

Atlantic Haleciidae and Campanulariidae (Hydrozoa, Cnidaria) collected during the CANCAP and Mauritania-II expeditions of the National Museum of Natural History, Leiden, The Netherlands

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Key words: Cnidaria; Hydrozoa; Leptolida; Haleciidae; Campanulariidae; north-eastern Atlantic; geographical distribution.

Twenty-one (sub)species of Leptolida (Hydrozoa, Cnidaria) of the families Haleciidae and Campanulariidae are described and figured, originating from collections made during the CANCAP and Mauritania-II expeditions of the Rijksmuseum van Natuurlijke Historie (now Nationaal Natuurhistorisch Museum) to the north-eastern Atlantic in the years 1976-1988, visiting waters around the Azores, Canary Islands, Madeira, Cape Verde Islands and off Morocco and Mauritania. This material largely concerns well known species, the majority of which needs no detailed description. Exceptions are i.a. *Halecium liouvillei* Billard, 1934, *Halecium sibogae marocanum* Billard, 1934, *Clytia arborescens* Pictet, 1893, and *Laomedea pseudodichotoma* Vervoort, 1959. These species are described in more detail as their distributional area is extended. Of all species extensive literature references are given and the geographical distribution is discussed in detail.

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Introduction

The present report is based on collections made in the years 1976-1986 during the CANCAP and Mauritania-II expeditions of the Rijksmuseum van Natuurlijke Historie, now Nationaal Museum van Natuurlijke Historie (National Museum of Natural History), Leiden, The Netherlands, to the Canarian-Cape Verdian region of the eastern North Atlantic and during a subsequent cruise off Mauritania (Mauritania-II expedition, 1988). Documentation concerning the CANCAP cruises is found in Van der Land (1987); the positions of the relevant Mauritania-II stations are given here.

The leptolid material treated here is now preserved in the collections of the National Museum of Natural History; the methods used to study this material are identical to those described by Medel & Vervoort (1998: 4-5).

As most of the species discussed here are widely distributed special attention has been given to references and geographical distribution. To properly evaluate the - sometimes quite extended - geographical distribution we have divided the world oceans in a number of generally recognized geographical areas to which we have rather strictly adhered when discussing the various species. Specific locality records can be lifted from the papers cited using the bibliography in Vervoort (1995), the present list of references and Bedot's "Matériaux".

Species with a more restricted geographical distribution are *Halecium liouvillei* Billard, 1934 (Atlantico-Mediterranean), *Halecium sibogae marocanum* Billard, 1934 (Moroccan coast and Mediterranean), *Clytia arborescens* Pictet, 1893 (first record of this

Indo-Pacific species from Madeira since 1906), and *Laomedea pseudodichotoma* Vervoort, 1959 (Atlantico-Mediterranean).

List of the stations

CANCAP Stations:

- Stn 1.K14, SE coast of Madeira, W of Caniçal, 32°44'N 16°44'W, rocky shore, shore collecting, 29.ii & 2, 3, 5, 6, 7.iii.1976: *Orthoxypris crenata* (Hartlaub, 1901).
- Stn 1.020, Madeira Archipelago, W of Deserta Grande, 32°31'N 16°32'W, 144 m, Van Veen grab, 8.iii.1976: *Laomedea pseudodichotoma* Vervoort, 1959.
- Stn 1.072, E of Madeira, 32°41'N 16°35'W, 80 m, Van Veen grab, 14.iii.1976: *Clytia hemisphaerica* (Linnaeus, 1767); *Obelia geniculata* (Linnaeus, 1758).
- Stn 1.093, S of Madeira, 32°38'N 16°50'W, 98-105 m, triangular dredge, 16.iii.1976: *Halecium beanii* (Johnston, 1838).
- Stn 1.094, S of Madeira, 32°39'N 16°49'W, 125-150 m, triangular dredge, 16.iii.1976: *Clytia arborescens* Pictet, 1893.
- Stn 1.102, S of Madeira, 32°38'N 16°49'W, 300 m, triangular and rectangular dredge, 16.iii.1976: *Campanularia hincksi* Alder, 1856.
- Stn 1.114, S of Madeira, 32°38'N 16°48'W, 280-320 m, rectangular dredge, 17.iii.1976: *Campanularia hincksi* Alder, 1856.
- Stn 1.118, Morocco, off Cape Dra, 28°22'N 11°47'W, 48 m, beam trawl, 23.iii.1976: *Halecium liouvillei* Billard, 1934; *Campanularia hincksi* Alder, 1856; *Obelia dichotoma* (Linnaeus, 1758).
- Stn 1.145, Morocco, off Cap Blanc du Nord, 33°14'N 08°49'W, 100 m, triangular dredge, 28.iii.1976: *Halecium sibogae maroccanum* Billard, 1934; *Obelia dichotoma* (Linnaeus, 1758).
- Stn 2.004, Canary Islands, S of Fuerteventura, Punta de Jandia, 28°03'N 14°29'W, 180-330 m, rectangular dredge, 23.viii.1977: *Halecium sibogae maroccanum* Billard, 1934.
- Stn 2.022, Canary Islands, S of Fuerteventura, Punta de Jandia, 28°03'N 14°30'W, 83-97 m, Van Veen grab, 25.viii.1977: *Laomedea pseudodichotoma* Vervoort, 1959.
- Stn 2.D04, Canary Islands, S coast of Fuerteventura, near Punta del Morro Jable, 28°04'N 14°20'W, 10-15 m, Scuba diving, 30.viii.1977: *Clytia gracilis* (M. Sars, 1850).
- Stn 3.017, Madeira Archipelago, S of Porto Santo, 33°02'N 16°21'W, 50-110 m, triangular dredge, 15.x.1978: *Halecium beanii* (Johnston, 1838).
- Stn 3.134, off Mauritania, 18°59'N 16°36'W, 74 m, Agassiz trawl, 29.x.1978: *Obelia bidentata* Clarke, 1875.
- Stn 3.162, off Mauritania, 19°25'N 16°50'W, 80 m, Agassiz trawl, 31.x.1978: *Halecium delicatulum* Coughtrey, 1876.
- Stn 3.D05, SE coast of Madeira, Caniçal, 32°44'N 16°44'W, 20 m, Scuba diving, 19 & 20.x.1978: *Clytia arborescens* Pictet, 1893.
- Stn AZO.024A, Azores, Terceira, E coast, Praia da Vitória, S part of northern beach, 38°43'N 27°04'W, shore collecting, 02.x.1979: *Clytia* spec.
- Stn AZO.037A, Azores, Flores, SE coast, Porto das Lajes, 39°23'N 31°10'W, 0-1 m, shore collecting and snorkeling, 19, 20, 23 & 25.x.1979: *Obelia dichotoma* (Linnaeus, 1758).
- Stn AZO.038, Azores, Flores, W coast, Porto da Fajã Grande, 39°28'N 31°15'W, shore collecting, 21, 22.x.1979: *Obelia dichotoma* (Linnaeus, 1758); *Orthopyxis integra* (Macgillivray, 1842).
- Stn 4.003, Canary Islands, S of Lanzarote, 28°50'N 13°48'W, 21-24 m, triangular dredge, 14.5.1980: *Clytia hemisphaerica* (Linnaeus, 1767).
- Stn 4.004, Canary Islands, S of Lanzarote, 28°50'N 13°48'W, 26-37 m, triangular dredge, 14.v.1980: *Halecium nanum* Alder, 1859; *Clytia hemisphaerica* (Linnaeus, 1767); *Obelia dichotoma* (Linnaeus, 1758); *Campanularia/Orthopyxis* spec.
- Stn 4.007, Canary Islands, S of Lanzarote, 28°50'N 13°50'W, 25-36 m, triangular dredge, 14.v.1980: *Clytia hemisphaerica* (Linnaeus, 1758).
- Stn 4.012, Canary Islands, S of Lanzarote, 28°51'N 13°51'W, 34-46 m, triangular dredge, 14.v.1980: *Halecium halecinum* (Linnaeus, 1758).

- Stn 4.015, Canary Islands, S of Lanzarote, 28°51'N 13°52'W, 35-70 m, triangular dredge, 14.v.1980: *Halecium beanii* (Johnston, 1838); *Clytia hemisphaerica* (Linnaeus, 1758); *Laomedea pseudodichotoma* Vervoort, 1959; *Obelia dichotoma* (Linnaeus, 1758).
- Stn 4.017, Canary Islands, S of Lanzarote, 28°49'N 13°49'W, 36 m, triangular dredge, 15.v.1980: *Halecium halecinum* (Linnaeus, 1758).
- Stn 4.021, Canary Islands, S of Lanzarote, 28°50'N 13°48'W, 24-34 m, Van Veen grab, 15.v.1980: *Halecium halecinum* (Linnaeus, 1758).
- Stn 4.023, Canary Islands, S of Lanzarote, 28°49'N 13°49'W, 38-40 m, triangular dredge, 15.v.1980: *Halecium halecinum* (Linnaeus, 1758).
- Stn 4.039, S of Lanzarote, 28°48'N 13°47'W, 70-50 m, rectangular dredge, 16.v.1980: *Obelia bidentata* (Clark, 1875).
- Stn 4.042, Canary Islands, S of Lanzarote, 28°48'N 13°47'W, 100-50 m, rectangular dredge, 16.v.1980: *Laomedea calceolifera* (Hincks, 1871).
- Stn 4.074, Canary Islands, SE of Lanzarote, 28°55'N 13°33'W, 85-110 m, Agassiz trawl, 20.v.1980: *Clytia* spec.
- Stn 4.143, Canary Islands, SW of Palma, 28°38'N 17°58'W, 110-86 m, rectangular dredge, 02.vi.1980: *Laomedea pseudodichotoma* Vervoort, 1959.
- Stn 4.148, Canary Islands, SW of Palma, 28°39'N 17°58'W, 60-80 m, rectangular dredge, 03.vi.1980: *Halecium halecinum* (Linnaeus, 1758); *Clytia paulensis* (Vanhöffen, 1910); *Laomedea pseudodichotoma* Vervoort, 1959.
- Stn 4.150, Canary Islands, SW of Palma, 28°39'N 17°58'W, 90-50 m, Agassiz trawl, 03.vi.1980: *Halecium halecinum* (Linnaeus, 1758).
- Stn 4.151, Canary Islands, SW of Palma, 28°39'N 17°58'W, 150-50 m, Agassiz trawl, 03.vi.1980: *Halecium beanii* (Johnston, 1838).
- Stn 4.152, Canary Islands, SW of Palma, 28°38'N 17°59'W, 200 m, Agassiz trawl, 03.vi.1980: *Halecium beanii* (Johnston, 1838); *Halecium halecinum* (Linnaeus, 1758).
- Stn 4.153, Canary Islands, SW of Palma, 28°38'N 17°59'W, 200 m, Agassiz trawl, 03.vi.1980: *Clytia gracilis* (M. Sars, 1850).
- Stn 4.173: Madeira Archipelago, Porto Santo, 33°01'N 16°22'W, 25-40 m, triangular dredge, 09.vi.1980: *Clytia paulensis* (Vanhöffen, 1910).
- Stn 4.174, Madeira Archipelago, Porto Santo, 33°02'N 16°22'W, 25-50 m, Agassiz trawl, 09.vi.1980: *Clytia paulensis* (Vanhöffen, 1910).
- Stn 4.176, Madeira Archipelago, Porto Santo, 33°02'N 16°21'W, 75 m, triangular dredge, 09.vi.1980: *Obelia dichotoma* (Linnaeus, 1758).
- Stn 5.002, Azores, NE of São Miguel, 38°10'N 24°52'W, 0-1 m, dip net, 23.v.1981: *Clytia hemisphaerica* (Linnaeus, 1767); *Obelia dichotoma* (Linnaeus, 1758).
- Stn 5.008, Azores, S of São Miguel, 37°42'N 25°30'W, 75 m, Van Veen grab, 26.v.1981: *Halecium halecinum* (Linnaeus, 1758); *Obelia bidentata* (Clark, 1875).
- Stn 5.010, Azores, S of São Miguel, 37°41'N 25°31'W, 150 m, Van Veen grab, 26.v.1981: *Halecium delicatulum* Coughtrey, 1876; *Halecium sibogae marocanum* Billard, 1934.
- Stn 5.044, Azores, S of Santa Marta, 36°55'N 25°08'W, 60-150 m, rectangular dredge, 29.v.1981: *Halecium delicatulum* Coughtrey, 1876; *Campanularia hincksii* Alder, 1856; *Laomedea calceolifera* (Hincks, 1871).
- Stn 5.056, Azores, S of São Miguel, 37°41'N 25°26'W, 180 m, Van Veen grab, 31.v.1981: *Obelia bidentata* (Clark, 1875).
- Stn 5.085, Azores, E of Faial, 38°31'N 28°35'W, 150-170 m, Agassiz trawl, 01.vi.1981: *Halecium* spec.; *Laomedea calceolifera* (Hinck, 1871).
- Stn 5.088, Azores, E of Faial, 38°31'N 28°36'W, 50-60 m, rectangular dredge, 01.vi.1981: *Halecium halecinum* (Linnaeus, 1758); *Clytia hemisphaerica* (Linnaeus, 1767).
- Stn 5.112, Azores, W of Pico, 38°32'N 28°34'W, 85 m, Van Veen grab, 03.vi.1981: *Halecium delicatulum* Coughtrey, 1876; *Halecium halecinum* (Linnaeus, 1758); *Halecium tenellum* Hincks, 1861.
- Stn 5.141, Azores, W of Pico, 38°35'N 28°33'W, 82-87 m, Agassiz trawl, 07.vi.1981: *Halecium halecinum* (Linnaeus, 1758).

- Stn 5.142, Azores, W of Pico, 38°35'N 28°33'W, 108-118 m, rectangular dredge, 07.vi.1981: *Halecium halecinum* (Linnaeus, 1758).
- Stn 5.153, Azores, E of Flores, 39°26'N 31°06'W, 150-168 m, rectangular dredge, 09.vi.1981: *Halecium halecinum* (Linnaeus, 1758).
- Stn 5.166, Azores, NE of Flores, 39°30'N 31°06'W, 150 m, rectangular dredge, 10.vi.1981: *Halecium halecinum* (Linnaeus, 1758).
- Stn 5.D02, Azores, Ilhéus Formigas, 37°16'N 24°47'W, 0-15 m, Scuba diving, 27.v.1981: *Hydrodendron mirabile* (Hincks, 1866).
- Stn 6.042, Cape Verde Islands, W of Fogo, 14°55'N 24°31'W, 100-150 m, rectangular dredge, 09.vi.1982: *Obelia bidentata* (Clark, 1875).
- Stn 6.060, Cape Verde Islands, SE of Boa Vista, 15°57'N 22°45'W, 50-55 m, Agassiz trawl, 12.06.1982: *Obelia bidentata* (Clark, 1875).
- Stn 6.069, Cape Verde Islands, SW of Boa Vista, 15°53'N 23°00'W, 76-90 m, Agassiz trawl, 13.vi.1982: *Halecium sibogae maroccanum* Billard, 1934; *Obelia bidentata* (Clark, 1875).
- Stn 6.072, Cape Verde Islands, SW of Boa Vista, 15°43'N 23°06'W, 110 m, rectangular dredge, 13.vi.1982: *Obelia bidentata* (Clark, 1875).
- Stn 6.076, Cape Verde Islands, SW of Boa Vista, 15°55'N 23°05'W, 92 m, Agassiz trawl, 13.vi.1982: *Campanularia hincksii* Alder, 1856; *Clytia paulensis* (Vanhöffen, 1910); *Obelia bidentata* (Clark, 1875).
- Stn 6.078, Cape Verde Islands, SW of Boa Vista, 15°55'N 23°06'W, 185-190 m, Agassiz trawl, 13.vi.1982: *Laomedea calceolifera* (Hincks, 1871).
- Stn 6.108, Cape Verde Islands, SW of Santa Luzia, 16°44'N 24°46'W, 55-65 m, rectangular dredge, 16.vi.1982: *Obelia dichotoma* (Linnaeus, 1758).
- Stn 6.114, Cape Verde Islands, SW of Santo Antão, 16°58'N 25°20'W, 200 m, Van Veen grab, 17.vi.1982: *Halecium delicatulum* Coughtrey, 1876.
- Stn 6.115, Cape Verde Islands, SW of Santo Antão, 16°58'N 25°20'W, 161-222 m, rectangular dredge, 17.vi.1982: *Halecium tenellum* Hincks, 1861.
- Stn 6.137, Cape Verde Islands, S of São Vicente, 16°46'N 25°03'W, 75-90 m, Agassiz trawl, 19.vi.1982: *Campanularia hincksii* Alder, 1856; *Obelia bidentata* (Clark, 1875).
- Stn 6.146, Cape Verde Islands, SW of São Vicente, 16°48'N 25°06'W, 75 m, Agassiz trawl, 20.vi.1982: *Obelia bidentata* (Clark, 1875).
- Stn 6.148, Cape Verde Islands, SW of São Vicente, 16°47'N 25°06'W, 100-200 m, Agassiz trawl, 20.vi.1982: *Obelia bidentata* (Clark, 1875).
- Stn 6.174, Cape Verde Islands, NW of São Vicente, 16°55'N 25°02'W, 75 m, Agassiz trawl, 22.vi.1982: *Clytia* spec.
- Stn 6.D06, Cape Verde Islands, SW coast of São Nicolau, Baía do Tarrafal, 16°35'N 24°22'W, 0-15 m, Scuba diving, 10.vi.1982: *Halecium delicatulum* Coughtrey, 1876.
- Stn 6.D10, Cape Verde Islands, S coast of São Vicente, 16°48'N 25°01'W, 0-15 m, Scuba diving, 19.vi.1982: *Obelia dichotoma* (Linnaeus, 1758).
- Stn 6.V04, Cape Verde Islands, S coast of São Vicente, 16°47'N 25°04'W, 63 m, fish-trap, 19/20.vi.1982: *Clytia linearis* (Thornely, 1889).
- Stn 7.044, Cape Verde Islands, SW of Maio, Ponta Inglez/Ponta Preta, 15°07'N 23°14'W, 45 m, rectangular dredge, 25.viii.1986: *Clytia* spec.
- Stn 7.058, Cape Verde Islands, SW of Maio, Ponta Inglez/Ponta Preta, 15°07'N 23°14'W, 69 m, rectangular dredge, 26.viii.1986: *Obelia bidentata* (Clark, 1875).
- Stn 7.059, Cape Verde Islands, SW of Maio, Ponta Inglez/Ponta Preta, 15°07'N 23°14'W, 61 m, rectangular dredge, 26.viii.1986: *Halecium* spec.; *Campanularia hincksii* Alder, 1856.
- Stn 7.115, Cape Verde Islands, S of Razo, 16°36'N 24°36'W, 80 m, Van Veen grab, 01.ix.1986: *Obelia bidentata* (Clark, 1875).
- Stn 7.140, Cape Verde Islands, S of Razo, 16°35'N 24°36'W, 1200 m, rectangular dredge, 04.ix.1986: *Halecium tenellum* Hincks, 1861.
- Stn 7.151, Cape Verde Islands, S of Branco, 16°38'N-24°41'W, 159 m, Agassiz trawl, 05.ix.1986: *Campanularia hincksii* Alder, 1856

MAURITANIA-II Expedition:

Stn MAU.009, Mauritania, Passe du Lévrier, E of Cap Blanc, 20°48'N 17°02'W, 17 m, Agassiz trawl, 07.vi.1988: *Campanularia hincksii* Alder, 1856; *Clytia gracilis* (M. Sars, 1850).

