

Hydroids (Cnidaria, Hydrozoa) from Shallow-water Environments along the Caribbean Coast of Panama

DALE R. CALDER¹ AND LISA KIRKENDALE²

¹Department of Natural History, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, Canada M5S 2C6,
Corresponding author: dalec@rom.on.ca

²Florida Museum of Natural History, University of Florida, Gainesville, Florida 32611-7800, USA,
lkirkendale@zoo.ufl.edu

ABSTRACT.—Hydroids were examined in three different collections of specimens, acquired in 1969, 2002, and 2004, from the Caribbean coast of Panama. Eighteen stations were sampled in the Bocas del Toro area, western Panama. Nine others were situated in Colón and vicinity, and a single station was made at Portobelo in the east. Seventy-nine species were identified overall, including 28 anthoathecates, 49 leptotheccates, and two actinulids. Included among the anthoathecates were the hydrocorals *Millepora alcicornis*, *M. complanata*, *M. squarrosa*, and *Stylaster roseus*. The six most frequently encountered species in the collections were *Turritopsis nutricula*, *Nemalécium lighti*, *Halopteris alternata*, *Millepora alcicornis*, *Antennella secundaria*, and *Dynamena disticha*. Records of each species from localities elsewhere in the Caribbean region are summarized. Four species, *Ectopleura mayeri*, *Sagamihydra dyssymetra*, *Halecium lightbourni*, and *Tridentata vervoorti*, are reported from the Caribbean Sea for the first time.

KEYWORDS.—Hydrozoans, Anthoathecata, Leptotheccata, hydrocorals, Bocas del Toro, Colón, Portobelo.

INTRODUCTION

Hydroids of the Caribbean Sea have received limited attention faunistically. Among the more comprehensive references on species reported from these tropical waters are the guidebook on hydroids of the Atlantic coast of North America by Fraser (1944), a report on sertularioids and plumularioids of the Caribbean by Van Gernerden Hoogeveen (1965), an account and check list of Caribbean species by Vervoort (1968), and a paper on anthoathecate hydroids from Puerto Rico and the Virgin Islands by Wedler and Larson (1986).

Publications with records of hydroids from the Caribbean coast of Panama include those of Fraser (1947) and Vervoort (1968). In addition, *Solanderia gracilis* was recorded from Panama by Larson (1987), *Ralpharia gorgoniae* was described from the Galeta Reef by Petersen (1990), and hydrocorals of the region were documented by Guzman and Guevara (1998a, b, 1999, 2001) and Sánchez (2003). Finally, reports of the brackish to fresh-water species *Cordylophora caspia* in the Gatún Locks near the At-

lantic entrance of the Panama Canal were given by Hildebrand (1939) and Jones and Rützler (1975).

Our objectives were to investigate the diversity and species composition of hydroids in shallow water environments along the Atlantic coast of Panama, in the southwestern Caribbean Sea.

MATERIALS AND METHODS

We examined hydroids in three separate collections of benthic material from the Atlantic coast of Panama (Fig. 1; Table 1). Specimens in the first of these collections were removed from samples of bryozoans acquired near Colón in April 1969 by N. A. Powell of the National Museum of Natural Sciences, National Museums of Canada (now the Canadian Museum of Nature, Ottawa). These were obtained as part of an assessment of the potential biological impacts of a sea-level canal through Panama (Jones 1972). A second collection was made by one of us (DRC) in and around Colón, and at Portobelo, in June 2002, during a survey for invasive species led by Andrew

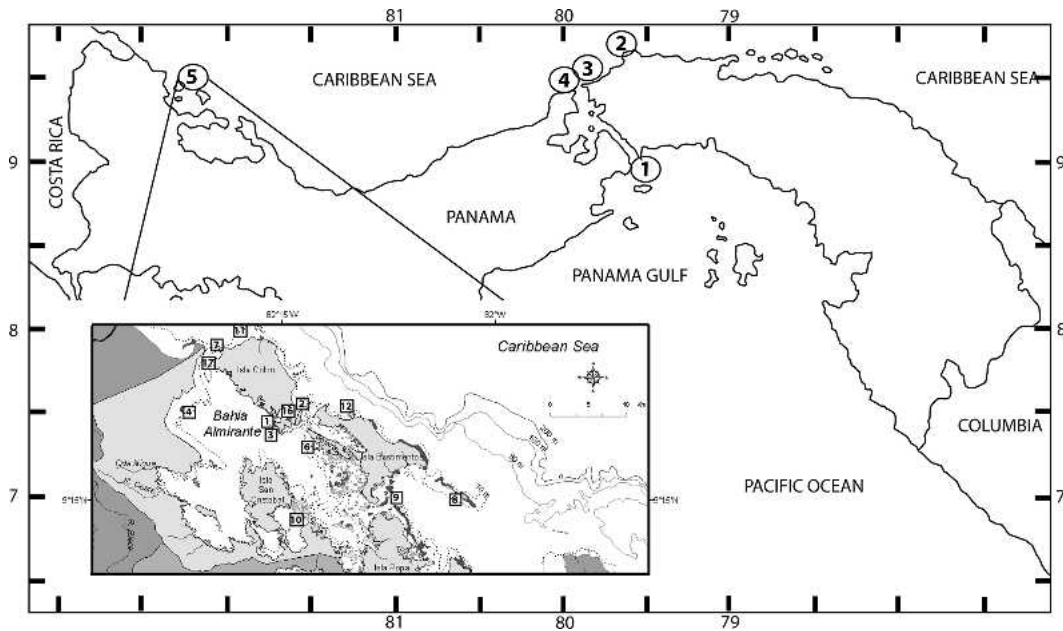


FIG. 1. Hydroid sampling stations visited in Panama (1-5, in circles) and Bocas del Toro (1-16, inset in squares) from 2003-2005. Please refer to the Materials and Methods for site details, with Bocas del Toro sites denoted by the prefix Stn P004. As certain stations are roughly overlapping, only the first of these are denoted here. These are Stations 1 and 14, Stns 2 and 5, Stns 7 and 15, Stns 12 and 13 and Stns 17 and 18.

Cohen of the San Francisco Bay Estuary Institute. The third and largest collection was obtained by us during a workshop on marine invertebrates at the Bocas del Toro Research Station of the Smithsonian Tropical Research Institute from 2-11 August 2004. Collections were made in the vicinity of Bocas del Toro on shallow rocky outcrops, rubble bottoms, mangrove habitats, reefs, seagrass beds, pilings, and buoys, by snorkeling and diving with SCUBA. Representative specimens from this study were deposited in collections of the Invertebrate Zoology Section of the Department of Natural History, Royal Ontario Museum (Toronto, Canada).

A minimum of two citations are given for most species in synonymy lists below. The first of these provides a reference to the original description and founding of the species name. The second comprises a reference containing a detailed synonymy list and description. Finally, any reference recording the species from the Atlantic coast of Panama has also been included in the synonymy list.

TAXONOMIC ACCOUNT

Class Hydrozoa
 Order Anthoathecata
 Suborder Filifera
 Family Cordylophoridae
Corydendrium parasiticum (Linnaeus, 1767)
Sertularia parasitica Linnaeus 1767: 1315.
Corydendrium parasiticum.—Calder 1988: 6, figs. 3, 4.
 Material: Stns. P002-010, P002-011, P004-005.
 Caribbean records: Colombia (Wedler 1975; Flórez González 1983); Belize (Spracklin 1982); Puerto Rico (Wedler and Larson 1986).

Rhizodendrium sp.

Material: Stns. P004-013, P004-018.
 Remarks: This material is likely referable to a species that is as yet undescribed.

Turritopsis nutricula McCrady, 1857

Oceania (Turritopsis) nutricula McCrady 1857: 56, pl. 4, figs. 1-10, 12-15, 28a, pl. 5, figs. 11, 16-18, 28b.

TABLE 1. Collection data for hydroids from the Atlantic coast of Panama. Abbreviations as follows: NP = N. A. Powell, DC = Dale Calder, LK = Lisa Kirkendale, KT = Kevin Tilbrook, RC = Rachel Collin, ST = Seth Tyler, JW = Judith Winston, STRI = Smithsonian Tropical Research Institute.

