits in well with these localities.

The longitudinal little stripes in the mesial nematothecae, as figured by BILLARD (1913) and mentioned by VERVOORT (1941), are sometimes visible in the present material, in empty nematothecae as well as in those in which the nematophore is still present.

Aglaophenia latecarinata Allman, 1885

Aglaophenia latecarinata ALLMAN, 1885, p. 151, pl. 23 figs. 5–6; BROCH, 1914, p. 7, fig. 7; LELOUP, 1935, p. 57; VANNUCCI, 1946, p. 586, pl. 7 figs. 60–64, 68–69; MILLARD, 1958, p. 213, fig. 14; VERVOORT, 1959, p. 309, fig. 54.
Aglaophenia minuta NUTTING, 1900, p. 96, pl. 21 figs. 1–3.

SOUTH AMERICAN MAINLAND: Sucre, Chacopata. Numerous colonies on algae, up to 10 mm. Many corbulae with gonophores.
ARUBA: 1011. Many colonies growing on *Sargassum*; height about 5 mm. One corbula.
CURAÇAO: 1016A. Numerous specimens on *Sarg.* together with some specimens of *Antennella secundaria, Campanularia* and an athecate hydroid; 5–9 mm in height.
KLEIN BONAIRE: 1049B. A fragment 5 mm in length.
BONAIRE: 1059B. Fragment 5 mm in length. — 1060. Many fragments 10–12 mm in height. — 1069. Many colonies on *Sarg.*, up to 20 mm. Some of the hydroclades are stolonizing.
ISLOTE AVES: 1114. Some fragments and corbulae.
ST. EUSTATIUS: Schildpaddenbaai. Many colonies on *Sarg.*, about 5 mm; corbulae are present.
FOURCHE: Five Island. Some fragments and corbulae.
ATLANTIC: 35°7′ N, 63°35′ W. A few colonies on *Sarg.*, together with *Plumularia sargassi.* — 43°4′ N, 31° W. *Sarg.* densely covered by delicate plumes of about 5 mm in length. Together with *Plumularia sarg., Dynamena quadridentata* var. *nodosa* and *Campanularia.*

For a description of the trophosome reference should be made to MILLARD (1958) and for a description of the corbula to NUTTING (1900), BROCH (1914) and VANNUCCI (1946). Some small variations are listed below.

The stolon is provided with many internal thickenings of the periderm.

All variations of the hydrothecal margin described by MILLARD (1958) and VERVOORT (1959) are present in my material. The carina is more or less developed, and is generally a little shorter than the abcauline tooth. The mesial nematotheca of the proximal internode of the hydroclade is smaller than those of the other internodes, and adnate to the hydrotheca for a shorter distance. The peridermal tooth of the abcauline wall of the mesial nematotheca is always distinct. Of the two internodal septa, the septum at the base of the lateral nematothecae is less strong or is incomplete. The nematothecae on the hydroclade often show many short longitudinal stripes, as are also present in *Lytocarpus philippinus* (Kirchenpauer) from St. Martin, loc. 1128.

The corbula is borne on the basal hydroclade (or on two basal hydroclades) of the colony. One normal hydrothecate internode is present between the corbula and the stem. The corbula is composed of 6–8 leaves; length 1.5–1.7 cm, diameter 0.8–1.0 cm.

Measurements (in μ):	
Hydroclade, internode, length	280–345
— internode, diameter across centre	60–80
hydrotheca, height	310–360
— diameter at aperture (excluding carina)	155–190

This species is common in the tropical and subtropical parts of the Atlantic Ocean, and also occurs in the Indian Ocean. Indian records are listed by MILLARD (1958): off Durnford Point and off Umtwalumi River, Cargados (JARVIS, 1922, as *A. minuta*) and Madagascar (BILLARD, 1907, as var. *madagascariensis*).