Stn MAU.039, off Mauritania, 18°48'N 16°43'W, 260-280 m, Agassiz trawl, 10.vi.1988: *Halecium halecinum* (Linnaeus, 1758).

Stn MAU.041, off Mauritania, 18°51'N 16°56'W, 800-840 m, Agassiz trawl, 10.vi.1988: *Halecium halecinum* (Linnaeus, 1758).

Stn MAU.072, Mauritania, off Banc d'Arguin, 20°00'N 17°24'W, 48-52 m, Agassiz trawl, 13.vi.1988: *Obelia dichotoma* (Linnaeus, 1758).

Taxonomic review

Family **HALECIIDAE** Hincks, 1868Genus *Halecium* Oken, 1815*Halecium beanii* (Johnston, 1838)
(fig. 1)

Thoa Beanii Johnston, 1838: 120-121, pl. 7 figs 1-2.

Halecium Beani(i); Verrill, 1879: 17; Holm, 1889: 171; Wood, 1901: 17, 21; Shidlovskii, 1902: 230; Rioja y Martín, 1906: 278; Bedot, 1911: 212; Linko, 1911: 64-68; Motz-Kossowska, 1911: 346; Ritchie, 1911: 29, 30; Babic, 1912: 460; Billard, 1912a: 460; Crawshaw, 1912: 326; Fraser, 1912c: 366, fig. 27; Massy, 1912: 216; Ritchie, 1912: 219, 220; Fraser, 1913b: 168; Grieg, 1913: 146; Kramp, 1913b: 3; Robson, 1913b: 78, 80; Stechow, 1913b: 144; 1913c: 9, 85; Sumner et al., 1913: 572; Robson, 1914a: 99; Deryugin, 1915: 306; Broch, 1918a: 38-39, fig. 13; Fraser, 1918b: 332, 352; Jäderholm, 1919b: 4; Stechow, 1919a: 33; Renouf, 1920: 115; Fraser, 1921: 164, fig. 60; 1922a: 5; Horsman, 1922: 263; Stechow, 1923b: 5; Stechow & Müller, 1923: 460, pl. 27 fig. 1; Teissier, 1923a: 355; Prenant & Teissier, 1924: 25; Billard, 1927c: 329; Fraser, 1927: 326; Stechow, 1927: 308; Broch, 1928a: 60, fig. 49B; 1928b: 114-115; Billard, 1931b: 247; Fraser, 1931: 479, 481; M.B.A., 1931: 70; Nobre, 1931: 14; Leloup, 1933c: 4, 19; 1934c: 6; Kramp, 1935b: 151, figs 61C, 63B; Philbert, 1935d: 25; 1935e: 22; Perrier, 1936: 21; Fraser, 1937b: 102, pl. 20 fig. 108; Moore, 1937: 41; Fraser, 1938b: 9, 41; 1938c: 110; 1938d: 133; Kramp, 1938d: 31, 63, 68, 72; Fraser, 1939c: 159 et seq.; Jones, 1939: 19; Da Cunha, 1940: 107, 111; Leloup, 1940b: 6; Bassindale, 1941: 148; Kramp, 1942b: 15; Vervoort, 1942: 282; Kramp, 1943b: 44; Da Cunha, 1944: 6, 22, fig. 5; Fraser, 1944a: 186-187, pl. 33 fig. 160; De Oreo, 1946: 646; Vervoort, 1946a: 296; 1946b: 161, figs 29b, 65-66; Leloup, 1947: 27, fig. 18; Berezina, 1948: 54, pl. 15 fig. 5; Fraser, 1948: 221; Da Cunha, 1950: 124; Teissier, 1950b: 13; Leloup, 1952a: 141-142, fig. 75; Picard, 1952a: 349; Rees, 1952: 7; Chu & Cutress, 1954: 9; Williams, 1954: 48; Knight-Jones & Jones, 1956: 29; Spaul, 1956: 17; Buchanan, 1957: 357; Hamond, 1957: 295, 301; M. B. A., 1957: 46; Millard, 1957: 188; 1958: 168; Picard, 1958b: 192; Ralph, 1958: 332, fig. 10a, b, e-k; Bousfield & Leim, 1959: 14; Vervoort, 1959: 224, fig. 6; Yamada, 1959: 32; Leloup, 1960: 230; Naumov, 1960: 447-449, figs 19, 336; Cabioch, 1961: 19; Ralph, 1961d: 236; Bruce et al., 1963: 53; Hamond, 1963b: 26; Filatova & Barsanova, 1964: 18; Redier, 1964b: 128; Cabioch, 1965b: 56; Plante, 1965: 259, 307; Rees & Thursfield, 1965: 105; Teissier, 1965: 20; Crothers, 1966: 12; Millard, 1966a: 464, fig. 9A-F; 1966b: 489; Monniot, 1966: 826 et seq.; Rees & White, 1966a: 275; Vervoort, 1966a: 103, fig. 3; Blanco, 1968b: 201, pl. 1 figs 11-13; Cabioch, 1968: 565, 589; Millard, 1968: 253, 256; Zatssepín & Rittikh, 1968: 63; Berrisford, 1969: 394; Rees & Rowe, 1969: 12; Robins, 1969: 332; Day, Field & Penrith, 1970: 12; Fey, 1970: 396; Hissock, 1970: 30; Patriti, 1970: 22, fig. 18; Jägerskiöld, 1971: 62; Rossi, 1971: 24, fig. 8D-F; Christiansen, 1972: 298; Houvenaghel-Crèveceur, 1972: 2815; Von Salvini-Plawen, 1972: 393; Vervoort, 1972a: 30, figs 6-7; Morton & Miller, 1973: 152; Day, 1974: 85; Laverack & Blacker, 1974: 22; Leloup, 1974: 10, fig. 7; Saldanha, 1974: 325; Cooke, 1975: 91, pl. 2 fig. 1; Cornelius, 1975b: 390, fig. 5; Hughes, 1975: 291 et seq.; Millard, 1975: 144, fig. 47A-E; Olafsson, 1975: 9, 14, 16;

Watson, 1975: 161, figs 5-6; Blanco, 1976: 30, pl. 1 figs 4-7; Cooke, 1977: 87, fig. 15; Mergner & Wedler, 1977: 12, pl. 1 fig. 7; Evans, 1978: 75; Millard, 1978: 193 et seq.; Bromley, 1979: 520; Millard, 1979b: 130; Stepan'yants, 1979: 108, pl. 16 fig. 6; 1980b: 116; Marinopoulos, 1981: 176; Castric & Michell, 1982: 84, fig.; Gili i Sardà, 1982: 49, fig. 15; Flóres González, 1983b: 119, photographs 14-15; Gili & Romero, 1983: 36 et seq.; Bouillon, 1984b: 105; Russell, 1984: 105; Austin, 1985: 55; Boero, 1985a: 136; Isasi Urdangarín, 1985: 46, fig. 3A-C; Stepan'yants, 1985a: 137; 1985b: 87; Boero & Fresi, 1986: 142; Gili, 1986: 136-137, figs 4.11A, 4.57h; Isasi & Sáiz, 1986: 69; Llobet i Nadal, 1987: 68-71, fig. 12; Aguirrezabalaga et al., 1988: 222, fig. 5; Cornelius, 1988b: 76; Llobet, Gili & Barangé, 1988: 36; Ramil Blanco & Iglesias Díaz, 1988a: 71-72, fig. 1; Gili, Murillo & Ros, 1989: 23; Gili, Vervoort & Pagès, 1989: 77-78, fig. 7A; Stepan'yants, 1989b: 416 et seq.; Altuna & García-Carrascosa, 1990: 54 et seq., fig.; Cornelius & Ryland, 1990: 137, fig. 4.14; Park, 1990: 76, fig. 3a-c; Cairns et al., 1991: 22; El Beshbeeshy, 1991: 29-32, fig. 3; Genzano, Cuartas & Excoffon, 1991: 71, fig. 5J; Llobet, Gili & Hughes, 1991: 153 et seq.; Park, 1991: 544; Calder, 1992a: 1080; Cornelius, 1992a: 255; Dawson, 1992: 14; Genzano & Zamponi, 1992: 37-39, fig. 16; Jensen & Frederiksen, 1992: 64; Boero & Bouillon, 1993a: 263; Park, 1993: 286; Altuna Prados, 1994a: 167-168; Blanco, 1994a: 156; 1994b: 186; Watson, 1994a: 66; Altuna-Prados, 1995a: 54; Álvarez-Claudio & Anadón, 1995: 239; Bouillon, Massin & Kresevic, 1995: 45; Cornelius, 1995a: 276-278, fig. 62; Hirohito, 1995: 17-18, fig. 3d-f, pl. 1 fig. A; Klitgaard, 1995: 17 et seq.; Park, 1995: 10; Genzano, 1996a: 290 et seq.; Medel & López-González, 1996: 199; Russell & Nagabhushanam, 1996: 93; Stepan'yants, Svoboda & Vervoort, 1996: 7; Watson, 1996: 78; Cornelius, 1998: 85.

Halecium cf. *beani*; Billard, 1933: 20; Dolfuss, 1933: 129; Stephenson, Stephenson & Du Toit, 1937: 374; Schmidt, 1972b: 42; Rees & Vervoort, 1987: 23-25, fig. 4a-b.

Material.— **Madeira area:** Stn 1.093: one detached, polysiphonic hydrocaulus, 70 mm high, with a few hydrocladia and without gonothecae; condition bad (RMNH-Coel. 27942); Stn 3.017: several colonies up to 40 mm high, stems polysiphonic, pinnate but branches dispersed. Immature, presumably female gonothecae present (fig. 1c; RMNH-Coel. 28807, slide 2487).— **Canary Islands and Selvagens Archipelago:** Stn 4.015: two polysiphonic stems, growing on a mollusc shell, without gonothecae, condition bad (RMNH-Coel. 27948); Stn 4.151: several hydrocauli up to 130 mm high, with mature female gonothecae (RMNH-Coel. 28811, slide 2498); Stn 4.152: numerous colonies up to 150 mm high, polysiphonic and branched. In addition 5 stems, up to 6 mm high, with female gonothecae of which some not fully developed (RMNH-Coel. 27941, slide 2500).

Description (material from Stn 4.151).— Colonies well developed, composed of a hydrorhiza with numerous tubes from which arise erect hydrocauli, polysiphonic over most of their length, and pinnately branched, branches all in the same plane. Hydrocladia partly flexuous, some of them larger and slightly branched, a first athecate internode usually present. Nodes of stem and branches transverse or slightly oblique. Hydrotheca placed at upper part of internode, directed laterally and alternately to right and left (fig. 1b). Hydrothecae shallow, sessile, walls straight, diverging, rim not everted. Hydrothecal renovation frequent (fig. 1d), all with hydrophores of similar length, smooth and short. Hydrocladia arising from hydrocauli originate from base of hydrothecae and are directed laterally, the hydrotheca becoming axillary (fig. 1a); branching of hydrocladia may arise from the back, the side, or the front of the hydrothecae.

Female gonothecae kidney-shaped, with two tubiform hydrothecae in middle of concave side (fig. 1e), observed in the months of June and October. Male gonothecae not found.

Remarks.— We observed similarities of this species with *H. sessile* Norman, 1867, from which species some authors (Altuna, 1994; Millard, 1975) describe hydrophores from hydrothecal renovations. Cornelius (1995) observed that the colonies of the two

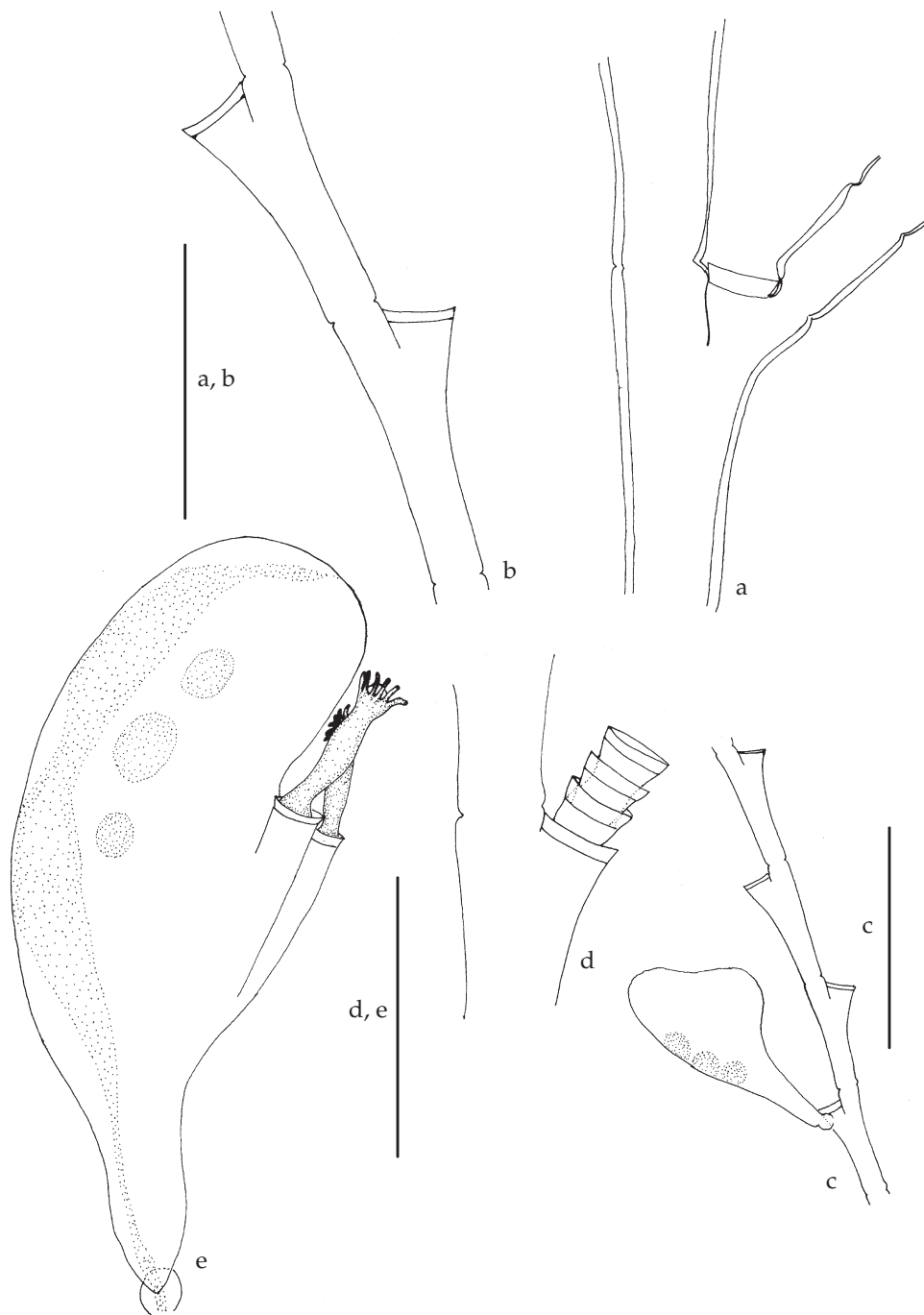


Fig. 1. *Halecium beanii* (Johnston, 1838), a-c, Stn 3.017, slide 2487; d-e, Stn 4.151, slide 2498; a, axillary hydrotheca; b, part of hydrocladium; c, hydrocladium with immature (female?) gonotheca; d, repeatedly renovated hydrotheca; e, mature female gonotheca. Scales: a-b, d-e, 0.5 mm; c, 1 mm.

species are different in appearance and in size, those of *H. sessile* being smaller, and we have followed his criteria.

The species has been found epizootic on *Nemertesia antennina* (L., 1758).