Station No.	Location	Date	Depth (m)	Temp (°C)	Salinity (‰)	Collector
NAP-001	Buoy #6, Atlantic side, Canal Zone	19-IV-1969				NP
NAP-002	Mole Buoy, Atl. entrance to canal	25-IV-1969				NP
NAP-003	US Army Harbor Craft Ops. Pier #1, Atlantic side	24-IV-1969				NP
P002-008	Colón, Fort Sherman dock, wood, 09°22'12"N, 79°56'59"W	2-VI-2002	0-2	30	29	DC
P002-009	Colón, bridge near Fort Sherman, 09°17'33"N, 79°55'22"W	2-VI-2002	0-1	31	21	DC
P002-010	Colón, Fort Sherman dock, marina, 09°20'57"N, 79°54'10"W	3-VI-2002	0-2	28	33	DC
P002-011	Colón, Club Nautico, steel pilings, 09°21'51"N, 79°53'39"W	3-VI-2002	0-1	29	33	DC
P002-012	Colón, Isla Margareta, Fort Randolph, shore, 09°23'15"N, 79°53'11"W	3-VI-2002	0-1	30	33	DC
P002-013	Portobelo Harbor, dock, 09°33'14"N, 79°39'34"W	4-VI-2002	0-1	29	33	DC
P002-015	Galeta, STRI Galeta Laboratory, dock, 09°24'08"N, 79°51'39"W	4-VI-2002	0-2	31.5	31	DC
P004-001	Bocas del Toro area, STRI Station dock, 09°21.07'N, 82°15.43'W	2-VIII-2004	0		30	LK
P004-002	Bocas del Toro area, Hospital Point, 09°20'00.7"N, 82°13'06.8"W	2-VIII-2004	0-2			LK
P004-003	Bocas del Toro area, Mangrove Inn, 09°19.52.6"N, 82°15'17.7"W	2-VIII-2004	2-3			LK
P004-004	Bocas del Toro area, Almirante pilings, 09°16.218'N, 82°23.382'W	3-VIII-2004	1-10			LK
P004-005	Bocas del Toro area, Hospital Point, 09°20'01.9"N, 82°13'07.7"W	4-VIII-2004	2-13			LK
P004-006	Bocas del Toro area, Cayo Solarte Sud, 09°18'45.3"N, 82°12'46.6"W	4-VIII-2004	2-3			KT
P004-007	Bocas del Toro area, Boca del Drago, 09°25'36.3"N, 82°19'30.1"W	5-VIII-2004	1-3			LK
P004-008	Bocas del Toro area, Cayos Zapotilla, 09°15.564'N, 82°02.750'W	6-VIII-2004	7-8			LK
P004-009	Bocas del Toro area, Crawl Cay, 09°15.261'N, 82°07.787'W	6-VIII-2004	2-4			LK
P004-010	Bocas del Toro area, near Laguna Bocatorito, no coordinates	7-VIII-2004	2-4			DC
P004-011	Bocas del Toro area, Swan's Key, 09°27'12.2"N, 82°18'01.8"W	7-VIII-2004	1-4			LK
P004-012	Bocas del Toro area, Bastimentos (front), 09°20.898'N, 82°09.959'W	8-VIII-2004	1-4			RC, ST
P004-013	Bocas del Toro area, Bastimentos (north), 09°20.898'N, 82°09.959'W	8-VIII-2004	1-4			LK
P004-014	Bocas del Toro area, STRI dock, 09°21'N, 82°16'W	8-VIII-2004	0			JW
P004-015	Bocas del Toro area, Boca del Drago, no coordinates	9-VIII-2004	0-3			DC
P004-016	Bocas del Toro area, "Emelio's Beach," 09°22.027'N, 82°14.336'W	9-VIII-2004				DC
P004-017	Bocas del Toro area, Drago 2, no coordinates, mangrove	10-VIII-2004	1-2			DC
P004-018	Bocas del Toro area, Drago 2, no coordinates	10-VIII-2004	2-4			LK

- Turritopsis nutricula*.—Vervoort 1968: 4.—Calder 1988:8, figs. 5, 6.
Material: Stns. NAP-002, P002-008, P002-009, P002-010, P002-011, P002-012, P004-002, P004-003, P004-004, P004-005, P004-009, P004-015.
Caribbean records: Virgin Islands (Stechow 1919; Fraser 1944); Curaçao, Panama (Vervoort 1968); Belize (Spracklin 1982; Calder 1991b, c); Colombia (Flórez González 1983; Bandel and Wedler 1987); Puerto Rico (Wedler and Larson 1986).
- Family Bougainvilliidae
Bimeria vestita Wright, 1859
Bimeria vestita Wright 1859: 109, pl. 8, fig. 4.
- Garveia humilis*.—Vervoort 1968: 7.
Bimeria vestita.—Calder 1988: 21, figs. 17, 18.
Material: Stn. P004-011.
Caribbean records: Trinidad (Fraser 1943, as *Garveia humilis*); Virgin Islands, Panama, Venezuela (Vervoort 1968, as *G. humilis*); Colombia (Wedler 1975, as *G. humilis*; 1983, as *G. humilis*); Belize (Spracklin 1982, as *G. humilis*); Puerto Rico (Wedler and Larson 1986, as *Bimeria* (?*Garveia*) *humilis*).
- Bougainvilliidae (undet.)
- Material: Stns. P002-010, P002-013, P002-015, P004-004, P004-005, P004-009, P004-010.
Remarks: Neither the species nor genus of this material could be established because of the lack of gonophores.
- Parawrightia robusta* Warren, 1907
- Parawrightia robusta* Warren 1907: 187, figs. 1, 2B, 3, 4, pls. 33, 34.
Parawrightia robusta.—Calder 1988: 19, figs. 15, 16.
Material: Stns. P004-008, P004-013.
Caribbean record: Puerto Rico (Wedler and Larson 1986, as *Garveia robusta*).
- Silhouetta uvacarpa*
Millard and Bouillon, 1973
- Silhouetta uvacarpa* Millard and Bouillon 1973: 25, figs. 3A-D, pls. 2, 3.
- Silhouetta uvacarpa*.—Calder 1988: 17, figs. 13, 14.
Material: Stn. P004-013.
Caribbean record: Puerto Rico (Wedler and Larson 1986, as *S. puertoricensis*).
- Family Stylasteridae
Stylaster roseus (Pallas, 1766)
- Madrepora rosea* Pallas 1766: 312.
Stylaster roseus.—Cairns 1986: 61, figs. 27A-H, 28A-C, 53D.
Material: Stns. P004-008, P004-013.
Caribbean records: Widely distributed in shallow waters (Cairns 1986).
- Family Eudendriidae
Eudendrium bermudense Calder, 1988
- Eudendrium bermudense* Calder 1988: 39, figs. 27-29.
Material: Stn. P004-018.
Caribbean records: Belize (Spracklin 1982, as *E. attenuatum*; Calder 1991 b, c).
- Eudendrium capillare* Alder, 1856
- Eudendrium capillare* Alder 1856: 355, pl. 12, figs. 9-12.
Eudendrium capillare.—Calder 1988: 41, figs. 30-12.
Material: Stn. P004-013.
Caribbean records: Colombia (Wedler 1975; Flórez González 1983).
- Eudendrium carneum* Clarke, 1882
- Eudendrium carneum* Clarke 1882: 137, pl. 7, figs. 10-17.
Eudendrium carneum.—Calder 1988: 43, figs. 33-35.
Material: Stns. P002-008, P002-009, P004-011, P004-013, P004-018.
Caribbean records: Puerto Rico (Fraser 1944; Wedler and Larson 1986); Venezuela, Costa Rica (Vervoort 1968; Kelmo and Vargas 2002); Colombia (Wedler 1975; Flórez González 1983; Bandel and Wedler 1987).
- Eudendrium* sp., aff. *album* Nutting, 1896
- Material: Stn. P004-007.
- Eudendrium* sp.
- Material: Stns. P002-008, P002-010, P004-002.

Myrionema amboinense Pictet, 1893

Myrionema amboinense Pictet 1893: 19, 62, pl. 1, figs. 12, 13, pl. 3, figs. 55, 56.

Myrionema amboinense.—Calder 1988: 46, figs. 36, 37.

Material: Stn. P004-014.

Caribbean records: Belize (Spracklin 1982, as *Myrionema hargitti*; Calder 1991b, c); Colombia (Flórez González 1983; Bandel and Wedler 1987; as *M. hargitti*); Puerto Rico (Wedler and Larson 1986, as *M. hargitti*).

Suborder Capitata
Family Tubulariidae

Ectopleura mayeri Petersen, 1990

Ectopleura mayeri Petersen 1990: 166, fig. 22.

Material: Stn. P004-017.

Caribbean records: not previously reported.

Ralpharia gorgoniae Petersen, 1990

Ralpharia gorgoniae Petersen 1990: 189, fig. 35.
Material: Stns. P004-007, P004-018.

Caribbean records: Belize (Spracklin 1982, as "corymorphid species"); Colombia (Flórez González 1983, as *Tubularia parasitica*); Puerto Rico (Wedler and Larson 1986, as *T. parasitica*); Panama, Barbados (Petersen 1990).

Zyzyzus calderi Petersen, 1990

Zyzyzus warreni Calder 1988: 49, figs. 38-40.

Zyzyzus calderi Petersen 1990: 180, fig. 30.
Material: Stn. P004-015.

Caribbean records: Trinidad (Millard 1975, as *Z. solitarius*); Puerto Rico, Colombia (Wedler and Larson 1986; Bandel and Wedler 1987; as *Z. solitarius*); Belize (Calder 1991 b, c, as *Z. warreni*).

Family Sphaerocorynidae
Sphaerocoryne bedoti Pictet, 1893

Sphaerocoryne bedoti Pictet 1893: 10, pl. 1, figs. 5, 6.

Sphaerocoryne bedoti.—Calder 1988: 61, figs. 46, 47.

Material: Stns. P004-005, P004-007, P004-010.