To show the distribution in the western Atlantic VANNUCCI (1946) may be cited: Gulf of Mexico, Bahamas, Cape Cod region and Cape Hatteras region. Brazilian records are also given by VANNUCCI (1946, 1949): Baía de Guanabara, Baía de Santos, I. de Sto. Amaro, Cayobá, I. de S. Sebastião, I. do Francês, E. of Ponta da Fruta. LELOUP (1937) mentions Cay Sal Bank. VANHÖFFEN (1910) records S. of the Azores. The species has been found many times in the Sargasso Sea (BROCH, 1914; LELOUP 1932, 1936, 1937; VERVOORT, 1946). African records are Angola (BROCH, 1914a), off Freetown and 9°24′ N, 14°48′ W (VERVOORT, 1959). LELOUP (1935) mentions Bonaire: Curaçao; Aruba; near Hollywood, Florida; S.E. of the Bermudas; N. of the Bermudas, and N.W. of the Azores. – Most of the present material is from the same localities as LELOUP's material; new are some places in Sucre and on Bonaire, St. Eustatius and Fourche.

Aglaophenia allmani Nutting, 1900 Fig. 43

Aglaophenia ramosa Allman, 1877, p. 39, pl. 23 figs. 1–4.
Aglaophenia allmani Nutting, 1900, p. 100, pl. 22 figs. 2–3; Ritchie, 1909, p. 93, fig. 10.
Aglaophenia (?) *allmani*, Leloup, 1935, p. 57.

Tortugas: Sta. 207. Branched colony 10 cm in height. — Sta. 210. Two branched colonies 10 and 7 cm in length, and several fragments. — Sta. 219. Fragment 4 cm in length.

The specimens, without corbulae, agree with those of Allman (1877) and Nutting (1900), and largely with those of Ritchie (1909).

Rigid and irregularly branched colonies; the stem and branches are fascicled. Only in the distal, monosiphonic parts is an indistinct division into internodes by means of straight nodes visible. Each internode gives rise to one hydroclade. The hydrothecae are borne on the stem and branches, but on the basal part of the stem only numerous nematothecae are present. The difference in size and shape between the hydrothecae and nematothecae of the proximal and distal parts of a hydroclade, as noticed by Ritchie, is very distinct in some of my specimens.

The lateral nematotheca has an aperture at the apex, and a second aperture on the surface which corresponds with the interior of the hydrotheca. Ritchie observed that on rare occasions, exclusively in the proximal internodes both apertures make contact, thus forming one large opening. This phenomenon often occurs in the Tortugas material, and is independent of the position of the lateral nematotheca on the hydroclade.

The mesial nematotheca has an aperture running from the apex towards the wall of the hydrotheca, and a second aperture just below

Measurements (in μ):	
Monosiphonic branch, internode, length	545–780
hydroclade, internode, length	390–470
hydrotheca, length	340–410
— diameter at aperture	185–205
mesial nematotheca, length	290–315
lateral nematotheca, length	155–190

the place where the nematotheca is no longer adnate to the hydrotheca.

The periderm of the adcauline wall of the hydrotheca is slightly thickened from margin to nematothecae.

The species is only distributed in the tropical part of the western Atlantic Ocean: Florida Reef (ALLMAN, 1877); 90°30′ N, 76°20′ W (NUTTING, 1900); Abrolhos Bank, Brasil, 18°14′ S, 37°58′ W (RITCHIE, 1909); Tortugas, Florida (LELOUP, 1935; see note on these specimens below); off Barbados, British West Indies and 17°37′55″ N, 64°54′20″ W, off Santa Cruz Island, West Indies (FRASER, 1948). This is a complete list of previous records; however, FRASER's (1944) paper is not available to me.

Some of the specimens from Tortugas, sta. 210, identified by LELOUP as *Aglaophenia allmani* Nutting, must be ascribed to other species: *Aglaophenia elongata* Meneghini and *Halicornaria hians* (Busk) var. *balei* Billard.

Aglaophenia elongata Meneghini, 1845 Fig. 44

Aglaophenia gracilis ALLMAN, 1877, p. 42, pl. 25 figs. 1–4.
Aglaophenia dubia NUTTING, 1900, p. 92, pl. 18 fig. 5; RITCHIE, 1909, p. 95.
Aglaophenia elongata, BEDOT, 1921b, p. 47, pl. 4 figs. 39–40; BROCH, 1933, p. 56, figs. 18d, 21; Leloup, 1937, p. 112.