Distribution.— **Arctic Seas:** general (Fraser, 1922a; Stepan'yants, 1989b), Russia (Linko, 1911; Berezina, 1948; Naumov, 1960), Barents Sea (Deryugin, 1915; Filatova & Barsanova, 1964; Zatsepin & Rittikh, 1968), Greenland (Holm, 1899; Kramp, 1913b, 1943b), Spitzbergen (Bouillon, Massin & Kresevic, 1995).— **Eastern Atlantic:** general (Broch, 1918a; Jäderholm, 1919b), White Sea (Shidlovskii, 1902; Stepan'yants, 1985a), Iceland (Kramp, 1938d; Olafsson, 1975), Faroer (Kramp, 1942b; Klitgaard, 1995), Norway (Grieg, 1913; Christiansen, 1972), Swedish west coast (Rees & Rowe, 1969; Jägerskiöld, 1971), Denmark (Kramp, 1935b), North Sea (Ritchie, 1912; Broch, 1928a, b), Baltic (Stechow, 1927), Netherlands (Leloup, 1933c; Vervoort, 1946b), Belgium (Leloup, 1947, 1952a), Great Britain (Johnston, 1838; Ritchie, 1911; Robson, 1914a; M.B.A., 1931, 1957; Knight-Jones & Jones, 1956; Spaul, 1956; Hamond, 1957, 1963b; Crothers, 1966; Robins, 1969; Hiscock, 1970; Laverack & Blacker, 1974; Cornelius, 1975b, 1995a; Cornelius & Ryland, 1990), Irish Sea & Bristol Channel (Wood, 1901; Massy, 1912; Robson, 1913b; Renoef, 1920; Horsman, 1922; Moore, 1932; Jones, 1939; Bassindale, 1941; Williams, 1954; Bruce et al., 1963; Evans, 1978), Channel coasts, Channel Islands and Roscoff (Bedot, 1911; Billard, 1912a; Crawshey, 1912; Prenant & Teissier, 1924; Philbert, 1935d, e; Teissier, 1950b, 1965; Cabioch, 1961, 1965b, 1968; Castric & Michell, 1982), France, general (Billard, 1927c; Perrier, 1936), Bay of Biscay (Fey, 1970), north and north-west coast of Spain (Rioja y Martín, 1906; Isasi Urdangarín, 1985; Isasi, 1986; Aguirrezabalaga et al., 1988; Ramil Blanco & Iglesias Díaz, 1988a; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a; Álvarez Claudio & Anadón, 1995; Medel & López-González, 1996), Portugal (Nobre, 1931; Da Cunha, 1940, 1944, 1950; Saldanha, 1974).— **Mediterranean:** general (Picard, 1958b; Marinopoulos, 1981; Boero & Bouillon, 1993a), Spanish Mediterranean coasts (Gili i Sardà, 1982; Gili & Romero, 1983; Gili, 1986; Llobet i Nadal, 1987; Llobet, Gili & Barangé, 1988; Gili, Murillo & Ros, 1989; Llobet, Gili & Hughes, 1991; Medel & López-González, 1996), French Mediterranean coast (Motz-Kossowska, 1911; Leloup, 1934a; Picard, 1952a; Monniot, 1966), Italy (Rossi, 1971; Boero, 1985a; Boero & Fresi, 1986).— **Temperate and subtropical eastern Atlantic:** general (Billard, 1931b, Leloup, 1940b), Azores (Rees & White, 1966a), Morocco (Patrity, 1970), Cape Verde Islands (Rees & Thursfield, 1965), Gold Coast (Buchanan, 1957), Gulf of Guinea (Vervoort, 1959; Gili, Vervoort & Pagès, 1989), south and south-west coasts of Africa, including Cape (Millard, 1957, 1966a, 1968, 1975; Day, Field & Penrith, 1970), Vema seamount (Millard, 1966b; Berrisford, 1969).— **Western Atlantic:** Hudson Bay (Fraser, 1931), Canada and U.S.A. (Verrill, 1879; Fraser, 1912c, 1913b, 1918b, 1921, 1944a; Sumner et al., 1913; Calder, 1992a), Colombia (Flórez González, 1983b), Argentine waters (Blanco, 1968b, 1976; El Beshbeeshy, 1991; Genzano, Cuatras & Excoffon, 1991; Genzano & Zamponi, 1992; Blanco, 1994a, 1994b; Genzano, 1996a).— **Pacific:** general (Fraser, 1938b, c, d, 1939c, 1948), Enewetok (Cooke, 1975), Hawaii (Cooke, 1977).— **Eastern Pacific:** Canada and U.S.A. (Fraser, 1937b; Austin, 1985), Chili (Leloup, 1974).— **Western Pacific:** Japanese waters (Stechow, 1913b, c; Yamada, 1959; Hirohito, 1995), Korea (Park, 1990, 1991, 1993, 1995), Australia and Tasmania (Watson, 1975; 1994a, 1996), New Zealand and Chatham Islands (Ralph, 1958; Morton & Miller, 1973; Dawson, 1992).— **Indian**

Ocean: general (Russell & Nagabhushanam, 1996), Red Sea (Mergner & Wedler, 1977), Gulf of Suez (Billard, 1933 ; Dollfus, 1933); Seychelles (Bouillon, Massin & Kresevic, 1995), Madagascar (Plante, 1965), Moçambique (Day, 1974), Indian Ocean coast of South Africa (Millard, 1958, 1975, 1979b), Indonesia , Aru Islands (Stechow & Müller, 1923).

Summarising: a cosmopolitan species recorded from all oceans, penetrating well into the Arctic Ocean (Naumov, 1960) and the subantarctic, but not into the Antarctic. In the Atlantic it occurs as far south as the coasts of Patagonia (Stepan'yants, 1979; El Beshbeeshy, 1991; Genzano & Zamponi, 1997); it is commonly distributed along the European coasts (Vervoort, 1946; Teissier, 1965; Cornelius, 1995a; Medel & López-González, 1996) and in the Mediterranean (Boero & Bouillon, 1993).

In the CANCAP area it has previously been recorded from off Morocco (Patriiti, 1970), the Azores (Rees & White, 1966) and the Cape Verde Islands (Rees & Thursfield, 1965); it was also described from Guinea Bissau (Vervoort, 1959; Gili et al., 1989). The present records are from south of Madeira, south of Porto Santo, and south of Lanzarote and south-west of Palma, Canary Islands. Depth records of the present material are between 35 and 180 m.

Halecium delicatulum Coughtrey, 1876

Halecium delicatulum Coughtrey, 1876a: 26, pl. 3 figs 4, 5; 1876b: 299; Ridley, 1881: 103; Stechow, 1913b: 144; 1913c: 9, 79; 1923b: 5; Bale, 1924: 235; Ralph, 1958: 334, figs 11e, h-n, 12 a-p; Pennycuik, 1959: 173; Yamada, 1959: 31; Leloup, 1960: 218, fig. 1; Naumov & Stepan'yants, 1962: 94, figs 16-17; Rees & Thursfield, 1965: 106; Millard, 1966a: 464, fig. 10L; Ralph, 1966: 158; Blanco, 1968b: 203, pl. 1 figs 14-18, pl. 2 figs 1-3; Millard, 1968: 253, 256; Day, Field & Penrith, 1970: 12; Patriiti, 1970: 23, fig. 21; Blanco & Bellusci de Miralles, 1972b: 7, figs 3-5; Naumov & Stepan'yants, 1972: 34, 52; Stepan'yants, 1972a: 72; Vervoort, 1972a: 27, figs 4-5; 1972b: 341, fig. 2a; Morton & Miller, 1973: 152, fig. 54 no. 10; Watson, 1973: 166; Leloup, 1974: 10; Millard, 1975: 145, fig. 47F-L; Watson, 1975: 159; Gordon & Ballantine, 1977: 100; Millard, 1977a: 7, fig. 1C-D; 1978: 193 et seq.; Stepan'yants, 1979: 105, pl. 20 fig. 4A-V; Watson, 1979: 234; García-Carrascosa, 1981: 130-134, pl. 4 figs a-f; Hirohito, 1983: 5, 11; Rho & Park, 1983: 41-42, pl. 2 figs 1-3; Aguirrezabalaga et al., 1984: 90; Altuna et al., 1984: 129-130, fig. 2a-c; Blanco, 1984c: 262, figs 1-6; 1984d: 271, figs 3-5; García-Carrascosa et al., 1987: 367; Rees & Vervoort, 1987: 25-28, fig. 5; Roca, 1987: 209; Staples & Watson, 1987: 218; Aguirrezabalaga et al., 1988: 222; Ramil Blanco & Iglesias Díaz, 1988a: 72-73, fig. 2; Gili, Vervoort & Pagès, 1989: 78, fig. 7B; Altuna & García-Carrascosa, 1990: 54 et seq., fig.; Genzano, 1990: 38-40, figs 2-5; El Beshbeeshy, 1991: 32-37, figs 4a, 4b; Park, 1991: 544; Peña Cantero, 1991: 44-47, pl. 1; Roca, Moreno & Barceló, 1991: 70; Dawson, 1992: 14; Genzano & Zamponi, 1992: 40-42, fig. 17; Ramil & Vervoort, 1992a: 82-85, fig. 20a-c; Branch & Williams, 1993: 11, fig.; Park, 1993: 286; Altuna Prados, 1994a: 168-175, pl. 26 figs A-C, pl. 27 figs A-D; 1994c: 54; Blanco, 1994a: 156; 1994b: 186; Genzano, 1994: 5; Watson, 1994a: 66; Bouillon, Massin & Kresevic, 1995: 45; Hirohito, 1995: 20-22, fig. 5a-c, pl. 1 fig. C; Park, 1995: 10; Peña Cantero, 1995: 199-205, pl. 20 figs d-e; Genzano, 1996a: 290 et seq.; Medel & López-González, 1996: 199; Migotto, 1996: 30-31, 122, fig. 6d-e; Peña Cantero & García-Carrascosa, 1996: 9-12, fig. 1A-D; Watson, 1996: 78; Medel, García & Vervoort, 1998: 31-33, fig. 1.

Material.— **Azores:** Stn 5.010: three stems up to 13 mm high, growing on *Halecium sibogae marocanum* (RMNH-Coel. 27968, slide 2509); Stn 5.044: several small, detached fragments, 20 mm high, with only one, apparently male, gonotheca; Stn 5.112: one fragment detached from serpulid concretion, 6 mm high; no gonothecae (RMNH-Coel. 27992).— **Atlantic coast of Morocco and Mauritania:** Stn 3.162:

several stems up to 15 mm high, without gonothecae, growing on Algae and Bryozoa (RMNH-Coel. 27989).— **Cape Verde Islands:** Stn 6.114: numerous colonies up to 25 mm high, polysiphonic at their base, growing on stem of Anthozoa (?); two gonothecae in bad condition are present (RMNH-Coel. 27971, slide 2512); Stn 6.D06: three small detached fragments 10 mm high, without gonothecae (RMNH-Coel. 28804, slide 2520).

Distribution.— **Arctic:** Barentz Sea (Bouillon, Massin & Kresevic, 1995).— **Eastern Atlantic:** general (Ramil & Vervoort, 1992a), north and north-west coast of Spain (Aguirrezabalaga et al., 1984, 1988; Altuna et al., 1984; Ramil Blanco & Iglesias Díaz, 1988a; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a; Medel & López-González, 1996), Gibraltar area (Medel, García & Vervoort, 1998).— **Mediterranean:** coast of Spain and Balears (García-Carrascosa, 1981; García-Carrascosa et al., 1987; Roca, 1987; Roca, Moreno & Barceló, 1991; Medel & López-González, 1996), Sea of Alborán and Chafarinas Islands (Peña Cantero, 1995).— **Temperate and subtropical eastern Atlantic:** Morocco (Patrity, 1970), Cap Blanc (Billard, 1906), Gulf of Guinea (Gili, Vervoort & Pagès, 1989), south and south-west coast of Africa, including Cape (Millard, 1966a, 1968, 1975; Day, Field & Penrith, 1970).— **Western Atlantic:** Brazil (Migotto, 1996), Argentine waters (Ridley, 1881; Blanco, 1968b, 1984c, 1994a, b; Blanco & Bellusci de Miralles, 1972; Genzano, 1990, 1994, 1996a; El Beshbeeshy, 1991; Genzano & Zamponi, 1992).— **Eastern Pacific:** Chili (Leloup, 1974).— **Western Pacific:** Japanese waters (Stechow, 1913b, c; Yamada, 1959; Hirohito, 1983, 1995), Korea (Rho & Park, 1983; Park, 1991, 1993, 1995), Australia, including Pearson Island (Bale, 1924; Pennycuik, 1959; Ralph, 1966; Watson, 1973, 1979, 1994a, b, 1996; Stapels & Watson, 1987), New Zealand (Coughtrey, 1876a, b; Ralph, 1958; Morton & Miller, 1973; Gordon & Ballantine, 1977; Dawson, 1992).— **Subantarctic:** general (Naumov & Stepan'yants, 1962), Kerguelen & Crozet (Millard, 1973a).— **Antarctic,** Adélie Land (Naumov & Stepan'yants, 1972), Davis Sea (Stepan'yants, 1972), Palmer Archipelago (Vervoort, 1972b), Scotia Arch (Peña Cantero, 1991; Peña Cantero & García Carrasoca, 1996).

Summarising: *Halecium delicatulum* is a near-cosmopolitan species, recorded from Atlantic waters (Cornelius, 1995a; Ramil Blanco & Iglesias Diaz, 1988; Medel & Lopez-González, 1996), including the Mediterranean (García-Carrascosa, 1981; Peña Cantero, 1995), penetrating as far south as the coasts of Patagonia (Stepan'yants, 1979; El Beshbeeshy, 1991). It is almost absent from the Antarctic, though recently recorded from that area by Stepan'yants, 1979 and Peña Cantero, 1991. Pacific records are given by Rees & Vervoort, 1987; and Arctic records by Leloup, 1940b.

In the CANCAP area it has been previously cited from off Morocco (Billard, 1906; Patrity, 1970), and from the Azores (Rees & White, 1966); near the CANCAP area it has been recorded from Guinea Bissau (Vervoort, 1959, as *H. parvulum*; Gili, Vervoort & Pagès, 1989). The present records are from the Azores (south of São Miguel and west of Pico, off Mauritania, and the Cape Verde Islands (southwest of Santo Antão and south-west coast of São Vicente). The bathymetric records of the CANCAP material vary between 15 and 200 m.

Remarks: The species was found epizootic on *Symplectoscyphus marionensis* Millard, 1971 (Blanco, 1984c).

Halecium halecinum (Linnaeus, 1758)
(fig. 2)

Sertularia halecina Linnaeus, 1758: 809; Anonymous, 1982: 172-174.

Halecium halecinum; Ansted & Lathan, 1862: 240; Anonymous, 1869: 13; Verrill, 1879: 17; Hansson, 1882: 80; Lameere, 1894: 20; Fauvel, 1895: lxvii; Whiteaves, 1901: 24; Wood, 1901: 17, 21; Shidlovskii, 1902: 229, pl. 3 fig. 27; Rioja y Martín, 1906: 278; Théel, 1907: 59; Broch, 1910b: 22, fig. 17; Bedot, 1911: 212; Fraser, 1911: 47; Linko, 1911: 38-41, fig. 8; Motz-Kossowska, 1911: 345; Ritchie, 1911: 29, 30; Babic, 1912: 460; Billard, 1912a: 460; Broch, 1912a: 13-14; Crawshaw, 1912: 326; Massy, 1912: 216; Ritchie, 1912: 219, 220; Stechow, 1912a: 352; Fraser, 1913a: 152; Meek & Storrow, 1913: 70; Robson, 1913b: 76-83; Sumner et al., 1913: 571; Dons, 1914: 51; Fraser, 1914a: 165, pl. 20 fig. 72; Heinsius & Jaspers, 1913: 106, fig. 25M; Robson, 1914a: 99; Fraser, 1915: 308; Hartlaub & Scheuring, 1916: 71; Pratt, 1916: 110, fig. 183; Broch, 1918a: 36-38, fig. 11; Fraser, 1918b: 332, 352; Stechow, 1919a: 34; Fraser, 1921: 164, fig. 63; Jarvis, 1922: 334; Scheuring, 1922: 159, 170; Van Benthem Jutting, 1922: lxxxvi; Stechow, 1923b: 5; 1923d: 92; Prenant & Teissier, 1924: 25; Billard, 1927c: 329; Stechow, 1927: 308; Broch, 1928a: 60, fig. 49A; 1928b: 114; Mathisen, 1928: 6, 17, 36; Vatova, 1928: 135; Gislén, 1930: 329; Vonck, 1930: 91, fig. 3; Billard, 1931b: 247; M.B.A., 1931: 70; Nobre, 1931: 13; Payne, 1931: 743; Broch, 1933b: 141, figs 1-2; Leloup, 1933c: 4, 19; Remane, 1933: 182, 213; Weill, 1934b: 471, figs 296-297; Alexander et al., 1935: 49; Fraser, 1935b: 144; Kramp, 1935b: 150, figs 61B, 63a; Philbert, 1935d: 25; 1935e: 21; Perrier, 1936: 21; Fraser, 1937b: 104, pl. 21 fig. 112; Moore, 1937: 41; Nobre, 1937: 22; De Beurs, 1938: 243; Fraser, 1938b: 9, 42; 1938d: 133; Kramp, 1938d: 30, 62, 68, 72, 80; Leloup, 1938a: 1, 4; Fraser, 1939c: 159 et seq.; Jones, 1939: 19; Da Cunha, 1940: 107, 111; Leloup, 1940b: 6; Bassindale, 1941: 148; Kramp, 1942b: 14; Vervoort, 1942: 282; Kramp, 1943b: 29, 44; Morley, 1943: 76; Da Cunha, 1944: 6, 21, fig. 4; Fraser, 1944a: 194-195, pl. 36 fig. 172; Kolosváry, 1945: 139; Cutcliffe, 1946: 170; Vervoort, 1946a: 296; 1946b: 158, figs 29a, 63, 64; Leloup, 1947: 27, fig. 19; Fraser, 1948: 223; Vervoort, 1949: 145; Caspers, 1950: 133; Da Cunha, 1950: 122, 124, 126; Teissier, 1950b: 13; McMillan, 1951: 73; Mistakidis, 1951: 45; Picard, 1951f: 260; Leloup, 1952a: 140-141, fig. 20D, 74; Rees, 1952: 7; Newell, 1954: 330; Williams, 1954: 48; Knight-Jones & Jones, 1956: 29; Spaul, 1956: 17; Bassindale & Barrett, 1957: 245; Hamond, 1957: 295, 301; M.B.A., 1957: 46; Picard, 1958b: 192; Rossi, 1958-4; Bousfield & Leim, 1959: 14; Riedl, 1959: 626; Vervoort, 1959: 225; Yamada, 1959: 33; Burdon-Jones & Tambs-Lyche, 1960: 7; Naumov, 1960: 446-447, figs 16D, 335, pl. 17 fig. 3; Cabioch, 1961: 26, 30; Bruce et al., 1963: 53; Hamond, 1963b: 6; Arndt, 1964b: 152; Redier, 1964b: 129; Cabioch, 1965b: 56; Redier, 1965: 371; Rees & Thursfield, 1965: 105; Teissier, 1965: 20; Crothers, 1966: 12; Millard, 1966a: 468, fig. 9G-L; Redier, 1967a: 385; Richards & Riley, 1967: 130; Cabioch, 1968: 565, 589, 642, 655; Vidal, 1968: 189; Rees & Rowe, 1969: 12; Robins, 1969: 332; Calder, 1970c: 1541; Fey, 1970: 396-397; Füller, 1970: 15, fig. 14/2; Patrity, 1970: 23, fig. 19; Riedl, 1970: 149, pl. 41; Thiel, 1970: 489; Bouillon & Levi, 1971: 221, fig. 3; Huxtable, 1971: 64, fig; Jägerskiöld, 1971: 62; Redier, 1971a: 502; Riedl, 1971: 1145; Rossi, 1971: 24, fig. 8G-I; Christiansen, 1972: 297; Houvenaghel-Crèveceur, 1972: 2815; Stepan'yants, 1972b: 325; Vervoort, 1972a: 25, fig. 3a; Von Salvini-Plawen, 1972: 393; Edwards, 1973b: 585, 586, 587; Hill-Cottingham, 1973: 283; Meyer, 1973: 73 et seq.; Hiscock, 1974: 24; Laverack & Blacker, 1974: 22; Millard & Bouillon, 1974: 4; Saldanha, 1974: 325; Wyttenbach, 1974: 700; Calder, 1975: 297, fig. 3A; Cornelius, 1975b: 393, fig. 6; Millard, 1975: 150, fig. 49A-E; Olafsson, 1975: 9, 13, 16; Cornelius, 1976a: 252, 253; Logan, 1976: 29; Boyden et al., 1977: 488; Chas Brínquez & Rodríguez Babio, 1977: 35, fig. 22A-B; Evans, 1978: 76; Millard, 1978: 193 et seq; Bromley, 1979: 520; Marinopoulos, 1981: 176; Wolff & Dankert, 1981: 26; Castric & Michel, 1982: 84, fig; Gili i Sardà, 1982: 50, fig. 16; Anonymous, 1982: 172-174; Flórez González, 1983b: 119, photograph 16; Bouillon, 1984b: 105; Headstrom, 1984: 71, fig; Austin, 1985: 55; Boero, 1985a: 136; Isasi Urdangarin, 1985: 46-47, fig. 3D-E; Stepan'yants, 1985a: 137; Woodhead & Jacobsen, 1985: 367; Boero & Fresi, 1986: 142; Gili, 1986: 137-138, figs 4.10A, 4.57c; Isasi & Sáiz, 1986: 69; Templado et al., 1986: 98; Bandel & Wedler, 1987: 49; Gili, Ros & Pagès, 1987: 92; Vervoort, 1987: 87; Cornelius, 1988b: 76; Llobet, Gili & Barangé, 1988: 36, fig. 4K; Ramil Blanco & Iglesias Díaz, 1988: 73, fig. 3; Bamber, 1989: 162; Stepan'yants, 1989b: 416 et seq;