Caribbean records: Colombia (Flórez González 1983); Puerto Rico (Wedler and Larson 1986); Belize (Calder 1991b, c).

Family Corynidae

Coryne sp.

Material: Stn. P004-012.

Remarks: We believe that these specimens should be referred to a new species.

Corynidae (undet.)

Material: Stn. P004-015.

Family Zancleidae

Zanclea alba (Meyen, 1834)

Zanclea alba Meyen 1834: 165, pl. 28, fig. 8.

Zanclea costata.—Fraser 1947: 3.

Zanclea alba.—Calder 1988: 69, figs. 51, 52.

Material: Stn. P004-004.

Caribbean records: Colombia (Fraser 1947, as *Z. costata*); Belize (Spracklin 1982, as *Z. costata*; Calder 1991b, c); Puerto Rico (Wedler and Larson 1986, as *Zanclea* sp.).

Zanclea sp.

Material: Stns. P004-002 (on the bryozoan *Rhynchozoon* sp.), P004-008 (on the bryozoan *Trematooecia aviculifera*).

Family Solanderiidae

Solanderia gracilis Duchassaing and Michelin, 1846

Solanderia gracilis Duchassaing and Michelotti 1846: 219.

Solanderia gracilis.—Larson 1987: 512.—Bouillon, *et al.* 1992: 8, pl. 4, figs. 1-4.

Material: Stns. P004-008, P004-013.

Caribbean records: Guadeloupe (Duchassaing and Michelotti 1846); Virgin Islands (Vervoort 1962; Larson 1987); Puerto Rico (Colin 1978); Panama, Tobago (Larson 1987).

Family Pennariidae

Pennaria disticha Goldfuss, 1820

Pennaria disticha Goldfuss 1820: 89.

Halocordyle disticha.—Vervoort 1968: 4.—Calder 1988: 56, figs. 43-45.

Material: Stns. P002-008, P002-012, P002-015, P004-002, P004-005, P004-008, P004-009, P004-013, P004-018.

Caribbean records: Haiti (A. Agassiz 1865; Fraser 1944); Colombia (Clarke 1879; Wedler 1975; Mergner 1977, 1987; Flórez González 1983; Bandel and Wedler 1987); St. Barthelemy (Jäderholm 1903); Virgin Islands (Stechow 1919); Jamaica, Costa Rica (Mergner 1977, 1987); Belize (Spracklin 1982); Puerto Rico (Wedler and Larson 1986); Costa Rica (Kelmo and Vargas 2002).

Family Milleporidae

Millepora alcicornis Linnaeus, 1758

Millepora alcicornis Linnaeus 1758: 791.

Millepora alcicornis.—Calder 1988: 73, figs. 53-55.—Guzman and Guevara 1998a: 608; 1998b: 897, 901; 1999: 664; 2001: 57, 58. Material: Stns. P004-002, P004-003, P004-004, P004-005, P004-008, P004-009, P004-010, P004-013, P004-015, P004-017, P004-018.

Caribbean records: numerous records throughout the region (Boschma 1948).

Millepora complanata Lamarck, 1816

Millepora complanata Lamarck 1816: 201.

Millepora complanata.—Boschma 1948: 34, fig. 11, pl. 7, fig. 2.—Guzman and Guevara 1998b: 898, 901; 1999: 664; 2001: 58, 62.

Material: Stns. P004-002, P004-003, P004-005, P004-008, P004-013, P004-017, P004-018.

Caribbean records: numerous records in the region (Boschma 1948).

Millepora squarrosa Lamarck, 1816

Millepora squarrosa Lamarck 1816: 200.

Millepora squarrosa.—Boschma 1948: 32, pl. 8, fig. 9.

Material: Stns. P004-003, P004-011, P004-015. Caribbean records: Puerto Rico, Barbados, St. Eustasius (de Weerd 1981).

Family Hydrocorynidae

Hydrocoryne sp.

Hydrocoryne sp. Wedler and Larson 1986: 79. Material: Stn. P004-004.

Caribbean record: Puerto Rico (Wedler and Larson 1986, as *Hydrocoryne* sp.).

Remarks: These specimens are believed to represent a new species.

Order Leptothecata

Family Incertae Sedis

Lafoeina amirantensis (Millard and Bouillon, 1973)

Egmundella amirantensis Millard and Bouillon 1973: 40, figs. 5a-d.

Lafoeina amirantensis.—Calder 1991a: 10, fig. 3.

Material: Stns. NAP-002, P002-008, P002-011.

Caribbean records: Belize (Calder 1991b, c).

Family Haleciidae

Halecium lightbourni Calder, 1991a

Halecium lightbourni Calder 1991a: 19, figs. 10, 11.

Material: Stn. P004-015.

Caribbean records: Not previously recorded.

Halecium nanum Alder, 1859

Halecium nanum Alder 1859: 355, pl. 14, figs. 1-4.

Halecium nanum.—Calder 1991a: 20, figs. 12, 13.

Material: Stns. P002-012, P004-003, P004-009.

Caribbean records: Antilles (Jäderholm 1903); Bonaire, Aruba, between Grenada and Trinidad (Leloup 1935); Belize (Spracklin 1982; Calder 1991b, c).

Halecium tenellum Hincks, 1861

Halecium tenellum Hincks 1861: 252, pl. 6, figs. 1-4.

Halecium tenellum.—Calder 1991a: 22, fig. 14. Material: Stn. P002-015.

Caribbean records: Bonaire, Curaçao (Leloup 1935); Isla la Tortuga (Fraser 1947); Puerto Rico (Wedler and Larson 1986); Belize (Calder 1991b, c).

Halecium sp.

Material: Stns. P002-009, P002-015.

Hydranthea sp.

Material: Stn. P002-013.

Nemalecium lighti (Hargitt, 1924)

Halecium lighti Hargitt 1924: 489, pl. 4, fig. 13. *Nemalecium lighti*.—Calder 1991a: 27, figs. 17, 18.

Material: Stns. P002-008, P002-010, P002-013, P004-003, P004-004, P004-005, P004-006, P004-007, P004-008, P004-010, P004-017, P004-018.

Caribbean records: Belize (Calder 1991b, c).

Sagamihydra dyssymetra (Billard, 1929)

Halecium dyssymetrum Billard 1929: 307, fig. 1C.

Endothecium dyssymetrum.—Calder 1991a: 14, figs. 6, 7.

Material: Stns. P004-007, P004-011.

Caribbean records: Not previously recorded.

Family Kirchenpaueriidae

Ventromma halecioides (Alder, 1859)

Ventromma halecioides Alder 1859: 353, pl. 12, figs. 1-5.

Ventromma halecioides.—Calder 1997: 4, fig. 1.

Material: Stns. P002-010, P002-012, P002-013, P004-006, P004-017.

Caribbean records: Klein Bonaire, Bonaire (Leloup 1935; Van Gernerden-Hoogeveen 1965); Aruba (Leloup 1935); Venezuela (Van Gernerden-Hoogeveen 1965; Hirohito 1974); Curaçao, Isla la Tortuga, Barbuda, St. Kitts, St. Eustatius, St. Martin, Virgin Islands (Van Gernerden-Hoogeveen 1965); Colombia (Wedler 1975; Flórez González 1983; Bandel and Wedler 1987); Belize (Spracklin 1982; Calder 1991b, c; Kaehler and Hughes 1992).

Family Plumulariidae

Dentitheca dendritica (Nutting, 1900)

Plumularia dendritica Nutting 1900: 67, pl. 8, figs. 4-6.

Dentitheca dendritica.—Fraser 1944: 342, pl. 73, fig. 330.

Material: Stn. P004-011.

Caribbean records: Anguilla (Jäderholm 1920); Curaçao (Van Gernerden-Hoogeveen 1965, as *Plumularia habereri*); Colombia (Flórez González 1983; Bandel and Wedler 1987; as *P. habereri*).

Monothecha margaretta Nutting, 1900

Monothecha margaretta Nutting 1900: 72, pl. 11, figs. 1-3.

Monothecha margaretta.—Calder 1997: 11, fig. 2.

Material: Stns. P004-007, P004-008, P004-011, P004-012, P004-013.

Caribbean records: Bonaire, Aruba (Leloup 1935; Van Gernerden-Hoogeveen 1965); Curaçao (Leloup 1935); Puerto Rico (Fraser 1944); Islas de Aves, Barbuda, St. Kitts, St. Martin, Virgin Islands (Van Gernerden-Hoogeveen 1965); Colombia (Fraser 1947; Wedler 1975; Flórez González 1983; Bandel and Wedler 1987); Belize (Spracklin 1982; Calder 1991b, c).

Plumularia floridana Nutting, 1900

Plumularia floridana Nutting 1900: 59, pl. 2, figs. 4, 5.

Plumularia floridana.—Calder 1997: 15, fig. 3.

Material: Stns. P004-005, P004-007, P004-009.

Caribbean records: Belize (Spracklin 1982, as *Plumularia* sp.); Colombia (Flórez González 1983, as *Plumularia* sp.).

Plumularia setacea (Linnaeus, 1758)

Sertularia setacea Linnaeus 1758: 813.