TORTUGAS: Sta. 210. Fragment of a branched colony; 4 cm. Fragment 13 cm in length, identified by LELOUP (1935) as *Aglaophenia allmani* Nutting (No. 71). No corbulae.

The present material agrees with the descriptions by ALLMAN, NUTTING and RITCHIE. It differs slightly from the accurate description by BEDOT in the following minor details:

The fragments represent two stems that are both sparsely and irregularly branched. The stem and branches are of equal diameter. All parts of the branches bear hydroclades, the proximal part included; this is not the case in BEDOT's material. Two adcauline teeth are always present in the hydrotheca, but they are covered by the lateral nematothecae, so that they are not easily observed. The abcauline tooth is lengthened is most hydrothecae, but in the distal part of the hydroclade this tooth may be of the same shape and size as the others.

The colour of the branches is brown, the hydroclades are colourless. The length of the hydroclades is about 1 cm.

Measurements (in μ):	
Hydroclade, internode, length	420–485
— diameter at middle	75–95
hydrotheca, length	340–375
— diameter at aperture	155–205
mesial nematotheca, length	170–205
lateral nematotheca, length	75–110

The occurrence of the species is restricted to the Atlantic Ocean. It is mentioned from the Mediterranean (MARKTANNER, 1890, as *Aglaophenia tubiformis*; BROCH, 1933; PICARD, 1955); the Azores and the western coasts of France (BEDOT, 1921b); Carysfort Reef (ALLMAN, 1877), the British West Indies and several localities near Florida (NUTTING, 1900); Abrolhos Bank, Brazil (RITCHIE, 1909), and Tampa Bay (LELOUP, 1937). This new Dry Tortugas record fits well into the picture of the distribution.

Aglaophenia pluma pluma (Linnaeus, 1758) Fig. 45

Aglaophenia pluma var. *typica*, MILLARD, 1957, p. 238, fig. 15A.

BIMINI: 1154. An unbranched plume 0.5 cm in height; the basal part is broken off.

The slightly geniculated stem and the hydroclades are more or less distinctly segmented. The margin of the hydrotheca is provided with nine triangular teeth of equal size, of which the abcauline tooth is not curved inwards. The mesial nematotheca is almost completely adnate, and ends some distance below the level of the margin of the hydrotheca. The terminal aperture runs from the apex to the wall of the hydrotheca; a second aperture corresponds with the interior of the hydrotheca. The lateral nematothecae reach or nearly reach the margin of the hydrotheca. The peridermal ridge in the internode at the base of the lateral nematothecae is less developed, like the intrathecal adcauline ridge near the base of the hydrotheca. Below the base of the mesial nematotheca the periderm of the internode is thickened.

Measurements (in μ):	
Stem, internode, length	280–300
hydroclade, internode, length	215–285
hydrotheca, total length	200–250
— diameter at margin	140–160

The colony is without corbulae, and not so well developed that it can be established with complete certainty whether it belongs to var. *dichotoma* (M. Sars, 1857) or to the typical form. These varieties of *Aglaophenia pluma* (Linnaeus) are mainly different in their mode of branching; on comparison of the present colony with those described by MILLARD (1957) I am inclined to identify the specimen as representing the typical form.

For a picture of the geographical distribution of *Aglaophenia pluma pluma* (Linnaeus), a list of previous records is given here.

Indian and Pacific region: S.E. Coast of Africa (MILLARD, 1958); Tanganyika (LELOUP, 1952); Indonesia (VERVOORT, 1941, as *A. elongata* (Meneghini)), and the tropical western coasts of the American continent (FRASER, 1937, 1948).

In the Atlantic Ocean it is known from the coast of England (MOORE, 1937); Portugal (DA CUNHA, 1944, 1950); the Mediterranean (BROCH, 1933; BILLARD, 1936; ROSSI, 1950; PICARD, 1955); the entire African coast (BROCH, 1914; LELOUP, 1937, 1939; VERVOORT 1946, 1959; MILLARD, 1957). No locality in the western part of the Atlantic is known to me. The only western Atlantic record is that of another variety (*A. pluma* (Linnaeus) var. *dichotoma* (M. Sars), from Tampa Bay in the Gulf of Mexico (LELOUP, 1937, as *A. dichotoma* M. Sars).

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