Altuna & García-Carrascosa, 1990: 54 et seq., fig; Cornelius & Ryland, 1990: 137, fig. 4.14; Davoult & Richard, 1990: 194; Antsulevich, 1991b: 41; Cairns et al., 1991: 22; Castric-Fey & Chassé, 1991: 523; Cornelius, 1992a: 255; Reyes & Campos, 1992: 108 et seq.; Boero & Bouillon, 1993: 263; Harms, 1993: 15; Jones, 1993: 108 et seq.; Schönborn et al., 1993: 244, pl. 14 fig. 3; Altuna Prados, 1994a: 175-177; 1995a: 54; Álvarez-Claudio & Anadón, 1995: 239; Bouillon, Massin & Kreševic, 1995: 45; Cornelius, 1995a: 279-281, fig. 63; Kühne & Rachor, 1996: 440 et seq.; Medel & López-González, 1996: 199; Medel, García & Vervoort, 1998: 33-35, fig. 2; Cornelius, 1998: 85-86, figs 1, 3. *Halecium* cf. *halecinum*; Day & Morgans, 1956: 301; Aguirrezabalaga et al., 1988: 222.

Material.— **Azores area:** Stn 5.008: four hydrocauli, 185 mm high, strongly polysiphonic and branched. No gonothecae (RMNH-Coel. 28809, slide 2501); Stn 5.088: three stems 160 mm high, polysiphonic and branched; female gonothecae present (RMNH-Coel. 27994, slides 2485 and 2518); Stn 5.112: two hydrocauli and three fragments 40 mm high, polysiphonic and branched; with *Hebella scandens* (Bale, 1888) and *Filellum serpens* (Hassall, 1848) (RMNH-Coel. 28803, slide 2507); Stn 5.141: five hydrocauli 65 mm high with male gonothecae (RMNH-Coel. 28802, slide 2516); Stn 5.142: one fragment 110 mm high, polysiphonic and branched; without gonothecae (RMNH-Coel. 28805, slide 2519); Stn 5.153: several hydrocauli, 70 mm high, polysiphonic and pinnately branched, hydrocladia well separated; male gonothecae present. In addition, one colony 195 mm high, polysiphonic and strongly branched, forming secondary hydrocauli; without gonothecae (RMNH-Coel. 27995, slide 2486); Stn 5.166: four fragments, 105 mm high, polysiphonic, pinnate but irregularly branched; male gonothecae present (RMNH-Coel. 27998, slide 2488).— **Atlantic coast of Morocco and Mauritania:** Stn MAU.039: several colonies, 37 mm high, apparently not full developed, slightly polysiphonic and branched, growing on Bryozoa and sponges, without gonothecae, may belong here (RMNH-Coel. 27972, slide 2499); Stn MAU.041: five hydrocauli up to 15 mm high, on tube of polychaete, slightly polysiphonic, with few branches and without gonothecae; *Modeeria rotunda* (Quoy & Gaimard, 1827) developing upon it (RMNH-Coel. 27973, slide 2504).— **Canary Islands and Selvagens Archipelago:** Stn 4.012: one strongly fascicled and branched hydrocaulus, 125 mm high, without gonothecae (RMNH-Coel. 27969, slide 2515); Stn 4.017: three stems up to 80 mm high, polysiphonic over most of their length, pinnate and branched; without gonothecae (RMNH-Coel. 27975, slide 2508); Stn 4.021: one colony, 140 mm high, polysiphonic and pinnate. In addition, three hydrocauli up to 60 mm high; all without gonothecae (RMNH-Coel. 27974, slide 2513); Stn 4.023: one hydrocaulus 35 mm high, polysiphonic (also the hydrocladia), pinnate, growing on calcareous substrate. Female gonothecae present, with the side opposite to their opening enlarged (RMNH-Coel. 27977, slide 2511); Stn 4.148: one colony 105 mm high, polysiphonic and branched; without gonothecae; with epizootic bivalve *Pteria* spec. (RMNH-Coel. 28808, slide 2489); Stn 4.150: four stems, 120 mm high, polysiphonic and pinnate. No gonothecae (RMNH-Coel. 27996, slide 2484); Stn 4.152: one colony 70 mm high, polysiphonic, pinnate and with some branches developing into secondary hydrocauli; few hydrocladia, no gonothecae (RMNH-Coel. 27999, slide 2497).— **Cape Verde Islands:** Stn 6.078: one stem 60 mm high, polysiphonic and branched, no gonothecae (slide 2514); Stn 6.120: two fragments up to 7 mm high, without gonothecae (RMNH-Coel. 27970, slide 2506).

Description (material from Stn 5088).— Colonies strongly polysiphonic and pinnately branched, giving rise to secondary hydrocauli and hydrocladia. Nodes slightly oblique, hydrothecae placed at upper part of internodes, directed laterally and alternately right and left (fig. 2c). Hydrotheca sessile, shallow, walls almost straight, rim not everted (fig. 2a). Renovations of hydrotheca usually few, but normally the secondary hydrotheca presents a big hydrophore. Female gonothecae sack-shaped, upper part enlarged on one side, with two hydrothecae at opposite side (fig. 2b). Male gonothecae sack-shaped, elongated (fig. 2c).

Remarks.—*Halecium halecinum* is very similar to *H. beanii*; the species mainly differ in the morphology of their female gonothecae. In absence of gonothecae the differ-

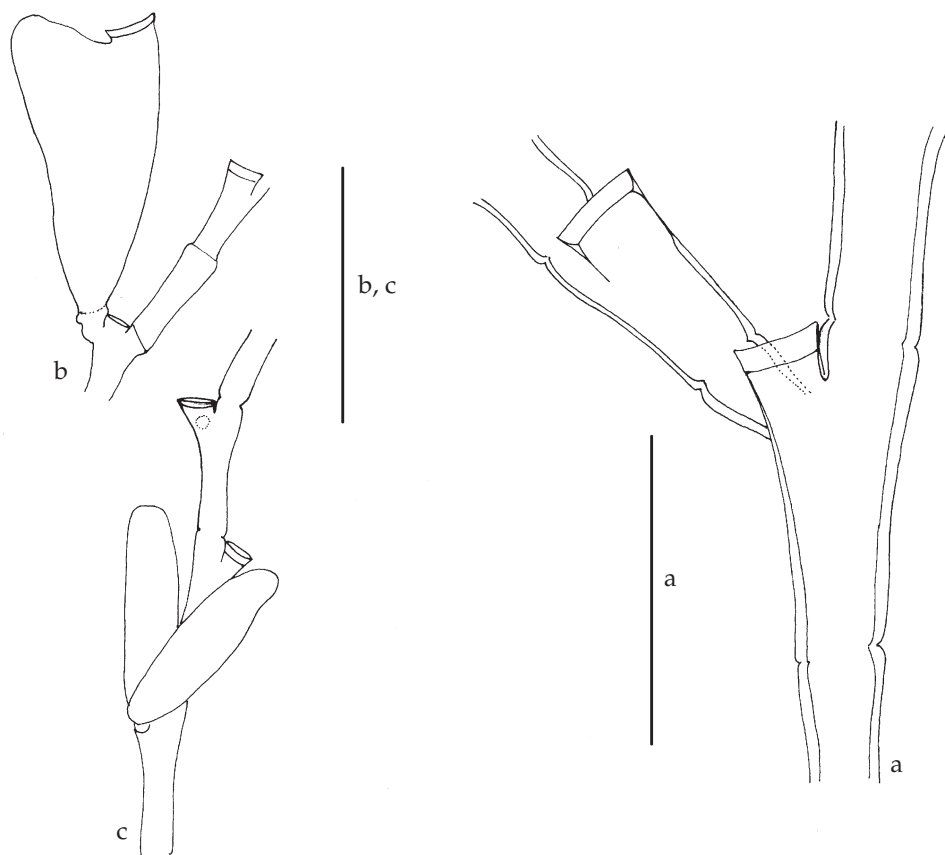


Fig. 2. *Halecium halecinum* (Linnaeus, 1758), a, b, Stn 5.088, slide 2485; c, Stn 5.133, slide 2486; a, part of axis with axillary hydrotheca and hydrocladium; b, hydrocladium with female gonotheca; c, hydrocladium with male gonotheca. Scales: a, 0.5 mm; b-c, 1 mm.

ent aspect of the colonies is diagnostic for distinction between the two species (cf. Vervoort, 1946b, 1959; Millard, 1975; Cornelius, 1995a). In the CANCAP material, many colonies of *H. beanii* have female gonothecae, but this sex is only present in one sample of *H. halecinum*. Besides, many colonies of *H. halecinum* in the CANCAP material are not fully developed. We have observed additional differences between these two species that are quite regular in our material. Hydrocladia in *H. halecinum* usually arise frontally or backwards of the hydrothecae (fig. 2a), whereas in *H. beanii* these arise laterally. The first internode of a hydrocladium is usually athecate in *H. beanii* but thecate in *H. halecinum*; the secondary hydrophores in *H. halecinum* are longer than those in *H. beanii*, in which species all hydrophores have a similar size. Using these characters we have identified the sterile CANCAP material of *H. halecinum*.

This species has been found pelagic by Stepan'yants, 1972b.

Distribution.— **Arctic Seas:** general (Stepan'yants, 1989b), Barents Sea (Hartlaub & Scheuring, 1916; Scheuring, 1922), White Sea and northern Russia (Shidlovskii,

1902; Linko, 1911; Naumov, 1960; Stepan'yants, 1985; Antsulevich, 1991b), Spitzbergen (Bouillon, Massin & Kresevic, 1995).— **Eastern Atlantic:** Iceland (Kramp, 1938d; Olafsson, 1975), Faroer (Kramp, 1942b), north-eastern Atlantic (Ritchie, 1912; Broch, 1918a), Norway (Broch, 1910b; Dons, 1914; Mathisen, 1928; Rees, 1952; Burdon-Jones & Tambs-Lyche, 1960; Christiansen, 1972), Swedish west coast (Hansson, 1882; Théel, 1907; Gislén, 1930; Rees & Rowe, 1969; Jägerskiöld, 1971), Denmark (Kramp, 1935b), Baltic (Stechow, 1927; Remane, 1933; Arndt, 1964b; Thiel, 1970; Meyer, 1973; Schönborn et al., 1993), German Bight (Caspers, 1950; Harms, 1993; Kühne & Rachor, 1996), North Sea (Broch, 1928a, b), Great Britain (Robson, 1914a; M.B.A., 1931, 1957; Morley, 1943; Cutcliffe, 1946; Mistakidis, 1951; Newell, 1954; Knight-Jones & Jones, 1956; Spaul, 1956; Hamond, 1957, 1963b; Crothers, 1966; Robins, 1969; Edwards, 1973b; Hiscock, 1974; Laverack & Blacker, 1974; Cornelius, 1975b, 1988b, 1995a; Cornelius & Ryland, 1990), Irish Sea and Bristol Channel (Wood, 1901; Massy, 1912; Meek & Storrow, 1913; Robson, 1913b; Alexander et al., 1935; Moore, 1937; Jones, 1939; Bassindale, 1941; Bassindale & Barrett, 1957; Bruce et al., 1963; Huxtable, 1971; Hill-Cottingham, 1973; Logan, 1976; Boyden et al., 1977; Evans, 1978; Jones, 1993), Ireland (McMillan, 1951; Williams, 1954), Netherlands (Heinsius & Jaspers, 1913; Van Benthem Jutting, 1922; Leloup, 1933c; De Beurs, 1930; Vervoort, 1946b; Wolff & Dankert, 1981), Belgium (Lameere, 1894; Vonck, 1930; Leloup, 1947, 1952a), English Channel, Channel Islands and Roscoff (Ansted & Latham, 1862; Fauvel, 1895; Bedot, 1911; Billard, 1912a; Crawshey, 1912; Prenant & Teissier, 1924; Philbert, 1935d, e; Vervoort, 1949; Teissier, 1950b, 1965; Cabioch, 1961, 1968; Castric & Michel, 1982; Davoult & Richard, 1990; Castric-Fey & Chassé, 1991), France, general (Billard, 1927c; Perrier, 1936), Bay of Biscay (Fey, 1970; Castric-Fey, 1973), North and North-West Spain (Rioja y Martín, 1906; Chas Brinquez & Rodríguez Babio, 1977; Isasi Urdangarín, 1985; Isasi, 1986; Ramil Blanco & Iglesias Díaz, 1988; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, c; Álvarez Claudio & Anadón, 1995; Medel & López-González, 1996), Portugal (Nobre, 1937; Da Cunha, 1940, 1944, 1950; Saldanha, 1974).— **Mediterranean:** general (Picard, 1958b; Marinopoulos, 1981; Boero & Bouillon, 19930), Strait of Gibraltar area (Medel, García & Vervoort, 1998), Mediteranean coast of France (Motz-Kossowska, 1911; Picard, 1951f; Vidal, 1968), Italy (Rossi, 1958, 1971; Riedl, 1959; Boero, 1985a; Boero & Fresi, 1986), Mediterreanean coast of Spain and Baleares (Gili i Sardà, 1982; Gili, 1986; Gili, Ros & Pagès, 1987; Llobet, Gili & Barangé, 1988; Medel & López-González, 1996), Alborán Sea (Templado et al., 1986), Adriatic (Anonymous, 1869; Broch, 1912a, 1993b; Vatova, 1928; Kolosváry, 1945; Riedl, 1970).— **Temperate and subtropical Atlantic:** general (Billard, 1931b; Leloup, 1940b), Morocco (Patriiti, 1970), Gulf of Guinea (Vervoort, 1959; Redier, 1965, 1971a), south and south-west coast of Africa, including Cape (Millard, 1966a, 1975). Western Atlantic, Greenland (Kramp, 1943b), Atlantic coast of Canada and United States (Verrill, 1879; Whiteaves, 1901; Sumner et al., 1913; Fraser, 1915, 1918b, 1921, 1944a; Leloup, 1938a; Bousfield & Leim, 1959; Richards & Riley, 1967; Calder, 1970c, 1975; Bromley, 1979; Woodhead & Jacobsen, 1985), Colombia (Flórez González, 1983b; Bandel & Wedler, 1987; Reyes & Campos, 1992).— **Eastern Pacific:** Canada and United States (Fraser, 1911, 1913a, 1914a, 1935b, 1937b; Austin, 1985).— **Temperate and subtropical Pacific:** general (Fraser, 1938b, d, 1939c, 1948).— **Western Pacific:** Japanese waters: Stechow, 1923b; Yamada, 1959.— **Indian Ocean:** Zanzibar (Jarvis, 1922), Seychelles (Millard & Bouillon, 1974).

Summarising: *Halecium halecinum* has been found in the East and West Atlantic, including the Mediterranean; and there are also several records from the Pacific Ocean (Cornelius, 1995a). The species has been recorded from arctic areas (Naumov, 1960), but it seems to be absent in the Antarctic. It has previously been recorded from Morocco (Patrity, 1970), and also from Gambia (Vervoort, 1959). The present records bear out its wide distribution in the Atlantic Ocean as it was obtained at the Azores, the coast of Mauritania, the Canary Islands, the Selvagens Archipelago and the Cape Verde Islands. The depth records of the CANCAP material are between 34 and 840 m; previously Naumow (1960) recorded the species from depths up to 310 m.