Plumularia setacea.—Calder 1997: 17, fig. 4.

Material: Stns. P002-009, P004-011.

Caribbean records: Colombia (Wedler 1975; Flórez González 1983; Bandel and Wedler 1987); Jamaica (Mergner 1977, 1987).

Plumularia strictocarpa Pictet, 1893

Plumularia strictocarpa Pictet 1893: 55, pl. 3, figs. 47-49.

Plumularia setaceoides.—Fraser 1947: 14 [not *Plumularia setaceoides* Bale, 1882].

Plumularia strictocarpa.—Calder 1997: 21, fig. 5.

Material: Stns. P004-002, P004-003, P004-005, P004-007, P004-009, P004-011, P004-012, P004-013, P004-018.

Caribbean records: Bonaire, Curaçao, Aruba (Leloup 1935; Van Gernerden-Hoogeveen 1965; as *Plumularia sargassi*); Colombia (Fraser 1947; Bandel and Wedler 1987); Tobago, St. Kitts, St. Barthelemy (Van Gernerden-Hoogeveen 1965, as *P. sargassi*); Belize (Spracklin 1982, as *P. setacea*; Calder 1991b, c).

Family Halopterididae

Antennella curvitheca Fraser, 1937

Antennella curvitheca Fraser 1937: 4, pl. 2, fig. 7.

Antennella curvitheca.—Van Gernerden-Hoogeveen 1965: 56, figs. 32, 33.

Material: Stn. P004-007.

Caribbean records: Puerto Rico (Fraser 1937); Nevis (Van Gernerden-Hoogeveen 1965).

Antennella secundaria (Gmelin, 1791)

Sertularia secundaria Gmelin 1791: 3854.

Antennella secundaria.—Calder 1997: 29, fig. 7.

Material: Stns. P004-002, P004-005, P004-007, P004-008, P004-009, P004-011, P004-012, P004-013, P004-016, P004-018.

Caribbean records: Bonaire (Leloup 1935); Curaçao (Leloup 1935; Van Gernerden-Hoogeveen 1965); Colombia (Flórez González 1983; Bandel and Wedler 1987, as *A. gracilis*); Belize (Calder 1991b, c).

Halopteris alternata (Nutting, 1900)

Plumularia alternata Nutting 1900: 62, pl. 4, figs. 1, 2.

Halopteris alternata.—Schuchert 1997: 42, fig. 14.

Material: Stns. P002-011, P002-015, P004-002, P004-003, P004-007, P004-008, P004-009, P004-010, P004-011, P004-012, P004-016, P004-017.

Caribbean records: Bonaire (Leloup 1935, as *Antennella diaphana*; Van Gernerden-Hoogeveen 1965, as *Antennella diaphana diaphana*); Aruba (Leloup 1935, as *A. diaphana*; Fraser 1947, as *Plumularia diaphana*; Van Gernerden-Hoogeveen 1965; as *A. diaphana diaphana*); Trinidad (Fraser 1943); Tobago (Fraser 1947, as *P. diaphana*); Curaçao, Klein Bonaire, Isla la Tortuga, Los Frailes, Antigua, St. Kitts, St. Barthelemy, St. Martin, Virgin Islands (Van Gernerden-Hoogeveen 1965, as *A. diaphana diaphana*); Jamaica (Vervoort 1968, as *Halopteris diaphana*; Mergner 1977, 1987, as *H. diaphana*); Colombia (Vervoort 1968; Wedler 1975; Flórez González 1983; Bandel and Wedler 1987;

as *H. diaphana*); Belize (Spracklin 1982; Calder 1991b, c; as *H. diaphana*).

Halopteris carinata Allman, 1877

Halopteris carinata Allman 1877: 33, pl. 19, figs. 3-7.

Halopteris carinata.—Calder 1997: 34, fig. 8. Material: Stns. P004-011, P004-013, P004-018.

Caribbean records: Montserrat (Fraser 1943); Colombia (Fraser 1947; Wedler 1975; Flórez González 1983; Bandel and Wedler 1987); Virgin Islands (Vervoort 1968); Belize (Spracklin 1983).

Family Aglaopheniidae

Aglaophenia dubia Nutting, 1900

Aglaophenia dubia Nutting 1900: 92, pl. 18, fig. 5.

Aglaophenia dubia.—Calder 1997: 51, fig. 13. Material: Stn. P004-005.

Caribbean records: Martinique (Fewkes 1881, as *A. gracilis*).

Aglaophenia latecarinata Allman, 1877

Aglaophenia late-carinata Allman 1877: 56.

Aglaophenia latecarinata.—Calder 1997: 55, fig. 17.

Material: Stns. P004-005, P004-006, P004-007, P004-008, P004-011.

Caribbean records: Bonaire, Curaçao, Aruba (Leloup 1935; Van Gernerden-Hoogeveen 1965); Haiti (Fraser 1943); Venezuela, Klein Bonaire, Islas de Aves, St. Eustatius, Ile Fourche (Van Gernerden-Hoogeveen 1965); Virgin Islands (Vervoort 1968); Colombia (Wedler 1975; 1983; Bandel and Wedler 1987); Belize (Spracklin 1982; Calder 1991b, c).

Macrorhynchia philippina Kirchenpauer, 1872

Macrorhynchia philippina Kirchenpauer 1872: 19.

Macrorhynchia philippina.—Calder 1997: 66, fig. 21.

Material: Stn. P004-011.

Caribbean records: St. Martin (Van Gernerden-Hoogeveen 1965, as *L. philippinus*); Venezuela (Vervoort 1968, as *Lyto-carpus philippinus*); Colombia (Wedler

1975; Flórez González 1983; Bandel and Wedler 1987; as *L. philippinus*).

Family Thyroscyphidae

Cnidoscyphus marginatus (Allman, 1877)

Obelia marginata Allman 1877: 9, pl. 6, figs. 1, 2.

Thyroscyphus marginatus.—Calder 1991a: 79, figs. 41, 42.

Material: Stns. P004-002, P004-005, P004-011, P004-013.

Caribbean records: Testigos Island (Versluys 1899, as *Obelia marginata*); Anguilla (Jäderholm 1903, as *O. marginata*); Barbados (Nutting 1919, as *O. marginata*); Venezuela (Leloup 1935, as *Lytoscyphus marginata*); Puerto Rico (Fraser 1944, as *C. marginata*; Wedler and Larson 1986); Aruba (Fraser 1947, as *Campanularia marginata*); Curaçao (Van Gemen-Hoogeveen 1965); Virgin Islands (Vervoort 1968); Colombia (Wedler 1975; Flórez González 1983; Bandel and Wedler 1987); Belize (Spracklin 1982); Costa Rica (Kelmo and Vargas 2002, as *Thyroscyphus marginatus*).

Remarks: Schuchert (2003) has questioned the validity of the genus *Cnidoscyphus* Spletstösser, 1929.

Symmetrosyphus intermedius
(Congdon, 1907)

Thyroscyphus intermedius Congdon 1907: 482, figs. 33-36.

Symmetrosyphus intermedius.—Calder 1991a: 77, figs. 39, 40.

Material: Stns. P004-003, P004-015.

Caribbean records: Belize (Spracklin 1982, as *Sertularella parvula*; Calder 1991b, c; Kaehler and Hughes 1992).

Thyroscyphus ramosus Allman, 1877

Thyroscyphus ramosus Allman 1877: 11, pl. 6, figs. 5, 6.

Thyroscyphus ramosus.—Vervoort 1968: 33, fig. 15.

Material: Stns. P004-011, P004-015, P004-018.

Caribbean records: Testigos Island (Versluys 1899); St. Barthelemy (Jäderholm 1903); Trinidad (Fraser 1943); Puerto

Rico, Sombrero Island (Fraser 1944); Venezuela, St. Eustatius (Van Gemen-Hoogeveen 1965); Haiti, Virgin Islands, Barbados, Venezuela (Vervoort 1968); Colombia (Wedler 1975; Flórez González 1983; Bandel and Wedler 1987); Costa Rica (Kelmo and Vargas 2002).

Family Syntheciidae

Hincksella formosa (Fewkes, 1881),
comb. nov.

Sertularella formosa Fewkes 1881: 130.

Sertularella formosa.—Vervoort 1968: 104.

Material: Stns. P004-008, P004-009.

Caribbean records: Grenada, Martinique (Fewkes 1881); Testigos Islands (Versluys 1899).

Synthecium tubithecum (Allman, 1877)

Sertularia tubithecum Allman 1877: 24, pl. 16, figs. 5, 6.

Synthecium tubithecum.—Calder 1991a: 84, figs. 44, 45.

Material: Stn. P004-008.

Caribbean records: Barbados (Fewkes 1881); Anguilla (Jäderholm 1903); Puerto Rico (Fraser 1944); Virgin Islands (Vervoort 1968); Colombia (Flórez González 1983).

Family Sertulariidae

Diphasia tropica Nutting, 1904

Diphasia tropica Nutting 1904: 110, pl. 30, fig. 1.

Diphasia tropica.—Calder 1991a: 88, fig. 46.

Material: Stn. P004-005.