Halecium liouvillei Billard, 1934

(fig. 3)

Halecium Liouvillei Billard, 1934: 227, fig. 1; Leloup, 1937a: 94-96, 116, fig. 2; Vervoort, 1946a: 297, fig. 1; Buchanan, 1956: 277; Patrity, 1970: 24, fig. 22; Ramil Blanco & Iglesias Díaz, 1988a: 74-75; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Ramil Blanco & Fernández Pulpeiro, 1991: 63-68, figs 1-3; Altuna Prados, 1994a: 185-189, pl. 30 figs A-E, pl. 31; 1994c: 47-53, figs 2-4; 1995a: 54; Bouillon, Massin & Kreševic, 1995: 46; Medel & López-González, 1996: 199; Medel, García & Vervoort, 1998: 35-37, fig. 3; Ramil et al., 1998: 193-194, fig. 4d.

Material.— **Atlantic coast of Morocco and Mauritania:** Stn 1.118: seven hydrocauli up to 20 mm high, branching in one plane, first internode athecate; hydrophores of secondary hydrothecae normally undulated. In addition, three fragments up to 20 mm long, polysiphonic at their base, perisarc thick, secondary hydrophores also undulated; all colonies with deep hydrothecae, walls diverging and in some with everted rim. Gonothecae absent (RMNH-Coel. 26880, slide 1979; RMNH-Coel. 27947, slide 2517).

Remarks.— We consider the deep, sessile hydrothecae with diverging walls, the thick perisarc of the internodes, the distinct, oblique nodes and the undulations of the hydrophore of the secondary hydrothecae as characteristic features (fig. 3a-b). The annulations in other parts of the colony (see Billard, 1934; Altuna, 1993) appear to be a variable character, absent in the present material and in that recorded from the Spanish coast by Medel and López-González (1996). Gonothecae were not found in the present material.

Distribution.— **Eastern Atlantic:** north and north-west coast of Spain (Ramil Blanco & Iglesias Díaz, 1988a; Altuna & García-Carrascosa, 1990; Ramil Blanco & Fernández Pulpeiro, 1991; Altuna Prados, 1994a, 1994c; Medel & López-González, 1996; Ramil et al., 1998), Strait of Gibraltar area (Medel, García & Vervoort, 1998).— **Temperate and subtropical Atlantic:** Agadir, Morocco, type locality (Billard, 1934; Patrity, 1970), Rio de Oro, Angra de Cintra, Cap Blanc, Western Sahara (Leloup, 1937a; Vervoort, 1946a; Bouillon, Massin & Kreševic, 1995), Gold coast (Buchanan, 1957).

The present record from off Morocco falls in the area where the species may be expected to occur, the depth record of that material is 48 m.

Halecium nanum Alder, 1859

(fig. 4)

Halecium nanum Alder, 1859: 355, pl. 14 figs 1-4; Motz-Kossowska, 1911: 343, figs 12-13; Fraser, 1912c:

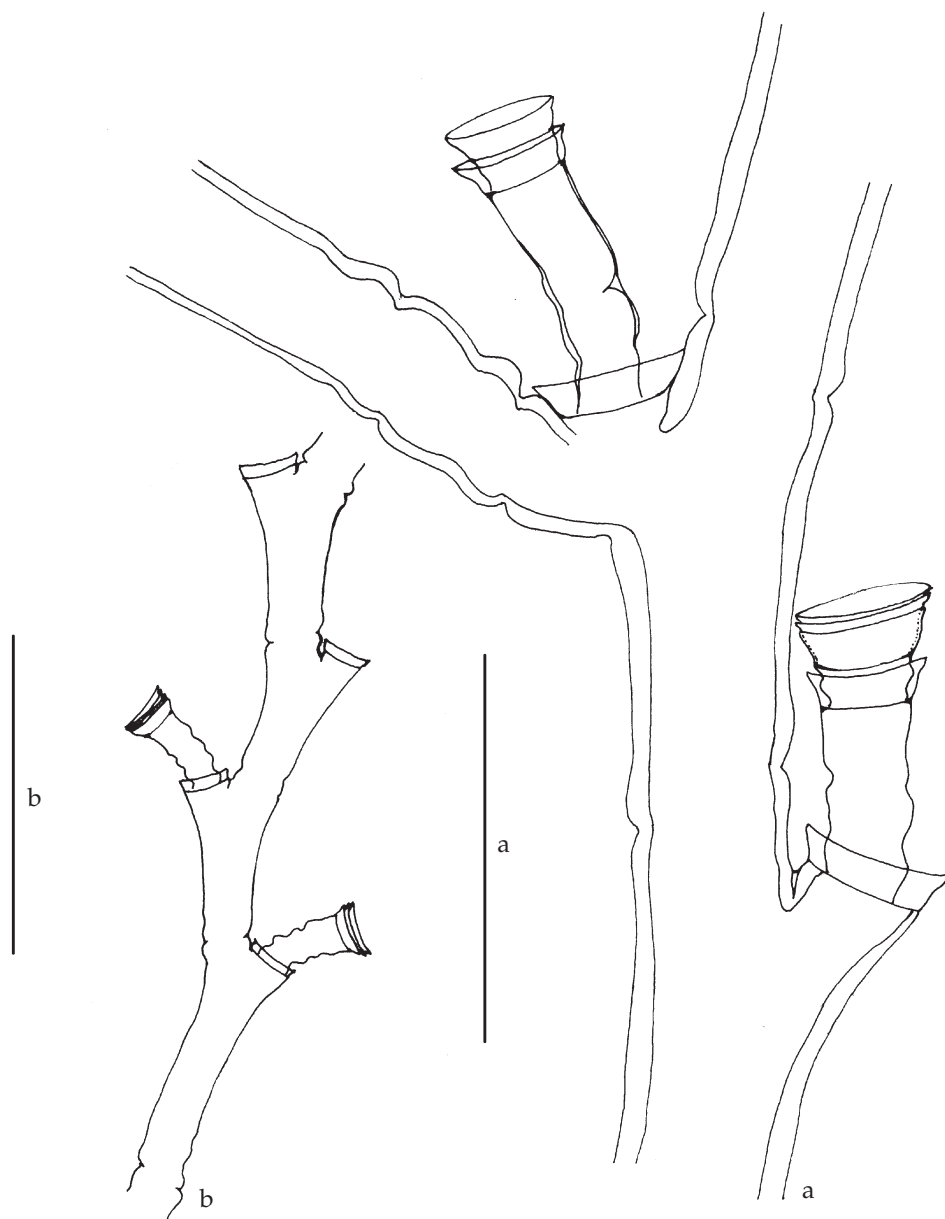


Fig. 3. *Halecium liouvillei* Billard, 1934, a, Stn 1.118, slide 2517; b, Stn 1.118, slide 1979; a, part of axis with axillary hydrotheca and insertion of hydrocladium; b, hydrocladium. Scales: a, 0.5 mm; b, 1 mm.

367, fig. 29; Stechow, 1914: 135; 1919a: 36; Bennitt, 1922: 245; Hentschel, 1922: 4, 8; Stechow, 1925a: 203; Billard, 1927c: 329; Leloup, 1935c: 8; Fraser, 1938b: 9, 43; 1938c: 110; 1938d: 133; Leloup, 1938b: 4; Burkenroad, 1939: 24; Fraser, 1939c: 159 et seq.; Leloup, 1940b: 7; Fraser, 1943b: 89; 1944a: 198-200, pl. 37 fig. 177; Deevey, 1950: 334, 345; 1954: 270; Picard, 1955b: 187; 1958b: 192; Riedl, 1959: 629; Yamada, 1959: 32; Vervoort, 1968: 95; Defenbaugh & Hopkins, 1973: 99, pl. 12 fig.

45; Morris & Mogelberg, 1973: 16, fig. 18; Marinopoulos, 1979b: 120; Cornelius & Garfath, 1980: 282; Boero, 1981a: 182; 1981c: 197; Masunari, 1983: 82; Boero, 1985a: 136; Boero, Chessa et al., 1985: 29; Boero & Fresi, 1986: 143; Calder, 1986b: 136, pl. 38; Boero, 1987b: 254; García-Rubies, 1987: 146, 148, 149; Vervoort, 1987: 87; Llobet, Gili & Barangé, 1988: 37, fig. 4M; Altuna & García-Carrascosa, 1990: 54 et seq., fig.; Cairns et al., 1991: 22; Calder, 1991a: 20-22, figs 12-13; 1991b: 223; 1991c: 2068 et seq.; Cornelius, 1992b: 98; Boero & Bouillon, 1993: 263; Calder, 1993b: 67 et seq.; Bouillon, Massin & Kresevic, 1995: 46; Calder, 1995: 543 et seq.; Cornelius, 1995a: 291-292, fig. 67; Watson, 1996: 78; Medel & López-González, 1996: 199.

Halecium cf. *nanum*; Aguirrezabalaga et al., 1988: 223, fig. 6F-G; Altuna Prados, 1995a: 54.

Material.— **Canary Islands and Selvagens Archipelago:** Stn 4.004: small colonies growing on algae, c. 10 mm high, without gonothecae (RMNH-Coel. 28810, slide 2521).

Remarks.— Our material is similar to that described by Calder (1991a); we have been able to identify it even in absence of its characteristic gonotheca. The internodes are partially annulated and curved at their base; the hydrothecae are sessile and shallow, the walls frequently thick and diverging though not everted at the rim (fig. 4). Cornelius (1995a) drew attention to the asymmetrical wall of many hydrothecae, and used this character to differentiate *H. nanum* from *H. lankesteri* (Bourne, 1890). We believe this character to be unreliable, as some hydrothecae are asymmetrical while others are not, depending upon of the angle of vision under the microscope. *H. lankesteri* (sensu Vervoort, 1959; Cornelius, 1995a) has distinct nodes, whereas in *H. nanum* there are several undulations without a distinct node. This, in our opinion, could be a reliable character to separate both species when female gonothecae are absent. On the other hand, Peña Cantero (1995) believes that under the name of *H. lankesteri* (Bourne, 1890) there are two different species, the second differing from the generally accepted appearance of *H. lankesteri* in its gonothecae and in its stem, that is not undulat-



Fig. 4. *Halecium nanum* Alder, 1859, Stn 4.004, slide 2521, part of colony. Scale: 0.5 mm.

ed. *Halecium lankesteri* as described by Vervoort, 1959 and Cornelius, 1995a, here compared with the CANCAP material of *H. nanum*, belongs to the second species if the views expressed by Peña Cantero (1995) are correct, and would be in need of a new specific name. We have preferred to await the inspection of a more copious material.

Distribution.— **Eastern Atlantic:** general (Leloup, 1946b), Farøer (Billard, 1927c), coasts of Great Britain (Alder, 1859; Cornelius & Garfath, 1980; Cornelius, 1995a), North and North-West Spain (Altuna & García-Carrascosa, 1990; Medel & López-González, 1996).— **Mediterranean:** general (Picard, 1958b; Boero & Bouillon, 1993), coasts of Spain (García-Rubies, 1987; Llobet, Gili & Barangé, 1988; Medel & López-González, 1996), coasts of France (Motz-Kossowska, 1911), Italy (Riedl, 1959; Boero, 1981a, c, 1987b (on *Posidonia* spec.); Boero, Chessa et al., 1985; Boero & Fresi, 1986), eastern part (Marinopoulos, 1979b), Algeria (Picard, 1955b).— **Temperate and (sub)tropical Atlantic:** Azores (Vanhöffen, 1910; Cornelius, 1992b).— **Western Atlantic:** Canada and United States (Fraser, 1912c, 1994a), Bermuda (Bennitt, 1922; Calder, 1986b, 1991a, 1993b), Gulf of Mexico (Deevey, 1950, 1954; Defenbaugh & Hopkins, 1973), Caribbean (Hentschel, 1922; Burkenroad, 1939 (on *Sargassum* spec.); Morris & Mogelberg, 1973; Calder, 1995), West Indies (Leloup, 1935c; Bouillon, Massin & Kresevic, 1995), Belize (Calder, 1991b, c), Brazil (Masunari, 1983, on algae).— **Pacific:** general (Fraser, 1938b, c, d, 1939c).— **Western Pacific:** Japanese waters (Leloup, 1938b; Yamada, 1959), Australia (Stechow, 1925a; Watson, 1996).

According to Calder (1991a) *H. nanum* is a shallow water species recorded from the temperate eastern and western Atlantic, including the Mediterranean, but records from the Pacific by Fraser (1938b-d, 1939c) and Leloup (1938b) are considered doubtful, because these are from deeper water (15-82 m and 22-26 m, respectively) and are not substantiated by descriptions or drawings.

The CANCAP material originates from south of Lanzarote, Canary Islands, the depth records are between 26 and 37 m; the characters of the colonies are in accordance with existing descriptions. The species was previously cited from the Azores by Vanhöffen (1910), but the female gonotheca he figured does not show the annulations of the wall usually attributed to *H. nanum*; this record is cited by Cornelius (1992b).

Halecium sibogae marocanum Billard, 1934
(fig. 5)

Halecium sibogae var. *marocanum* Billard, 1934: 229, fig. 2; Patrìti, 1970: 25, fig. 23; Ramil & Vervoort, 1992a: 86-90, figs 21a-e, 22a-b.

Halecium sibogae marocanum; Peña Cantero, 1995: 222-224, pl. 23 figs a-g; Medel & López-González, 1996: 199; Medel, García & Vervoort, 1998: 39-41, fig. 5.

Material.— **Azores area:** Stn 5.010: one stem 75 mm high, polysiphonic, hydrothecae with many renovations, empty. No gonothecae (RMNH-Coel. 27968, slide 2510).— **Atlantic coast of Morocco and Mauritania:** Stn 1.145: several small colonies up to 20 mm long, with gonothecae, growing on stems of gorgonids, together with *Eudendrium* spec., *Filellum* spec., *Lafoea dumosa* (Fleming, 1820), *Zygophylax* spec., and *Antennella secundaria* (Gmelin, 1791) (RMNH-Coel. 28801, slide 2493).— **Canary Islands and Selvagens Archipelago:** Stn 2.004: one hydrocaulus 75 mm high with many gonothecae (RMNH-Coel. 28806, slide 2490).— **Cape Verde Islands:** Stn 6.069: one colony 90 mm high, with polysiphonic stem and branches, many gonothecae present (RMNH-Coel. 28000, slide 2492).

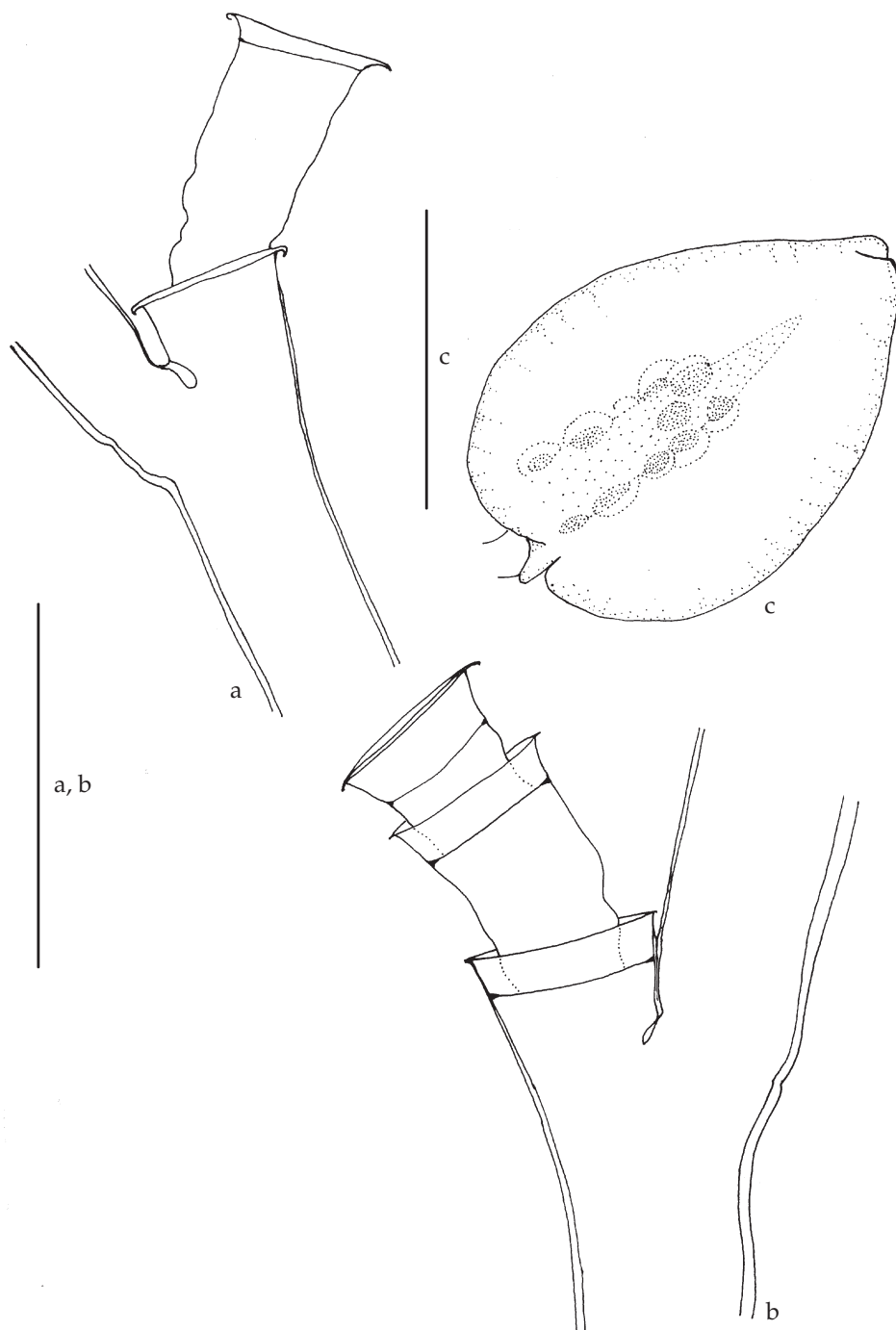


Fig. 5. *Halecium sibogae marocanum* Billard, 1934, a, c, Stn 2.004, slide 2490; b, Stn 6.069, slide 2492; a, hydrocladial hydrotheca; b, hydrocladial hydrotheca; c, female gonotheca. Scales: a-b, 0.5 mm; c, 1 mm.

Remarks.— The present material (fig. 5a-b) is in accordance with the description by Ramil & Vervoort (1992). These authors described what they considered to be the male gonotheca, because of the uniform mass inside. Our material has many gonothecae and both male and female are present on different colonies. They are quite similar, almost spherical, frequently showing a quadrangular cross section, and with one or two more or less developed basal projections (not mentioned by the authors cited above), more pronounced in the female gonothecae (fig. 5c). These gonothecae also show the characteristic opening with two elevations, described by Ramil & Vervoort (1992a).

Distribution.—**Mediterranean:** Alborán Sea, Chafarinas (Peña Cantero, 1995; Medel & López-González, 1996), Strait of Gibraltar (Medel, García & Vervoort, 1998).— **Temperate and (sub)tropical eastern Atlantic:** Morocco (Billard, 1934; Patriiti, 1970; Ramil & Vervoort, 1992a).

The present records extend the distribution to the Azores (south of São Miguel), the Canary Islands (south of Fuerteventura) and the Cape Verde Islands (south-west of Boa Vista); a further record is from Cap Blanc du Nord, Morocco. *Halecium sibogae marocanum* seems to be an Atlantic warm water species, penetrating into the Mediterranean but not dispersed in it. The depth records of the CANCAP material vary between 76 and 100 m.

Halecium tenellum Hincks, 1861

Halecium tenellum Hincks, 1861: 252, pl. 6 figs 1-4; Verrill, 1879: 17; Wood, 1901: 17, 21; Shidlovskii, 1902: 232; Rioja y Martín, 1906: 278; Fraser, 1911: 49; Hilgendorf, 1911: 540; Linko, 1911: 26-29, 240, fig. 5; Motz-Kossowska, 1911: 343; Ritchie, 1911: 30; Billard, 1912a: 462; Broch, 1912a: 17-18, fig. 3; Crawshaw, 1912: 327; Fraser, 1912c: 369, fig. 31; Fraser, 1913b: 169; Ritchie, 1913c: 10, 14; Robson, 1913b: 76-80; Sumner et al., 1913: 572; Fraser, 1914a: 169, pl. 21 fig. 79; 1914b: 218, 219; Robson, 1914a: 99; Deryugin, 1915: 306; Broch, 1918a: 46-50, fig. 20; Fraser, 1918b: 332, 353; Jäderholm, 1919a: 5, pl. 1 fig. 3; Stechow, 1919a: 41, fig. J-K; Fraser, 1921: 165, fig. 67; Bennitt, 1922: 246; Fraser, 1922a: 5; Scheuring, 1922: 159, 170; Stechow, 1923b: 5; Prenant & Teissier, 1924: 25; Fraser, 1926: 213; Jäderholm, 1926: 3; Hargitt, 1927: 507; Broch, 1928a: 61; 1928b: 115; Mathisen, 1928: 6, 19; Fraser, 1931: 479, 481; M.B.A., 1931: 71; Fraser, 1932: 51; Kramp, 1932b: 19; 1932c: 56, 69; Leloup, 1932c: 146; Broch, 1933b: 17; Fraser, 1933a: 564, 565; 1933b: 259; Leloup, 1934c: 7; Fraser, 1935b: 144; Kramp, 1935b: 145, fig. 60a; Leloup, 1935c: 9; Fraser, 1936c: 124; 1937b: 110-111, pl. 23 fig. 121; Leloup, 1937a: 96, 117; 1937b: 4, 17, fig. 8; Moore, 1937: 41; Ushakov, 1937: 18; Fraser, 1938b: 9, 44; 1938c: 110; 1938d: 133; Kramp, 1938d: 34, 63, 68, 73; Fraser, 1939c: 159 et seq; 1940c: 497; Leloup, 1940b: 7; Kramp, 1942b: 17-18; 1943b: 32, 44; Da Cunha, 1944: 23; Fraser, 1944a: 201-203, pl. 37 fig. 179; Vervoort, 1946b: 164, fig. 68; Fenyuk, 1947: 3; Fraser, 1947: 9; Kramp, 1947b: 15; Leloup, 1947: 27, fig. 18; Berezina, 1948: 54, pl. 15 fig. 6; Fraser, 1948: 225; Caspers, 1950: 133; Da Cunha, 1950: 122, 124, 126, fig. 1; Teissier, 1950b: 13; Picard, 1951f: 260; Dawydoff, 1952: 54; Day, Millard & Harrison, 1952: 404; Leloup, 1952a: 144, fig. 77; Deevey, 1954: 270; Picard, 1955b: 187; Spaul, 1956: 17; Buchanan, 1957: 357; Hamond, 1957: 307, fig. 14; M.B.A., 1957: 48; Millard, 1957: 193, fig. 5; Picard, 1958b: 192; Vervoort, 1959: 229, fig. 8; Yamada, 1959: 31; Leloup, 1960: 220, 230; Naumov, 1960: 454-455, fig. 344; Rossi, 1961: 76; Brotskaya et al., 1963: 174; Bruce et al., 1963: 53; Mammen, 1965: 9, figs 35-36; Rees & Thursfield, 1965: 109; Rossi, 1965: 174; Vasseur, 1965: 52, 70; Teissier, 1965: 21; Millard, 1966a: 471, fig. 11C-F; Rees & White, 1966a: 275; Vervoort, 1966a: 102, fig. 2; Millard, 1968: 253, 258; Vervoort, 1968: 95; Vidal, 1968: 189; Rees & Rowe, 1969: 13; Robins, 1969: 332; Brunel, 1970b: 18; Day, Field & Penrith, 1970: 12; Fey, 1970: 397; Patriiti, 1970: 24, fig. 21; Huxtable, 1971: 64, fig. 1; Jägerskiöld, 1971: 62; Blanco & Bellusci de Miralles, 1972b: 5, figs 1-2; Manea, 1972: 409, fig. 1; Stepan'yants, 1972a: 72; Morris & Mogelberg, 1973: 25; Hirohito, 1974: 8-

9, fig. 2; Laverack & Blacker, 1974: 22; Leloup, 1974: 11; Millard & Bouillon, 1974: 5, 22; Rho & Chang, 1974: 136, pl. 1 figs 1-4; Saldanha, 1974: 325; Vasseur, 1974: 158; Belousov, 1975b: 655, fig. 1 no. 25; Cornelius, 1975b: 409, fig. 12; Millard, 1975: 156, fig. 50F-L; Olafsson, 1975: 14; Wedler, 1975: 334; Millard, 1977a: 11; 1977b: 106; Rho, 1977: 252, 414, pl. 17 no. 63; Calder & Hester, 1978: 90; Drainville et al., 1978: 9; Evans, 1978: 79; García-Corrales et al., 1978: 9, figs 1-2; Millard, 1978: 193 et seq.; Gosner, 1979: 84; Millard, 1979b: 130; Stepan'yants, 1979: 104, pl. 20 fig. 5A-V; Estrada, 1980: 9; Ljubenkova, 1980: 50; Stepan'yants, 1980b: 116; Boero, 1981a: 182; 1981c: 197; García-Carrascosa, 1981: 121-124, pl. 2 figs f-j; Marinopoulos, 1981: 176; Gili i Sardà, 1982: 52, fig. 18; Gili & Romero, 1983: 36 et seq.; Hirohito, 1983: 5, 11; Aguirrezabalaga et al., 1984: 87; Blanco, 1984a: 10-11, pl. 6 figs 14-15; Headstrom, 1984: 71, fig.; Austin, 1985: 55; Bavestrello, 1985: 356; Gili & Castelló, 1985: 12, fig. 2F-G; Gili & Ros, 1985: 329; Stepan'yants 1985a: 137; 1985b: 86; Boero & Fresi, 1986: 143; Gili, 1986: 139-140, fig. 4.13A; Templado et al., 1986: 98; Antsulevich, 1987b: 106; Llobet i Nadal, 1987: 88-92, fig. 19; Tucker & Burton, 1987: 2 et seq.; Llobet, Gili & Barangé, 1988: 38, fig. 2E; Gili, Murillo & Ros, 1989: 23; Gili, Ros & Romero, 1989: 282; Gili, Vervoort & Pagès, 1989: 81, fig. 10A; Stepan'yants, 1989b: 416 et seq.; Altuna & García-Carrascosa, 1990: 54 et seq., fig.; Cornelius & Ryland, 1990: 140, fig. 4.15; Cairns et al., 1991: 23; Calder, 1991a: 22-24, fig. 14; 1991b: 223; 1991c: 2068 et seq.; El Beshbeeshy, 1991: 40-44, fig. 6; Gili & Ballesteros, 1991: 247; Llobet, Gili & Hughes, 1991: 153 et seq.; Park, 1991: 544; Cornelius, 1992a: 255; 1992b: 81 et seq.; Dawson, 1992: 15; Jensen & Frederiksen, 1992: 64; Park, 1992: 286; Ramil & Vervoort, 1992a: 90-91, fig. 21f-g; Boero & Bouillon, 1993a: 263; Branch & Williams, 1993: 11, fig.; Calder, 1993b: 67 et seq. 1-2; Altuna Prados, 1994a: 196-197; Blanco, 1994a: 156; 1994b: 187; Stepan'yants, 1994: 126 et seq.; Altuna Prados, 1995a: 54; Álvarez-Claudio & Anadón, 1995: 239; Bouillon, Massin & Krešević, 1995: 47; Cornelius, 1995a: 296-297, fig. 69; Hirohito, 1995: 29-31, fig. 8a-c; Park, 1995: 10; Peña Cantero, 1995: 227-230, pl. 24 figs a-d; Medel & López-González, 1996: 199; Migotto, 1996: 34-35, 122, fig. 6h; Russell & Nagabhushanam, 1996: 93; Stepan'yants, Svoboda & Vervoort, 1996: 15; Watson, 1996: 78; Calder & Mañal, 1998: 73; Cornelius, 1998: 90-91, fig. 5.

Halecium sp. (*tenellum* aff.) Kramp, 1911: 370, pl. 23 figs 1-2.

?*Halecium tenellum*; Hartlaub & Scheuring, 1916: 71.

Halecium (?) *tenellum*; Ralph, 1958: 340, fig. 11f-g.

Halecium tonellum; Aguirrezabalaga et al., 1988: 225, fig. 6F-G (incorrect subsequent spelling).

Material.— **Azores area:** Stn 5.112: several stems up to 10 mm high, growing on concretion of serpulid tubes; no gonothecae (RMNH-Coel. 27993).— **Cape Verde Islands:** Stn 6.115: several colonies 17 mm high, growing on sponges; gonothecae present (RMNH-Coel. 27997, slide 2491); Stn 7.140: numerous hydrocauli up to 15 mm high, without gonothecae (RMNH-Coel. 27976, slide 2502).

Distribution.— **Arctic seas:** general (Ushakov, 1937; Stepan'yants, 1989b, 1994), Barents Sea (Scheuring, 1922; Stepan'yants, 1985b), coasts of Russia (Linko, 1911; Berezina, 1948; Naumov, 1960).— **Eastern Atlantic:** general (Broch, 1918a; Kramp, 1947b), White Sea (Shidlovskii, 1902; Deryugin, 1915; Brodskaya et al., 1963; Stepan'yants, 1985a), Iceland (Kramp, 1938d, Olafsson, 1975), Faroer (Kramp, 1942b; Jensen & Frederiksen, 1992), Norway (Mathisen, 1928), Swedish west coast (Rees & Rowe, 1969; Jägerskiöld, 1971), Denmark (Kramp, 1935b), North Sea (Broch, 1928a, b), German Bight (Caspers, 1950), Great Britain (Hincks, 1861; Ritchie, 1911; Robson, 1914a; M.B.A., 1931, 1957; Spaul, 1956; Hamond, 1957; Robins, 1969; Laverack & Blacker, 1974; Cornelius, 1975b, 1995a; Cornelius & Ryland, 1990), Irish Sea (Wood, 1901; Robson, 1913b; Moore, 1937; Bruce et al., 1963; Huxtable, 1971; Evans, 1978), Netherlands (Vervoort, 1946b), Belgium (Leloup, 1947, 1952a), Channel, including Roscoff (Billard, 1912a; Crawshey, 1912; Prenant & Teissier, 1924; Teissier, 1950b, 1965), France, Bay of Biscay (Fey, 1969), Atlantic coast of Spain (Rioja y Martín, 1906;

Estrada, 1980; Aguirrezabalaga et al., 1984, 1988; Templado et al., 1986; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, c; Álvarez Claudio & Anadón, 1995; Medel & López-González, 1996), Portugal (Da Cunha, 1944, 1950; Saldanha, 1974).— **Mediterranean:** general (Picard, 1958a; Marinopoulos, 1981; Boero & Bouillon, 1993), coast of Spain (García-Corrales et al., 1978; García-Carrascosa, 1981; Gili i Sardà, 1982; Gili & Romero, 1983; Gili & Castelló, 1985; Gili & Ros, 1985; Gili, 1986; Llobet i Nadal, 1987; Llobet, Gili & Barangé, 1988; Gili, Murillo & Ros, 1989; Gili, Ros & Romero, 1989; Gili & Ballesteros, 1991; Llobet, Gili & Hughes, 1991; Medel & López-González, 1996), Alborán Sea, Chafarinas (Peña Cantero, 1995), coast of France (Motz-Kossowska, 1911; Leloup, 1934c; Picard, 1951f; Vidal, 1968), Italy (Rossi, 1961, 1965; Boero, 1981a, c; Bavestrello, 1985; Boero & Fresi, 1986), Adriatic (Broch, 1912a, 1933b), Alborán Sea (Ramil & Vervoort, 1992a), Algeria (Picard, 1955b), Black Sea (Manea, 1972).— **Temperate and (sub)tropical Atlantic:** Azores (Rees & White, 1966a; Cornelius, 1992b), Morocco (Patrity, 1970; Vervoort & Ramil, 1992a), Gold Coast (Buchanan, 1957), Gulf of Guinea (Vervoort, 1959; Gili, Vervoort & Pagès, 1989), coasts of South-West and South Africa, including Cape (Millard, 1957, 1966a, 1968, 1975; Day, Field & Penrith, 1970).— **Western Atlantic:** Greenland (Kramp, 1932b, c, 1943b; Fraser, 1933a), Hudson Bay (Fraser, 1931), Atlantic coasts of Canada and United States (Verrill, 1879; Fraser, 1912c, 1913b, 1918b, 1921, 1922a, 1944a; Sumner et al., 1913; Brunel, 1970b; Calder & Hester, 1978), Bermuda (Bennett, 1922; Calder, 1991a, 1993b), Gulf of Mexico (Deevey, 1954), West Indies (Leloup, 1935c), Caribbean (Fraser, 1947; Morris & Mogelberg, 1973), Belize (Calder, 1991b, c), Colombia (Wedler, 1975), Brazil (Migotto, 1996; Calder & Mañal, 1998), Argentine waters (Blanco & Belusci de Miralles, 1972b; Blanco, 1984a, 1994a, b; El Beshbeeshy, 1991).— **Eastern Pacific:** general (Fraser, 1938b, c, d, 1939c, 1940c, 1948), Pacific coasts of Canada and United States (Fraser, 1911, 1914a, 1932, 1935b, 1936c, 1937b; Ljubenkova, 1980; Austin, 1985), Chili (Leloup, 1974).— **Western Pacific:** Sea of Okhotsk (Fenyuk, 1947), Kuriles (Antsulevich, 1987b), Japanese waters (Jäderholm, 1919a; Stechow, 1923b; Yamada, 1959; Hirohito, 1974, 1983, 1995), Korea (Rho & Chang, 1974; Rho, 1977; Park, 1991, 1992, 1995), South China Sea (Hargitt, 1927), Indochina (Leloup, 1937b; Dawydoff, 1952; Bouillon, Massin & Kresevic, 1995), Australia (Watson, 1996), Kermadec Islands (Hilgendorf, 1911), New Zealand (Dawson, 1992).— **Indian Ocean:** general (Russell & Nagabhushanam, 1996), coast of South Africa (Day, Millard & Harrison, 1952; Millard, 1977b, 1979b), Madagascar (Vasseur, 1965, 1974), Seychelles (Millard & Bouillon, 1974), India (Leloup, 1932c; Mammen, 1965).— **Subantarctic:** Kerguelen and Crozet Islands (Millard, 1975a), Marion and St Paul (Branch & Williams, 1993).— **Antarctic:** general (Ritchie, 1913a; Jäderholm, 1926; Stepan'yants, 1972a, 1979; Tucker & Burton, 1987; Bouillon, Massin & Kresevic, 1995).

Summarising: a cosmopolitan species, found in all oceans, also in Arctic and Antarctic regions (cf. Cornelius, 1995a; Stepan'yants, 1979). It has been reported previously from Morocco (Patrity, 1970; Ramil & Vervoort, 1992a) and from the Azores (Rees & White, 1966); also recorded from the Gulf of Guinea and Guinea Bissau (Vervoort, 1959; Vervoort, 1966; Gili, Vervoort & Pagès, 1989). The present records are from the Azores (west of Pico) and the Cape Verde Islands (south-west of Santo Antão and south of Razo); depth records vary between 85 and 1200 m.

Halecium spec.
(fig. 6)

Material.— **Azores area:** Stn 5.085: two mutilated stems, 35 mm long; no gonothecae (RMNH-Coel. 27945).— **Cape Verde Islands:** Stn 7.059: several colonies 1 mm high, fragile, associated with Bryozoa. They resemble *H. tenellum* in appearance but have slightly oblique nodes and sessile, shallow hydrothecae with their walls diverging but the rim not everted (fig. 6). No gonotheca are present (slide 4026, RMNH-Coel. 27944).