Caribbean records: Aruba (Leloup 1935); Trinidad (Fraser 1943); Colombia, Aruba, Bonaire (Van Gemen-Hoogeveen 1965); Colombia (Wedler 1975; Bandel and Wedler 1987); Belize (Spracklin 1982).

Dynamena crisioides Lamouroux, 1824

Dynamena crisioides Lamouroux 1824: 613, pl. 90, figs. 11, 12.

Thuiaria crisioides.—Fraser 1947: 12.

Dynamena crisioides.—Calder 1991a: 89, figs. 47, 48.

Material: Stns. P002-015, P004-001, P004-002, P004-003, P004-005, P004-008, P004-010, P004-011, P004-017.

Caribbean records: Virgin Islands (Jäderholm 1920, as *Sertularia tubuliformis*; Van Gernerden-Hoogeveen 1965; Vervoort 1968); Klein Bonaire, Bonaire, Curaçao, Aruba (Leloup 1935; Van Gernerden-Hoogeveen 1965); Martinique (Leloup 1937); Trinidad (Fraser 1943, Van Gernerden-Hoogeveen 1965); Colombia (Fraser 1947; Vervoort 1968; Wedler 1975; Flórez González 1983; Bandel and Wedler 1987); Isla la Tortuga, Los Frailes, St. Kitts, St. Martin, Jamaica (Van Gernerden-Hoogeveen 1965); Jamaica (Mergner 1977, 1987); Belize (Spracklin 1982; Calder 1991b, c, d).

Dynamena disticha (Bosc, 1802)

Dynamena disticha Bosc 1802: 101, pl. 29, fig. 2.
Dynamena disticha.—Calder 1991a: 93, fig. 50.

Material: Stns. P002-012, P004-005, P004-007, P004-008, P004-009, P004-010, P004-012, P004-015, P004-016, P004-018.

Caribbean records: Yucatan (Clarke 1879, as *Sertularia complexa*); Bonaire (Leloup 1935; Van Gernerden-Hoogeveen 1965; as *Dynamena cornicina*); Curaçao (Leloup 1935, as *D. cornicina*); Aruba (Leloup 1935; Fraser 1947; Van Gernerden-Hoogeveen 1965; as *D. cornicina* or *Sertularia cornicina*); Klein Curaçao, Isla la Blanquilla, Los Frailes, Los Testigos, Trinidad, Tobago, St. Kitts, St. Martin, between Trinidad and Grenada (Van Gernerden-Hoogeveen 1965, as *D. cornicina*); Colombia (Wedler 1975; Flórez González 1983; Bandel and Wedler 1987; as *D. cornicina*); Belize (Spracklin 1982, as *D. cornicina*; Calder 1991b, c); Costa Rica (Kelmo and Vargas 2002).

Dynamena quadridentata (Ellis and Solander, 1786)

Sertularia quadridentata Ellis and Solander 1786: 57, pl. 5, figs. g, G.

Dynamena quadridentata.—Calder 1991a: 96, fig. 51.

Material: Stns. P002-012, P004-016.

Caribbean records: Bonaire, Curaçao, Aruba (Leloup 1935; Van Gernerden-Hoogeveen 1965); Puerto Rico (Fraser

1943); Tobago, Barbados (Van Gernerden-Hoogeveen 1965); Colombia (Wedler 1975; Flórez González 1983; Bandel and Wedler 1987).

Sertularella cylindritheca (Allman, 1888)

Sertularella cylindritheca Allman 1888: 59, pl. 29, figs. 1, 1a.

Sertularella cylindritheca.—Vervoort 1968: 43, fig. 20.

Material: Stns. P004-011, P004-013, P004-018.

Caribbean records: Testigos Islands (Vervsluys 1899); Trinidad (Nutting 1904; Fraser 1943); Guadeloupe (Leloup 1960); Virgin Islands (Vervoort 1968).

Sertularella hartlaubi Nutting, 1904

Sertularella hartlaubi Nutting 1904: 104, pl. 27, fig. 5.

Sertularella hartlaubi.—Vervoort 1968: 105.

Material: Stns. P004-011, P004-013, P004-018.

Caribbean records: Jamaica (Nutting 1904).
Remarks: This species is retained in *Sertularella* for the present, although it does not conform with the diagnosis of any existing genus.

Tridentata loculosa (Busk, 1852)

Sertularia loculosa Busk 1852: 393, pl. 19, fig. 9.

Sertularia loculosa.—Schuchert 2003: 188, fig. 42.

Material: Stn. P004-018.

Caribbean records: Belize (Spracklin 1983, as "sertularid species").

Tridentata marginata (Kirchenpauer, 1864)

Dynamena marginata Kirchenpauer 1864: 13, figs. 8a-c.

Tridentata marginata.—Calder 1991a: 107, figs. 56, 57.

Material: Stns. P004-002, P004-007, P004-008, P004-011.

Caribbean records: Caribbean Sea, St. Barthelemy (Jäderholm 1903, as *Sertularia inflata*); Bonaire, Curaçao (Leloup 1935; Van Gernerden-Hoogeveen 1965); Venezuela (Fraser 1944, as *S. inflata*); Isla la Tortuga (Fraser 1947, as *S. inflata*); Islas

de Aves, Ile Fourche (Van Gernerden-Hoogeveen 1965); St. Kitts, St. Eustatius, St. Martin (Van Gernerden-Hoogeveen 1965, as *S. inflata*); Virgin Islands, Costa Rica (Vervoort 1968, as *S. inflata*); Colombia (Vervoort 1968; Wedler 1975; Bandel and Wedler 1987; as *S. inflata*; Flórez González 1983); Belize (Calder 1991b, c).

Tridentata subtilis (Fraser, 1937)

Sertularia subtilis Fraser 1937: 3, pl. 1, fig. 4.

Material: Stns. P004-007, P004-008, P004-010, P004-011, P004-013.

Caribbean records: Puerto Rico (Fraser 1937); Colombia (Flórez González 1983).

Tridentata turbinata (Lamouroux, 1816)

Dynamena turbinata Lamouroux 1816: 180.

Sertularia turbinata.—Fraser 1947: 11.

Tridentata turbinata.—Calder 1991a: 110, fig. 60.

Material: Stns. P004-007, P004-008, P004-011, P004-017, P004-018.

Caribbean records: Bonaire, Aruba (Leloup 1935; Van Gernerden-Hoogeveen 1965); Colombia (Fraser 1947; Van Gernerden-Hoogeveen 1965; Wedler 1975; Flórez González 1983); Isla la Tortuga (Fraser 1947); Tobago, Antigua, St. Martin, between Grenada and Trinidad (Van Gernerden-Hoogeveen 1965); Virgin Islands (Vervoort 1968); Belize (Spracklin 1982; Calder 1991b, c).

Tridentata vervoorti (Migotto and Calder, 1998)

Sertularia vervoorti Migotto and Calder 1998: 170, figs. 1-3.

Material: Stn. P004-002.

Caribbean records: Not previously recorded.

Family Campanulariidae
Clytia gracilis (M. Sars, 1850)

Laomedea gracilis M. Sars 1850: 138.

Clytia cylindrica.—Vervoort 1968: 13, fig. 3.

Clytia gracilis.—Calder 1991a: 54, fig. 31.

Material: Stns. NAP-002, NAP-003, P002-012, P002-013, P004-004, P004-005, P004-006.

Caribbean records: Venezuela (Leloup 1937, as *Laomedea cylindrica*; Fraser 1947, as *Gonothyræa gracilis*); Virgin Islands (Vervoort 1968, as *Laomedea (Phialidium) pelagica*); Panama, Guatemala (Vervoort 1968, as *Campanularia (Clytia) cylindrica*); Colombia (Wedler 1975, as *C. cylindrica*; Flórez González 1983, as *C. cylindrica*).

Clytia hemisphaerica (Linnaeus, 1767)

Medusa hemisphaerica Linnaeus 1767: 1098.

Clytia hemisphaerica.—Calder 1991a: 57, fig. 32.

Material: Stns. P004-006, P004-010.

Caribbean records: Virgin Islands (Stechow 1914, as *Thaumantias elsaeoswaldae*; Vervoort 1968, as *Laomedea (Phialidium) pelagica*); Klein Bonaire, Bonaire, Aruba (Leloup 1935, as *Laomedea coronata*); Venezuela (Fraser 1947, as *C. similis*); Belize (Spracklin 1982; Calder 1991 b, c).

Clytia linearis (Thornely, 1900)

Obelia linearis Thornely 1900:453, pl. 44, fig. 6.

Clytia linearis.—Calder 1991a: 62, fig. 34.

Material: Stns. NAP-003, P002-012, P004-003, P004-008, P004-009, P004-013, P004-017.

Caribbean records: Puerto Rico (Nutting 1915, as *C. fragilis*); Virgin Islands (Vervoort 1968, as *Laomedea (Phialidium) tottoni*); Colombia (Vervoort 1968, as *Laomedea (Phialidium) tottoni*; Wedler 1973, 1975, as *L. tottoni*; Mergner 1977, 1987, as *L. (Obelia) tottoni*; Flórez González 1983, as *C. gravieri*); Belize (Calder 1991b, c).