Remarks.— This material could not properly be identified.

Genus *Hydrodendron* Hincks, 1875

Hydrodendron mirabile (Hincks, 1866)

Ophiodes mirabilis Hincks, 1866: 422-423, pl. 14 figs 1-5; Motz-Kossowska, 1911: 334; Stechow, 1913a: 585; Bedot, 1914a: 82; Prenant & Teissier, 1924: 26; Bassindale, 1941: 149; Teissier, 1950b: 13; 1965: 20; Crothers, 1966: 12.

Ophiidissa mirabilis; Stechow, 1919a: 42; Picard, 1951f: 260; 1952d: 220, 222; 1958d: 192; Cornelius, 1975b: 414, fig. 14; Aguirrezabalaga et al., 1984: 87; Isasi Urdangarín, 1985: 51, fig. 5D-F; Boero & Fresi, 1986: 143; Bouillon, Boero & Gravier-Bonnet, 1986: 66, fig. 2A; Isasi, 1986: 69; Ramil Blanco & Iglesias Díaz, 1988: 76-77, fig. 8; Medel & López-González, 1996: 200.

Diplocyathus mirabilis; Leloup, 1934c: 7; Perrier, 1936: 21; Leloup, 1940a: 5.

Hydrodendron mirabilis; Boero, 1981a: 182; Gili, 1986: 132-133, fig. 4.9B; Vervoort, 1987: 88.

Hydrodendron mirabile; Rees & Vervoort, 1987: 20; Gili, Vervoort & Pagès, 1989: 81-82, fig. 10B; Cairns et al., 1991: 23; Cornelius, 1992a: 255; Boero & Bouillon, 1993: 263; Altuna Prados, 1994a: 200-204, pl. 35, pl. 36 figs A-F; 1995a: 54; Cornelius, 1995a: 309-311, fig. 73; Peña Cantero, 1995: 240-245, pl. 26 figs a-b; Medel, García & Vervoort, 1998: 43-45, fig. 7.

Hydrodendron (Hydrodendron) mirabile; Hirohito, 1995: 36-38, fig. 10, pl. 3 fig. A.

Ophiodes caciniiformis Ritchie, 1907: 500-501, pl. 23 figs 11-12, pl. 24 fig. 1, pl. 25 fig. 5.

Ophiidissa caciniiformis; Stechow, 1919: 42; Vervoort, 1959: 218-221, figs 1-2.

Diplocyathus caciniiformis; Leloup, 1935: 10; 1939b: 4, fig. 3.

Hydrodendron caciniiformis; Millard, 1957: 186, fig. 3; Ralph, 1957: 342-344, figs 13b-c, 14a; Mammen, 1965; 7, fig. 34; Millard, 1975: 158-160, fig. 51; Bouillon, Massin & Kresevic, 1995: 47.

Material.— **Azores area:** 5.D02: numerous hydrocauli up to 10 mm high growing on sponges; polysiphonic at the base and irregularly branched, internodes of varied length, no gonothecae (RMNH-Coel. 27943, slides 4023).

Remarks.— We follow Cornelius (1975b) in accepting the synonymy of *Ophiodes mirabilis* Hincks, 1866 and *Ophiodes caciniiformis* Ritchie, 1907, but follow Rees and Vervoort (1987) in the generic allocation in *Hydrodendron* Hincks, 1874. *Hydrodendron mirabile* has recently been re-described by Medel, García & Vervoort (1998: 43-45); the CANCAP material is in agreement with that description.

Distribution.— **Eastern Atlantic:** Great Britain (Hincks, 1866; Bassindale, 1941; Crothers, 1966; Cornelius, 1975a, 1995a), France, Roscoff (Bedot, 1914a; Prenant & Teissier, 1924; Teissier, 1950b, 1965), Atlantic coast of Spain (Ramil Blanco & Iglesias Díaz, 1988; Medel & López-González, 1996), Bay of Biscay (Aguirrezabalaga et al., 1984; Isasi Urdangarín, 1985; Isasi, 1986; Altuna Prados, 1994a, 1995a), Strait of

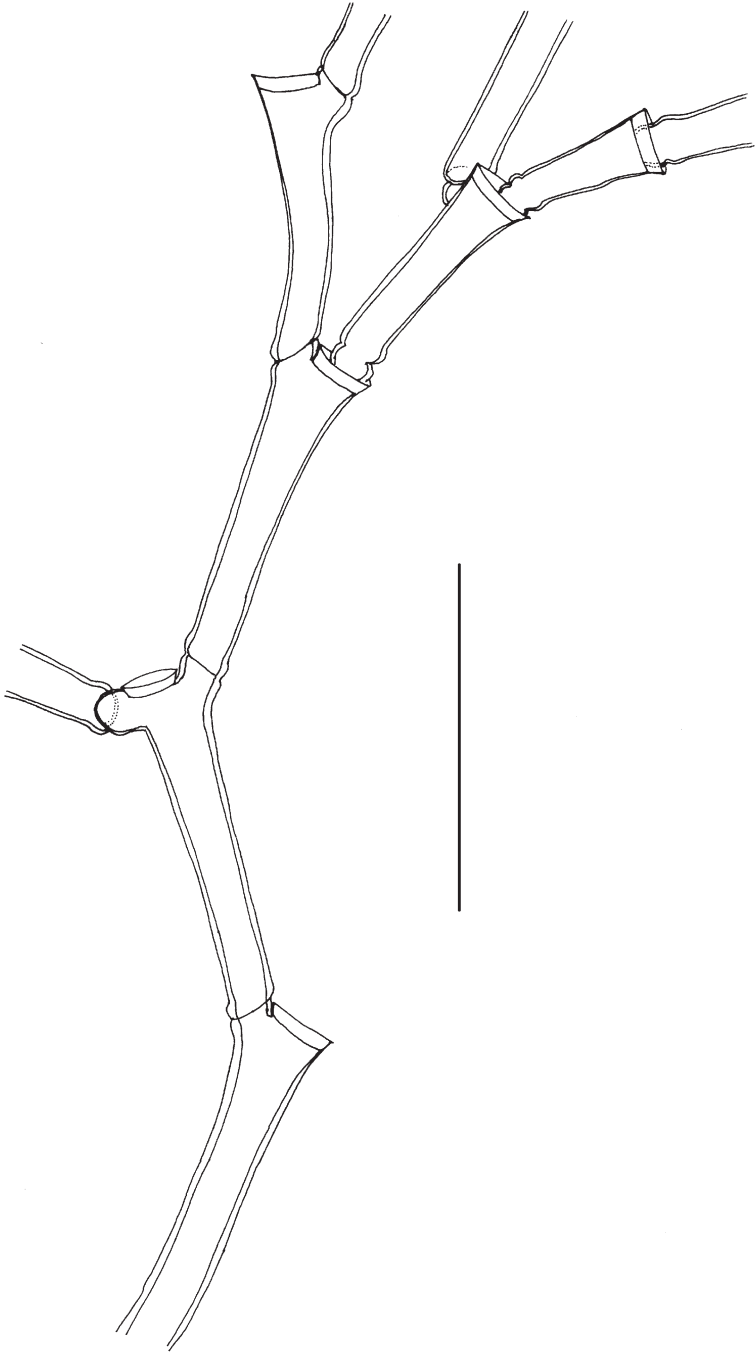


Fig. 6. *Halecium* spec., Stn 7.059, slide 4026, part of colony. Scale: 0.5 mm.

Gibraltar area (Medel, García & Vervoort, 1998).— **Mediterranean:** coast of France (Motz-Kossowska, 1911; Picard, 1951f, 1952d, 1958b), coast of Spain (Gili, 1986; Medel & López-González, 1996), Alborán Sea, Chafarinas Islands (Peña Cantero, 1995), Italy (Leloup, 1934c; Boero, 1981a; Boero & Fresi, 1986; Boero & Bouillon, 1993).— **Temperate and (sub)tropical Atlantic:** Guinea Bissau (Gili, Vervoort & Pagès, 1989), Cape Verde Archipelago (Ritchie, 1907), Pointe Noire, Congo (Bouillon, Massin & Kresevic, 1995), and False Bay, Cape (Millard, 1957, 1975).— **Western Atlantic:** West Indies (Leloup, 1935; Bouillon, Massin & Kresevic, 1995).— **Pacific:** Japan (Stechow, 1913a; Leloup, 1940a; Hirohito, 1995), India (Mammen, 1965).

This species is considered to be circumtropical, occurring in warmer water around the world. It was recorded previously from the Cape Verde Islands (Ritchie, 1907) and was found in the Gulf of Guinea (Vervoort, 1959; Gili, Vervoort & Pagès, 1989). It is here recorded from the Azores (Ilhéus Formigas) at c. 15 m depth.

Family CAMPANULARIIDAE Johnston, 1836

Genus *Campanularia* Lamarck, 1816

Campanularia hincksii Alder, 1856

Campanularia Hincksii Alder, 1856: 360, pl. 13 fig. 9; Verrill, 1879: 16; Whiteaves, 1901: 22; Wood, 1901: 16-20; Rioja y Martín, 1906: 278; Robson, 1913b: 78; Sumner et al., 1913: 568; Kudelin, 1914: 462-464, fig. 166; Robson, 1914a: 96; Pratt, 1916: 111, fig. 104; Broch, 1918a: 162; Neppi, 1921: 19; Leloup, 1937b: 4, 18; Kramp, 1938d: 16, 62, 67; Leloup, 1940b: 19; Vervoort, 1942: 308; 1946b: 276, figs 122, 124a; 1949: 157; Knight-Jones & Jones, 1956: 29; Vervoort, 1959: 311, fig. 55a; Millard, 1966a: 471, fig. 12A-D; Rees & White, 1966a: 275; Rees & Rowe, 1969: 16; Millard, 1975: 208, fig. 67B-E; Olafsson, 1975: 17; Millard, 1977b: 107; García-Corrales et al., 1978: 18, fig. 6; Millard, 1978: 189; 1979b: 131; Cornelius & Garfath, 1980: 282; Boero, 1981a: 182, 190, fig. 9; Cornelius, 1982a: 53-55, fig. 3; Altuna et al., 1983: 132, fig. 3d; Östman, 1983b: 6; Gili, Murillo & Ros, 1989: 23; Gili, Vervoort & Pagès, 1989: 105, 106, fig. 30A; Gili, Ros & Romero, 1989: 282; Altuna & García-Carrascosa, 1990: 54 et seq., fig.; Cornelius & Ryland, 1990: 131, fig. 4.10; Genzano, 1990: 40-42, figs 6-7; Cairns et al., 1991: 23; Calder, 1991a: 49-50, fig. 29; El Beshbeeshy, 1991: 97-98, fig. 22b; Llobet, Gili & Hughes, 1991: 153 et seq.; Cornelius, 1992a: 254, 257; 1992b: 98; Genzano & Zamponi, 1992: 17-18, fig. 8; Ramil & Vervoort, 1992a: 233-235, fig. 66; Boero & Bouillon, 1993: 264; Calder, 1993b: 67 et seq.; Altuna Prados, 1994a: 309-312; Blanco, 1994a: 159; 1994b: 191; Genzano, 1994: 5; Altuna Prados, 1995a: 54; Álvarez-Claudio & Anadón, 1995: 240; Bouillon, Massin & Kresevic, 1995: 78; Cornelius, 1995b: 229-231, fig. 52; Peña Cantero, 1995: 415-422, pl. 52 figs a-d; Medel & López-González, 1996: 205.

Campanularia hincksii; Ritchie, 1911: 32; Fraser, 1911: 31; Billard, 1912a: 464; Crawshaw, 1912: 325; Broch, 1913: 13; Stechow, 1913c: 144; Fraser, 1918b: 332, 344; Stechow, 1919a: 57; Fraser, 1921: 154, fig. 31; Stechow, 1923d: 96, 100; Prenant & Teissier, 1924: 25; Fraser, 1926: 213; Vatova, 1928: 140; Billard, 1931b: 246; M.B.A., 1931: 71; Leloup, 1933c: 7, 21; Billard, 1934: 230; Leloup, 1934c: 9; Kramp, 1935b: 102, fig. 45c; Philbert, 1935d: 27; 1935e: 30; Perrier, 1936: 23; Fraser, 1937b: 63-64, pl. 13 fig. 56; Moore, 1937: 41; Fraser, 1938b: 8, 28; 1938c: 109; 1938d: 132; 1939c: 158 et seq.; Jones, 1939: 19; Kramp, 1942b: 35-36; Kramp, 1943b: 43; Fraser, 1944a: 121, pl. 21 fig. 92; Kramp, 1947b: 7; Leloup, 1947: 22, fig. 12; Fraser, 1948: 204; Caspers, 1950: 133; Da Cunha, 1950: 122, 125, 138, figs 6, 7; Teissier, 1950b: 16; Picard, 1951e: 278; 1951f: 261; Leloup, 1952a: 150, fig. 82; Picard, 1952a: 349; 1952d: 222; Dawydoff, 1952: 54; Rees, 1952: 6; Williams, 1954: 48; Bassindale & Burrett, 1957: 244; M.B.A., 1957: 43; Tortonese, 1958: 182; Riedl, 1959: 632; Burdon-Jones & Tambs-Lyche, 1960: 6; Bruce, Colman & Jones, 1963: 50; Rees & Thursfield, 1965: 91; Teissier, 1965: 18; Crothers, 1966: 11;

Fey, 1970: 394; Robins, 1969: 331; Bellan-Santini, 1970: 356; Patrìti, 1970: 33, fig. 41; Riedl, 1970: 150, pl. 41; Bouillon & Levi, 1971: 221, fig. 7; Jägerskiöld, 1971: 61; Lipkin & Safriel, 1971: 10; Christiansen, 1972: 293; Laverack & Blacker, 1974: 20; Saldanha, 1974: 325; Manea, 1975: 9, fig. 3; Evans, 1978: 47; Estrada, 1980: 7-8, fig. 2; Ljubenkov, 1980: 46; Stepan'yants, 1980b: 116; García-Carrascosa, 1981: 169, pl. 33 figs e-f; Castric & Michel, 1982: 82, fig.; Gili i Sardà, 1982: 59, fig. 22B; Gili & Romero, 1983: 36 et seq.; Altuna et al., 1984: 132, fig. 3d; Boero, 1985a: 136; Gili & Castelló, 1985: 14, fig. 4D; Gili & García-Rubies, 1985: 43, fig. 3D; Gili & Ros, 1985: 329; Boero & Fresi, 1986: 143; Gili, 1986: 180-181, figs 4.16A, 4.56c; Parapar Vegas, 1986: 96, pl. 14 fig. 2; Templado et al., 1986: 98; Llobet i Nadal, 1987: 118-121, fig. 31b-c; Östman, 1987: 75, 76; Roca, 1987: 210; Llobet, Gili & Barangé, 1988: 40, fig. 3A; Östman, 1988: 501, figs 7-9, 20-25; Boero & Bouillon, 1989b: 39, fig. 1 no. iii; Roca, Moreno & Barceló, 1991: 70.

Campanularia (Eucampanularia) hincksii; Broch, 1912a: 49-50, fig. 16; 1928a: 72, fig. 69; 1933b: 87, figs 37-38.

Clytia hincksii; Picard, 1955b: 186.

Orthopyxis hincksii; Picard, 1958b: 191.

Orthopyxis hincksi; Rossi, 1961: 79; 1971: 30, fig. 12B.

Campanularia (Campanularia) hincksii; Vervoort, 1968: 95.

Material.— **Azores area:** Stn 5.044: several pedicels 9 mm high from stolon growing on *Aglaophenia* sp.; gonothecae not greatly elongated, wider than in other colonies. In addition, several pedicels with numerous fully developed gonothecae (RMNH-Coel. 27957, slide 2550).— **Atlantic coast of Morocco and Mauritania:** Stn 1.118: numerous pedicels up to 5 mm high, growing on *Aglaophenia* spec. and *Nemertesia* spec.; with gonothecae (RMNH Coel. 27950, slides 2525 and 2526).— Stn Mau.009: colonies reptant on *Aglaophenia* spec.; pedicels undulated, some gonothecae present (RMNH-Coel. 27953).— **Madeira area:** Stn 1.102: several pedicels 8 mm high, growing on hydrocauli of *Lytocarpia myriophyllum* (Linnaeus, 1758); with gonothecae. Castellate teeth of the hydrothecae with a deep notch, resembling those of *Clytia paulensis* (Vanhöffen, 1910) (RMNH-Coel. 28840, slide 2538).— Stn 1.114: several pedicels 10 mm high, growing on Plumulariidae, without gonothecae (RMNH-Coel. 28836, slide 2544).— **Cape Verde Islands:** Stn 6.076: numerous stalks growing on a dead hydrocaulus, the majority without hydrothecae, but with many gonothecae (RMNH-Coel. 27956).— Stn 6.137: several pedicels growing on *Obelia bidentata* Clarke, 1875 and also on stem of plumulariid; no gonothecae (RMNH-Coel. 27986).— Stn 7.059: several pedicels growing on a dead hydrocaulus, without gonothecae; hydrothecae with renovations; marginal teeth rather more rounded than castellated (RMNH-Coel. 27949).— Stn 7.151: several pedicels up to 5 mm high growing on *Aglaophenia* spec., no gonothecae present (RMNH-Coel. 28820).

Remarks.— This well known species has recently been re-described from Atlantic material by Ramil & Vervoort (1992a). The variation of the castellate cusps of the hydrothecal rim in our material is as wide as in the colonies studied by Ramil & Vervoort, varying between an apically flat cusp and a cusp with a fairly deep though still rounded incision, approaching the condition observed in *Clytia paulensis* (Vanhöffen 1910), though in that species the hydrothecae are much smaller.