Clytia paulensis (Vanhöffen, 1910)

Campanularia paulensis Vanhöffen 1910: 298, fig. 19.

Clytia paulensis.—Cornelius 1995: 258, fig. 59.

Material: Stn. P002-008.

Caribbean records: Belize (Calder 1991b, c).

Clytia stolonifera Blackburn, 1938

Clytia stolonifera Blackburn 1938: 325, figs. 9, 10.

Clytia stolonifera.—Watson in press.

Material: Stn. P004-004.

Caribbean records: Belize (Calder 1991b, c, as *Clytia latitheca*).

Remarks: Watson (in press) has been followed in regarding *C. latitheca* Millard and Bouillon, 1973 as a junior synonym of *C. stolonifera* Blackburn, 1938.

Clytia sp., aff. *kincaidi* (Nutting, 1899)

Material: Stns. P002-009, P004-001.

Clytia sp. A

Material: Stns. NAP-001, NAP-002, NAP-003, P004-013.

Remarks: Gonothecae of this species were unusually long for the genus.

Clytia sp. B

Material: Stn. P002-011.

Clytia sp. C

Material: Stn. P004-004.

Remarks: Hydrothecae of this species were slender and crowned with long, linguiform cusps.

Obelia bidentata Clark, 1875

Obelia bidentata Clark 1875: 58, pl. 9, fig. 2. *Laomedea (Obelia) longicyatha*.—Vervoort 1968: 21, fig. 8.

Obelia bidentata.—Calder 1991a: 70, fig. 37.

Material: Stns. NAP-001, NAP-002, P002-008, P002-009, P002-010, P002-011, P002-012, P002-013.

Caribbean records: Virgin Islands (Stechow 1914, as *Obelia* (?) *oxydentata*); Bonaire, Aruba (Leloup 1935, as *Laomedea spinulosa* var. *minor*); Venezuela (Rodriguez 1963, as *O. oxydentata*; Vervoort 1968, as *Laomedea (Obelia) bicuspidata*); Guatemala (Vervoort 1968, as *Laomedea (Obelia) bicuspidata*); Panama (Vervoort 1968, as *Laomedea (Obelia) longicyatha*); Colombia (Wedler 1973, 1975; Flórez González 1983; as *O. bicuspidata*); Belize (Calder 1991b, c).

Obelia dichotoma (Linnaeus, 1758)

Sertularia dichotoma Linnaeus 1758: 812.

Obelia equilateralis.—Fraser 1947: 7

Obelia dichotoma.—Calder 1991a: 72, fig. 38.

Material: Stns. NAP-001, P002-008, P002-011, P004-009, P004-011, P004-013, P004-017, P004-018.

Caribbean records: Bonaire, Aruba (Leloup 1935, as *Laomedea sargassi*); Haiti (Fraser 1943, as *O. hyalina*); Venezuela (Fraser 1947, as *O. equilateralis*; Vervoort 1968, as *Laomedea (Obelia) congdoni*); Colombia (Wedler 1975, as *L. congdoni*; Mergner 1977, 1987, as *L. (O.) congdoni*; Flórez González 1983; Bandel and Wedler 1987); Belize (Spracklin 1982; Calder 1991b, c).

Orthopyxis sp.

Material: Stn. P002-012, P004-009.

Order Actinulidae
Family Halammohydridae
Halammohydra sp.

Material: Stn. P004-008.

Otohydra sp.

Material: Stn. P004-012.

CHECK LIST OF HYDROIDS (EXCLUDING HYDROCORALS) REPORTED FROM THE ATLANTIC COAST OF PANAMA

Order Anthoathecata
Family Cordylophoridae

Cordylophora caspia (Pallas, 1771): *Gatun Locks, Panama Canal* (Hildebrand 1939: 22, as *Cordylophora lacustris*; Fraser 1944: 34, as *C. lacustris*; Jones and Rützler 1975: 57).

Turritopsis nutricula McCrady, 1857: Colón, "E. Hentschel, on experimental plates" (Vervoort 1968: 4).

Family Bougainvilliidae

Bimeria vestita Wright, 1859: Colón, "E. Hentschel, on experimental plates" (Vervoort 1968: 7, as *Garveia humilis*).

Family Tubulariidae

Ralpharia gorgoniae Petersen, 1990: Galeta Reef, 1.5-2.0 m, coll. C. de Ridder (Petersen 1990).

Family Zancleidae

Zanclaea alba (Meyen, 1834): "Caledonia Bay, on floating *Sargassum*" (Fraser 1947:3, as *Zanclaea costata*).

Family Solanderiidae

Solanderia gracilis Duchassaing and Michelin, 1846: Duarte Cays, 9°36'N, 79°40'W (Larson 1987: 512).

Family Pennariidae

Pennaria disticha Goldfuss, 1820: Colón, "E. Hentschel, 31.xii.1932, on piles of jetty" (Vervoort 1968: 4, as *Halocordyle disticha*).

Order Leptothecata

Family Haleciidae

Halecium paucinodum (Fraser, 1947): "Caledonia Bay, handline on rocky reef" (Fraser 1947: 8, as *Endothecium paucinodum*).

Family Plumulariidae

Plumularia strictocarpa Pictet, 1893: "Caledonia Bay, on floating *Sargassum*" (Fraser 1947: 14, as *Plumularia setaceoides*).

Family Sertulariidae

Dynamena crisioides Lamouroux, 1816: "Caledonia Bay, shore" (Fraser 1947: 12, as *Thuiaria crisioides*).

Tridentata distans (Lamouroux, 1816): "Caledonia Bay, on floating *Sargassum*" (Fraser 1947: 11, as *Sertularia stookeyi*).

Tridentata turbinata (Lamouroux, 1816): "Caledonia Bay, on floating *Sargassum*" (Fraser 1947: 11, as *Sertularia turbinata*).

Family Campanulariidae

Clytia gracilis (M. Sars, 1850): Colon, "E. Hentschel, on experimental plates" (Vervoort 1968: 13, as *Clytia cylindrica*).

Clytia noliformis McCrady, 1859: "Caledonia Bay, on floating *Sargassum*" (Fraser 1947: 6).

Obelia bidentata Clark, 1875: Colon, "E. Hentschel, on experimental plates" (Vervoort 1968: 21, as *Laomedea (Obelia) longicyatha*).

Obelia dichotoma (Linnaeus, 1758): "Caledonia Bay, handline on rocky reef" (Fraser 1947: 7, as *Obelia equilateralis*).

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LITERATURE CITED

- Agassiz, A. 1865. North American Acalephae. *Illustr. Cat. Mus. Comp. Zool. Harvard Coll.* 2:1-234.
- Alder, J. 1856. A notice of some new genera and species of British hydroid zoophytes. *Ann. Mag. Natur. Hist., 2nd ser.*, 18:353-362.
- Alder, J. 1859. Descriptions of three new species of sertularian zoophytes. *Ann. Mag. Natur. Hist., 3rd ser.*, 3:353-356.
- Allman, G. J. 1877. Report on the Hydroida collected during the exploration of the Gulf Stream by L. F. de Pourtalès, assistant United States Coast Survey. *Mem. Mus. Comp. Zool. Harvard Coll.* 5(2):1-66.
- Allman, G. J. 1888. Report on the Hydroida dredged by H.M.S. Challenger during the years 1873-76. Part II.—The Tubularinae, Corymorphinae, Campanularinae, Sertularinae, and Thalamophora. *Rep. Sci. Res. Voyage H.M.S. Challenger 1873-76, Zool.*, 23:1-90.
- Bale, W. M. 1882. On the Hydroida of south-eastern Australia, with descriptions of supposed new species, and notes on the genus *Aglaophenia*. *J. Microsc. Soc. Victoria* 2:15-48.

- Bandel, K., and E. Wedler. 1987. Hydroid, amphineuran and gastropod zonation in the littoral of the Caribbean Sea, Colombia. *Senckenb. Marit.* 19:1-129.
- Billard, A. 1929. Note sur un genre nouveau et quelques espèces nouvelles d'Halecidae. *Bull. Soc. Zool. Fr.* 54:305-307.
- Blackburn, M. 1938. Hydrozoa. The Sir Joseph Banks Islands. Reports of the Expedition of the McCoy Society for Field Investigation and Research, 3. *Proc. Roy. Soc. Victoria* 50:312-328.
- Bosc, L. A. G. 1802. *Histoire naturelle des vers, contenant leur description et leurs moeurs; avec figures dessinées d'après nature. Tome 3.* Paris: Guilleminet.
- Boschma, H. 1948. The species problem in *Millepora*. *Zool. Verh., Leiden* 1:1-115.
- Bouillon, J., K. Wouters, and F. Boero. 1992. Étude des Solanderiidae de la Baie de Hansa (Papouasie Nouvelle-Guinée) avec une révision du genre *Solanderia* (Cnidaria, Hydrozoa). *Bull. Inst. Roy. Sci. Natur. Belg., Biol.*, 62:5-33.
- Busk, G. 1852. An account of the Polyzoa, and sertularian zoophytes, collected in the voyage of the "Rattlesnake," on the coasts of Australia and the Louisiade Archipelago, etc. In *Narrative of the voyage of H.M.S. Rattlesnake, commanded by the late Captain Owen Stanley, R.N., F.R.S., etc., during the years 1846-1850, Vol. 1*, J. Macgillivray, 343-402. London: T. and W. Boone.
- Cairns, S. D. 1986. A revision of the northwest Atlantic Stylasteridae (Coelenterata: Hydrozoa). *Smiths. Contrib. Zool.* 418:1-131.
- Calder, D. R. 1988. Shallow-water hydroids of Bermuda: the Athecatae. *Roy. Ontario Mus., Life Sci. Contrib.* 148:1-107.
- Calder, D. R. 1991a. Shallow-water hydroids of Bermuda: the Thecatae, exclusive of Plumularioidea. *Roy. Ontario Mus., Life Sci. Contrib.* 154:1-140.
- Calder, D. R. 1991b. Abundance and distribution of hydroids in a mangrove ecosystem at Twin Cays, Belize, Central America. *Hydrobiologia* 216/217: 221-228.
- Calder, D. R. 1991c. Associations between hydroid species assemblages and substrate types in the mangal at Twin Cays, Belize. *Can. J. Zool.* 69:2067-2074.
- Calder, D. R. 1991d. Vertical zonation of the hydroid *Dynamena crisioides* (Hydrozoa, Sertulariidae) in a mangrove ecosystem at Twin Cays, Belize. *Can. J. Zool.* 69:2993-2999.
- Calder, D. R. 1997. Shallow-water hydroids of Bermuda: superfamily Plumularioidea. *Roy. Ontario Mus., Life Sci. Contrib.* 161:1-85.
- Clark, S. F. 1875. Descriptions of new and rare species of hydroids from the New England coast. *Trans. Conn. Acad. Arts Sci.* 3:58-66.
- Clarke, S. F. 1879. Report on the Hydroida collected during the exploration of the Gulf Stream and Gulf of Mexico by Alexander Agassiz, 1877-78. *Bull. Mus. Comp. Zool. Harvard Coll.* 5:239-252.
- Clarke, S. F. 1882. New and interesting hydroids from Chesapeake Bay. *Mem. Boston Soc. Natur. Hist.* 3(4): 135-142.
- Colin, P. L. 1978. *Caribbean reef invertebrates and plants.* Neptune City, New Jersey: T. F. H. Pubs.
- Congdon, E. D. 1907. The hydroids of Bermuda. *Proc. Am. Acad. Arts Sci.* 42:46-485.
- Cornelius, P. F. S. 1995. North-west European thecate hydroids and their medusae. Part 2. Sertulariidae to Campanulariidae. *Synop. Brit. Fauna (n.s.)*, 50:1-386.
- Duchaissaing, P., and H. Michelotti. 1846. Note sur deux polypiers de la famille des coraux, appartenant aux genres *Solanderia* et *Pterogorgia*. *Rev. Zool. Soc. Cuvier.* 9:218-220.
- Ellis, J., and D. Solander. 1786. *The natural history of many curious and uncommon zoophytes, collected from various parts of the globe by the late J. Ellis... Systematically arranged and described by the late Daniel Solander...* London.
- Fewkes, J. W. 1881. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Caribbean Sea, in 1878, 1879, and along the Atlantic coast of the United States, during the summer of 1880, by the U.S. Coast Survey Steamer "Blake," Commander J. R. Bartlett, U.S.N., commanding. XI. Report on the Acalephae. *Bull. Mus. Comp. Zool. Harvard Coll.* 8:127-140.
- Flórez González, L. 1983. Inventario preliminar de la fauna hidroide de la Bahía de Cartagena y áreas adyacentes. *Bol. Mus. Mar, Bogota* 11:112-140.
- Fraser, C. M. 1937. New species of hydroids from the Puerto Rican region. *Smiths. Misc. Coll.* 91(28):1-7.
- Fraser, C. M. 1943. Distribution records of some hydroids in the collection of the Museum of Comparative Zoölogy at Harvard College, with description of new genera and species. *Proc. N. E. Zool. Club* 22:75-98.
- Fraser, C. M. 1944. *Hydroids of the Atlantic coast of North America.* Toronto: Univ. Toronto Press.
- Fraser, C. M. 1947. Hydroids of the Allan Hancock Caribbean Sea Expedition. *Allan Hancock Atlantic Exped.* 4:1-24.
- Gemerdén-Hoogeveen, G. C. H. Van. 1965. Hydroids of the Caribbean: Sertulariidae, Plumulariidae and Aglaopheniidae. *Stud. Fauna Curaçao* 22:1-87.
- Gmelin, J. F. 1791. *Caroli a Linné, systema naturae. Tomus 1, Pars 6.* Lipsiae: G. E. Beer.
- Goldfuss, G. A. 1820. *Handbuch der Zoologie. I. Abtheilung.* Nürnberg: Johann Leonhard Schrag.
- Guzman, H. M., and C. A. Guevara. 1998a. Bocas del Toro, Panama coral reefs. 1. Distribution, structure and conservation state of continental reefs in Laguna de Chiriqui and Bahía Almirante. *Rev. Biol. Trop.* 46:601-623.
- Guzman, H. M., and C. A. Guevara. 1998b. Coral reefs of Bocas del Toro, Panama. 2. Reef distribution, structure and conservation condition in Bastimentos, Solarte, Carenero and Colon islands. *Rev. Biol. Trop.* 46:889-912.
- Guzman, H. M., and C. A. Guevara. 1999. Coral reefs of Bocas del Toro, Panama. III. Distribution, struc-

- ture, diversity, and conservation status of reefs in Pastores, Cristobal, Popa and Cayo Agua islands. *Rev. Biol. Trop.* 47:659-676.
- Guzman, H. M., and C. A. Guevara. 2001. Coral reefs of Bocas del Toro, Panama. IV. Distribution, structure, and conservation status of continental reefs in Valiente Peninsula. *Rev. Biol. Trop.* 49:53-66.
- Hargitt, C. W. 1924. Hydroids of the Philippine Islands. *Philipp. J. Sci.* 24:467-507.
- Hildebrand, S. F. 1939. The Panama Canal as a passageway for fishes, with lists and remarks on the fishes and invertebrates observed. *Zoologica, New York*, 24:15-45.
- Hincks, T. 1861. A catalogue of the zoophytes of south Devon and south Cornwall. *Ann. Mag. Natur. Hist., 3rd ser.*, 8:251-262.
- Hirohito, His Majesty the Showa Emperor. 1974. *Some hydrozoans of the Bonin Islands*. Tokyo: Biological Laboratory, Imperial Household.
- Jäderholm, E. 1903. Aussereuropäische Hydroiden im schwedischen Reichsmuseum. *Ark. Zool.* 1:259-312.
- Jäderholm, E. 1920. On some exotic hydroids in the Swedish Zoological State Museum. *Ark. Zool.* 13(3): 1-11.
- Jones, M. L. (ed.), 1972. *The Panamic biota: some observations prior to a sea-level canal*. Proc. Biol. Soc. Washington 2.
- Jones, M. L., and K. Rützler. 1975. Invertebrates of the upper chamber, Gatún Locks, Panama Canal, with emphasis on *Trochospongilla leidii* (Porifera). *Mar. Biol.* 33:57-66.
- Kaehler, S., and R. G. Hughes. 1992. The distributions and growth patterns of three epiphytic hydroids on the Caribbean seagrass *Thalassia testudinum*. *Bull. Mar. Sci.* 51:329-336.
- Kelmo, F., and R. Vargas. 2002. Anthoathecatae and Leptothecatae hydroids from Costa Rica (Cnidaria: Hydrozoa). *Rev. Biol. Trop.* 50:599-627.
- Kirchenpauer, G. H. 1864. Neue Sertulariden aus verschiedenen Hamburgischen Sammlungen, nebst allgemeinen Bemerkungen über Lamouroux's Gattung *Dynamena*. *Verh. Kaiserlich. Leopoldino-Carol. Dtsch. Akad. Naturforsch.* 31(3):1-16.
- Kirchenpauer, G. H. 1872. Ueber die Hydroidenfamilie Plumularidae, einzelne Gruppen derselben und ihre Fruchthälter. I. *Aglaophenia* Lx. *Abh. Geb. Naturw. Naturwiss. Ver. Hamburg* 5:1-52.
- Lamarck, J. B. P. A. de. 1816. *Histoire naturelle des animaux sans vertèbres*. Tome 2. Paris: Verdrière.
- Lamouroux, J. V. F. 1816. *Histoire des polypiers coralligènes flexibles, vulgairement nommés zoophytes*. Caen: F. Poisson.
- Lamouroux, J. V. F. 1824. Description des polypiers flexibles. In *Voyage autour du monde, entrepris par ordre du Roi, exécuté sur les corvettes de S. M. l'Uranie et la Physicienne, pendant les années 1817, 1818, 1819, et 1820*. Zoologie, ed. J. R. Quoy and J. P. Gaimard, 603-643. Paris: Pillet Aîné.
- Larson, R. J. 1987. The ecology of the western Atlantic athecate hydroid, *Solanderia gracilis*. *Bull. Mar. Sci.* 40:512-515.
- Leloup, E. 1935. Hydraires calyptoblastiques des Indes Occidentales. *Mém. Mus. Roy. Hist. Natur. Belg., 2^{me} sér.*, 2:1-73.
- Leloup, E. 1937. Résultats scientifiques des croisières du navire-école Belge "Mercator." VI. Hydroidea, Siphonophora, Ceriantharia. *Mém. Mus. Roy. Hist. Natur. Belg., 2^{me} sér.*, 9:91-127.
- Leloup, E. 1960. Hydropolypes du Muséum National d'Histoire Naturelle de Paris. *Mém. Mus. Nat. Hist. Natur., n.s., sér. A, Zool.*, 17:217-241.
- Linnaeus, C. 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis, locis*. Editio decima, reformata. Holmiae: Laurentii Salvii.
- Linnaeus, C. 1767. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Tomus I. Pars II. Editio duodecima, reformata. Holmiae: Laurentii Salvii.
- McCrary, J. 1857. Description of *Oceania (Turritopsis) nutricula* nov. spec. and the embryological history of a singular medusan larva, found in the cavity of its bell. *Proc. Elliott Soc. Natur. Hist.* 1:55-90.
- McCrary, J. 1859. Gymnophthalmata of Charleston Harbor. *Proc. Elliott Soc. Natur. Hist.* 1:103-221.
- Mergner, H. 1977. Hydroids as indicator species for ecological parameters in Caribbean and Red Sea coral reefs. *Proc. 3rd Int. Coral Reef Symp., Miami*, 1:119-125.
- Mergner, H. 1987. Hydroids as indicator species of environmental factors on coral reefs. In *Modern trends in the systematics, ecology, and evolution of hydroids and hydromedusae*, ed. J. Bouillon, F. Boero, F. Cicogna, and P. F. S. Cornelius, 185-195. Oxford: Clarendon Press.
- Meyen, F. J. F. 1834. Beiträge zur Zoologie, gesammelt auf einer Reise um die Erde. Fünfte Abhandlung. Über das Leuchten des Meeres und Beschreibung einiger Polypen und anderer niederer Tiere. *Nov. Act. Acad. Caesareae Leopoldin.-Carol. Natur. Curiosorum* 16:125-216.
- Migotto, A., and D. R. Calder. 1998. *Sertularia vervoorti* (Hydrozoa: Sertulariidae), an undescribed species of hydroid from Brazil. *Zool. Verh., Leiden* 323:169-174.
- Millard, N. A. H. 1975. Monograph on the Hydroidea of southern Africa. *Ann. South Afr. Mus.* 68:1-513.
- Millard, N. A. H., and J. Bouillon. 1973. Hydroids from the Seychelles (Coelenterata). *Ann. Mus. Roy. Afr. Cent., sér. In-8°, Sci. Zool.*, 206:1-106.
- Nutting, C. C. 1899. Hydroidea from Alaska and Puget Sound. *Proc. U. S. Nat. Mus.* 21:741-753.
- Nutting, C. C. 1900. American hydroids. Part I. The Plumularidae. *Smiths. Inst., U. S. Nat. Mus. Spec. Bull.* 4(1):1-285.
- Nutting, C. C. 1904. American hydroids. Part II. The Sertulariidae. *Smiths. Inst., U. S. Nat. Mus. Spec. Bull.* 4(2):1-325.
- Nutting, C. C. 1915. American hydroids. Section III. The Campanularidae and Bonneviellidae. *Smiths. Inst., U. S. Nat. Mus. Spec. Bull.* 4(3):1-126.

- Nutting, C. C. 1919. Barbados-Antigua Expedition. Narrative and preliminary report of scientific expedition from the University of Iowa to the Lesser Antilles under the auspices of the Graduate College. *Univ. Iowa Stud. Natur. Hist.* 8(3):1-274.
- Pallas, P. S. 1766. *Elenchus zoophytorum*. Hagae: Franciscum Varrentrapp.
- Petersen, K. W. 1990. Evolution and taxonomy in capitate hydroids and medusae (Cnidaria: Hydrozoa). *Zool. J. Linn. Soc.* 100:101-231.
- Pictet, C. 1893. Étude sur les hydraires de la Baie d'Amboine. *Rev. Suisse Zool. Ann. Mus. Hist. Natur. Genève* 1:1-64.
- Rodriguez, G. 1963. The intertidal estuarine communities of Lake Maracaibo, Venezuela. *Bull. Mar. Sci. Gulf Caribb.* 13:197-218.
- Sánchez, J. A. 2003. Preliminary list of the corals, octocorals, and black corals (Cnidaria) from Bocas del Toro, Panama, southwestern Caribbean. Unpub. manuscript.
- Sars, M. 1850. Beretning om en i Sommeren 1849 foretagen zoologisk Reise i Lofoten og Finmarken. *Nyt Mag. Naturvidensk.* 6:121-211.
- Schuchert, P. 1997. Review of the family Halopterididae (Hydrozoa, Cnidaria). *Zool. Verh., Leiden* 309:1-162.
- Schuchert, P. 2003. Hydroids (Cnidaria, Hydrozoa) of the Danish expedition to the Kei Islands. *Steenstrupia* 27:137-256.
- Splettstösser, W. 1929. Beiträge zur Kenntnis der Sertulariiden. *Thyroscyphus* Allm., *Cnidocyphus* nov. gen., *Parascyphus* Ritchie. *Zool. Jahrb., Abt. Syst. Ökol. Geogr. Tiere* 58:1-134.
- Spracklin, B. W. 1982. Hydrozoa (Cnidaria: Hydrozoa) from Carrie Bow Cay, Belize. In *The Atlantic barrier reef ecosystem at Carrie Bow Cay, Belize, I. Structure and communities*, ed. K. Rützler and I. G. Macintyre, 239-251. Washington: *Smiths. Contrib. Mar. Sci.*
- Stechow, E. 1914. Zur Kenntnis neuer oder seltener Hydroidpolypen, meist Campanulariden, aus Amerika und Norwegen. *Zool. Anz.* 45:120-136.
- Stechow, E. 1919. Zur Kenntnis der Hydroidenfauna des Mittelmeeres, Amerikas und anderer Gebiete, nebst Angaben über einige Kirchenpauer'sche Typen von Plumulariden. *Zool. Jahrb., Abt. Syst. Geogr. Biol. Tiere* 42:1-172.
- Thornely, L. R. 1900. The hydroid zoophytes collected by Dr. Willey in the southern seas. In *Zoological results based on material from New Britain, New Guinea, Loyalty Islands and elsewhere. Part IV*, ed. A. Willey, 451-457. Cambridge: Cambridge Univ. Press.
- Vanhöffen, E. 1910. Die Hydroiden der Deutschen Südpolar-Expedition 1901-1903. *Dtsch. Südpolar-Exped. 1901-1903, Zool.*, 11, 3(4):269-340.
- Versluys, J. 1899. Hydraires calyptoblastes recueillis dans la mer des Antilles pendant l'une des croisières accomplies par le Comte R. de Dalmas sur son yacht CHAZALIE. *Mém. Soc. Zool. France* 12:29-58.
- Vervoort, W. 1962. A redescription of *Solanderia gracilis* Duchassaing and Michelin, 1846, and general notes on the family Solanderiidae (Coelenterata; Hydrozoa). *Bull. Mar. Sci. Gulf Caribb.* 12:508-542.
- Vervoort, W. 1968. Report on a collection of Hydroida from the Caribbean region, including an annotated checklist of Caribbean hydroids. *Zool. Verh., Leiden* 92:1-124.
- Warren, E. 1907. On *Parawrightia robusta* gen. et sp. nov., a hydroid from the Natal coast; and also an account of a supposed schizophyte occurring in the gonophores. *Ann. Natal Gov. Mus.* 1:187-208.
- Watson, J. In press. Hydroids of the Archipelago of the Recherche and Esperance, Western Australia: annotated list, redescription of species and description of new species. *Proc. Int. Mar. Biol. Workshop, 2003, Esperance, Australia.*
- Wedler, E. 1973. Die Hydroiden der Ciénaga Grande de Santa Marta (Kolumbien) und einiges zu ihrer Ökologie. *Mitt. Inst. Colombo-Alemán Inv. Cient., Santa Marta* 7:31-39.
- Wedler, E. 1975. Ökologische Untersuchungen an Hydroiden des Felslitorals von Santa Marta (Kolumbien). *Helgoländ. Wiss. Meeresun.* 27:234-363.
- Wedler, E., and R. Larson. 1986. Atheticate hydroids from Puerto Rico and the Virgin Islands. *Stud. Neotrop. Fauna Env.* 21:69-101.
- Weerdt, W. H. de. 1981. Transplantation experiments with Caribbean *Millepora* species (Hydrozoa, Coelenterata), including some ecological observations on growth forms. *Bijdr. Dierkd.* 51:1-19.
- Wright, T. S. 1859. Observations on British zoophytes. *Edinb. New Phil. J., n.s.*, 10:105-114.