Distribution.— **Arctic:** East Greenland (Kramp, 1943b).— **North Atlantic:** general (Broch, 1913, 1918a, 1928a; Kudelin, 1914; Billard, 1931b; Kramp, 1938d; Leloup, 1940b; Vervoort, 1942; Rees & Rowe, 1969; Robins, 1969; Olafsson, 1975), Faroer (Kramp, 1942b), south-west coast of Norway and Sweden (Rees, 1952; Burdon-Jones & Tambs-Lyche, 1960; Jägerskiöld, 1971; Christiansen, 1972), North Sea (Vervoort, 1946b; Leloup, 1947; 1950a; Knight-Jones & Jones, 1956; Laverack & Blacker, 1974; Cornelius, 1982a), Denmark (Kramp, 1935b), Great Britain (Alder, 1856; Ritchie, 1911; Crawshey, 1912; M.B.A., 1931, 1957; Cornelius & Ryland, 1990; Cornelius, 1995b), Ire-

land and Irish Sea (Wood, 1901; Robson, 1913b, 1914; Leloup, 1933c; Moore, 1937; Jonas, 1939; Williams, 1954; Caspers, 1950; Bassindale & Barrett, 1957; Bruce et al., 1963; Laverack & Blacker, 1974; Evans, 1978), coast of France (Billard, 1912a; Prenant & Teissier, 1924; Philbert, 1935d; Perrier, 1936; Vervoort, 1949; Teissier, 1950b, 1965; Fey, 1970; Castric & Michel, 1982), coast of Spain (Rioja y Martín, 1906; Estrada, 1980; Altuna et al., 1983, 1984; Parapar Vegas, 1986; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a; Álvarez Claudio & Anadón, 1995; Medel & López-González, 1996), Portugal (Da Cunha, 1950; Saldanha, 1974).— **Mediterranean:** general (Broch, 1912a; 1933b; Neppi, 1921; Vatova, 1928; Leloup, 1934c; Picard, 1951e, f, 1952a, d, 1955b, 1958b; Tortonese, 1958; Riedl, 1959, 1970; Bellan-Santini, 1961; Rossi, 1961; Lipkin & Safriel, 1971; García-Corrales et al., 1978; Boero, 1981a; García-Carrascosa, 1981; Gili i Sardà, 1982; Gili & Romero, 1983; Boero, 1985a; Gili & Castelló, 1985; Gili & García Rubies, 1985; Gili & Ros, 1985; Gili, 1986; Boero & Fresi, 1986; Templado et al., 1986; Llobet i Nadal, 1987; Roca, 1987; Llobet, Gili & Barangé, 1988; Gili, Murillo & Ros, 1989; Gili, Ros & Romero, 1989; Llobet, Gili & Hughes, 1991; Ramil & Vervoort, 1992a; Boero & Bouillon, 1993a; Peña Cantero, 1995), Black Sea (Manea, 1975).— **Temperate and subtropical eastern Atlantic:** Azores (Rees & White, 1996a), coast of West and South Africa (Billard, 1934; Kramp, 1947b; Vervoort, 1959; Millard, 1966a, 1975; Patrìti, 1970; Gili, Vervoort & Pagès, 1989).— **Western Atlantic:** coasts of Canada and United States (Verrill, 1879; Whiteaves, 1901; Sumner et al., 1913, Fraser, 1944a), Bermuda (Calder, 1991a, 1993b), Caribbean (Vervoort, 1968), South America (Genzano, 1990; El Beshbeeshy, 1991; Genzano & Zamponi, 1992; Blanco, 1994a, 1994b).— **Western Pacific:** Indo-China (Leloup, 1937b; Dawydoff, 1952; Bouillon, Massin & Kresevic, 1995), Japan (Stechow, 1913c).— **Eastern Pacific:** general (Fraser, 1938b, 1938c, 1939c, 1948), coasts of Canada and United States (Fraser, 1911, 1918b, 1921, 1926, 1937).

Summarising: an almost cosmopolitan species; absent in high arctic seas (Cornelius, 1995b) and from the Antarctic, but it is recorded from the Patagonian coast by El Beshbeeshy (1991). From the CANCAP area it has previously been cited from Morocco (Patrìti, 1970), from the Azores (Rees & White, 1966) and from Madeira (Bouillon, Massin & Kresevic, 1995). It has also been recorded from the Gulf of Guinea (Vervoort, 1959; Gili Vervoort & Pagès, 1989). It is here recorded from the Azores (south of Santa Marta), from the coast of Morocco (off Cape Dra), from off Mauritania (Passe du Lévrier), from south of Madeira and from the Cape Verde Archipelago (south-west of Boa Vista, south of São Vicente, south-west of Maio and south of Branco). The depth records at those localities vary between 17 and 320 m; exceptionally it has also been found below 1200 m depth (Leloup, 1940b).

Genus *Clytia* Lamouroux, 1812

Clytia arborescens Pictet, 1893 (figs 7-8)

Clytia arborescens Pictet, 1893: 2, 34, pl. 2 figs 30-31; Billard, 1906: 157, 167; 1933: 8, fig. 9; Dollfus, 1933: 126; Millard & Bouillon, 1973: 7, 50, fig. 7A-D; Bouillon, Massin & Kresevic, 1995: 79.
Laomedea arborescens; Leloup, 1937b: 4, 20, fig. 10.

Material.— **Madeira area:** Stn 1.094: one colony, 100 mm high; condition bad (RMNH-Coel. 28825, slide 2546); Stn 3.D05: numerous colonies, 70 mm high, growing on hard substrate; hydrocauli strongly polysiphonic and branched; with gonothecae (RMNH-Coel. 27988, 2 slides 2531).

Description (material from Stn 3.D05).— Hydrocauli brown, strongly polysiphonic over almost their full length and irregularly branched; large and annulated pedicels with hydrothecae also originate directly from the polysiphonic parts (fig. 7). Monosiphonic parts of colonies with large internodes, slightly curved in zig-zag fashion, and with several annulations at their base; one hydrotheca at the end of each internode provided with a pedicel of varied length, usually annulated throughout (figs 7, 8a). Hydrothecae very deep, with a thin diaphragm at the base, and with 10-14 (usually 12) large, triangular and pointed marginal cusps that have the inclination to point in one direction (fig. 8a). Gonothecae small, compared to the size of the colony, smooth, sac-shaped, truncated at their distal end, and there with a indistinct neck, peduncle short and smooth (fig. 8b-c).

Remarks.— Our material agrees with the description by Pictet (1893); it differs slightly in the shape of the gonothecae; these in our material have a more distinct neck and have no annuli on the pedicel (fig. 8b-c).

Distribution.— This species has previously been recorded from Amboina (Indonesia) (Pictet, 1893), from the Gulf of Suez and the Gulf of Akaba (Billard, 1933), from Madeira (Billard, 1906), Vietnam (Leloup, 1937b; Bouillon, Massin & Kresevic, 1995), and the Seychelles (Millard & Bouillon, 1973). Our records from Madeira (south of Madeira and south-east coast of Madeira) are the first since 1906. It is remarkable that Madeira is the only Atlantic locality where this species has ever been found; it is not present in the Mediterranean. This is an Indo-Pacific species that it seems to have rounded the Cape to reach Madeira and has not followed the route via the Mediterranean

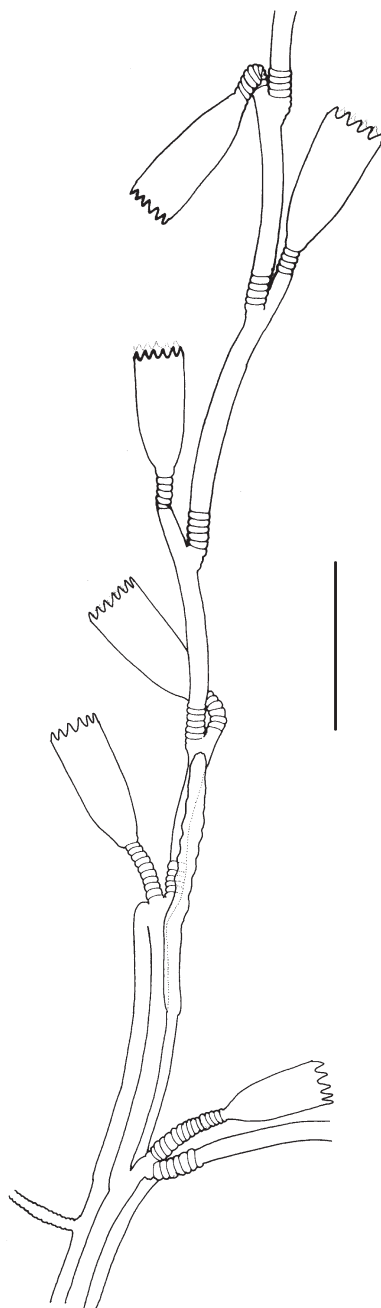


Fig. 7. *Clytia arborescens* Pictet, 1893, Stn 3.D05, slide 2531, part of colony. Scale: 1 mm.

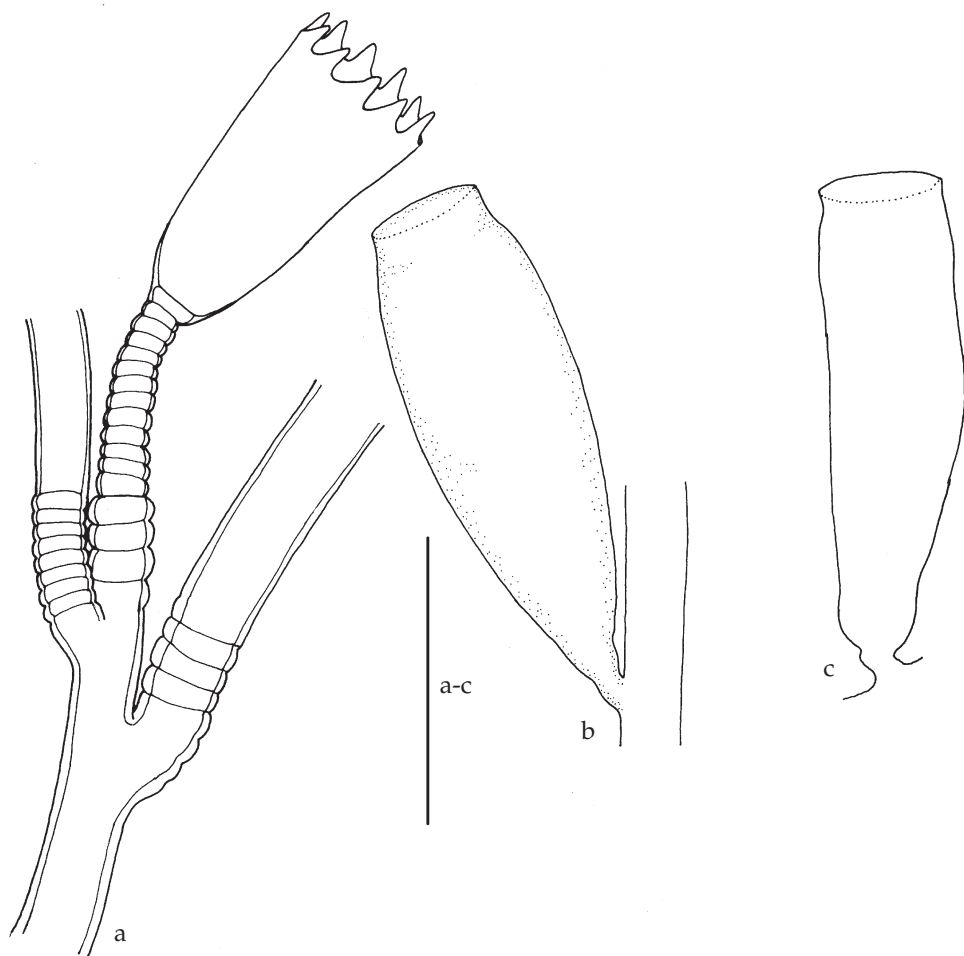


Fig. 8. *Clytia arborescens* Pictet, 1893, a-b, after wet preparation; c, slide 2531; a, hydrotheca in monosiphonic part of colony; b-c, gonothecae. Scale: 0.5 mm.

by crossing the Suez Channel. The depth records are from between 15 m (Leloup, 1937b) and 150 m (present material).

Clytia gracilis (M. Sars, 1850)

Laomedea gracilis p.p. M. Sars, 1850: 138.

Laomedea (*Campanularia*) *gracilis*; M. Sars, 1857: 160, pl. 2 figs 1-3, 5; Kramp, 1942b: 41; Leloup, 1952a: 155-157, fig. 88; Anonymous, 1988a: 57; Jensen & Frederiksen, 1992: 64.

Gonothyræa gracilis; Hincks, 1868: 183-184, pl. 36 fig. 1; Rioja y Martín, 1906: 278; Kudelin, 1914: 467-469; Fraser, 1937b: 81, pl. 16 fig. 80; 1944a: 148-149, pl. 26 fig. 121; Defenbaugh, 1972: 387-388; 1974a: 118; Fotheringham & Brunenmeister, 1975: 160; Britton & Morton, 1989: 344, figs 3.5C, 6.9R.

Laomedea (*Clytia*?) *gracilis*; Broch, 1928a: 73.

- Clytia gracilis*; Calder & Hester, 1978: 90; Rho & Park, 1980: 19-20, pl. 2 figs 5-6; Antsulevich, 1981: 85; Castric & Michel, 1982: 82, fig.; Stepan'yants, 1985b: 86; Cornelius & Östman, 1986: 165-166; Venugopalan & Wagh, 1986: 276; Cornelius, 1987d: 34, pl. 1 fig. a; Östman, 1987: 67, 74, 75, 76, 78; Stepan'yants, 1989b: 412 et seq.; Antsulevich, 1991b: 40, 41; Calder, 1991a: 54-57, fig. 31; Genzano, Cuartas & Excoffon, 1991: 69, fig. 5E; Cornelius, 1992a: 254, 257; 1992b: 98; Genzano & Zamponi, 1992: 35-36, fig. 15; Park, 1992: 288; Ramil & Vervoort, 1992a: 235-238, fig. 67a; Boero & Bouillon, 1993a: 264; Calder, 1993b: 67 et seq.; Schönborn et al., 1993: 237; Vervoort, 1993b: 557-558; Altuna Prados, 1994a: 314-317, pl. 60 figs A-F; Blanco, 1994a: 158; 1994b: 193; Genzano, 1994: 5; Altuna Prados, 1995a: 54; Álvarez-Claudio & Anadón, 1995: 240; Cornelius, 1995b: 246-251, fig. 56; Bouillon, Massin & Kresevic, 1995: 80; Hirohito, 1995: 63-64, fig. 18c-g; Peña Cantero, 1995: 428-434, pl. 54 figs a-c; Genzano, 1996: 290 et seq.; Medel & López-González, 1996: 205; Migotto, 1996: 81-82, 121, fig. 15c; Watson, 1996: 78; Ramil et al., 1998: 198-199.
- Clytia* (?) *gracilis*; Gibbons & Ryland, 1989: 400-402, fig. 18.
- Clytia hemisphaerica* f. *gracilis*; Östman, 1983b: 6; 1984: 100.
- Campanularia pelagica* Van Breemen, 1905: 205, fig. 8; Heinsius & Jaspers: 1913: 101, fig. 25N; Billard, 1917b: 539, fig. 1; Van Benthem Jutting, 1922: lxxvi; Stepan'yants, 1972b: 325.
- Laomedea* (*Phialidium*) *pelagica*; Hummelinck, 1930: 37, fig. 6; Vervoort, 1959: 313-315, fig. 55b-c; Vervoort, 1968: 15-17, fig. 5.
- Clytia* (*Campanularia*) *pelagica*; Wulff, Büchmann & Künne, 1934: 336; Künne, 1938: 144, 148, 152, 154, 156, 160, 162; 1952: 41; Kühl, 1962: 223-225, figs 12-13; 1967: 242-243.
- Laomedea pelagica*; Vervoort, 1946b: 285-288, fig. 126; 1949: 157; Hummelinck, 1954: 161; Kühne & Rachor, 1966: 440 et seq.; Wolff & Dankert, 1981: 21; Gili & Romero, 1983: 36 et seq.; Gili & García-Rubies, 1985: 43; Gili & Ros, 1985: 329; Gili, 1986: 186-187, fig. 4.168; Gili, Ros & Romero, 1989: 282; Gili & Ballesteros, 1991: 247.
- Clytia pelagica*; Teissier, 1965: 16; Kühl & Mann, 1968a: 121; 1968b: 441; 1969: 47; Kühl, 1971: 807; Wedler, 1975: 332 et seq.; Castric & Michel, 1982: 82, fig.
- Laomedea* (*Clytia*) *pelagica*; Vervoort, 1972: 91-92, fig. 26c; García-Corrales et al., 1978: 28, fig. 11; Gili i Sardà, 1982: 61, fig. 24.
- Clytia sarsi* Cornelius, 1982: 78.

Material.— **Atlantic coast of Morocco and Mauritania:** MAU.009: numerous colonies, 9 mm high, growing on *Amphisbetia operculata* (Linnaeus, 1758); a few gonothecae are present (RMNH-Coel. 27990).— **Canary Islands and Selvagens Archipelago:** Stn 2.D04: several branched pedicels on *Zostera spec.*; without gonothecae (RMNH-Coel. 27979); Stn 4.153: three small detached fragments without gonothecae (RMNH-Coel. 28824, slide 2541).

Remarks.— The CANCAP material agrees with previous descriptions (Vervoort, 1959, 1968, as *Laomedea* (*Phialidium*) *pelagica*) and Ramil & Vervoort (1992a) and is distinguished from *Clytia hemisphaerica* (Linnaeus, 1767) by the generally larger size of the hydrothecae, that are slenderer and have slightly internally directed, more acute marginal cusps.

Distribution.— **Arctic Seas:** general (Stepan'yants, 1987b), Barentz Sea (Stepan'yants, 1985b; Antsulevich, 1991b), northern Russia (Antsulevich, 1981).— **Eastern Atlantic:** general (Ramil & Vervoort, 1992a), Norway (M. Sars, 1850, 1858), Faroer (Kramp, 1942b; Jensen & Frederichsen, 1992), Baltic (Kühl, 1962, 1967, 1971; Schönborn et al., 1993), German Bight (Künne, 1952), North Sea, general (Broch, 1928a), Great Britain (Cornelius, 1995b), Belgium (Leloup, 1952a), France, Bay of Biscay (Castric & Michel, 1982), north coast of Spain (Altuna Prados, 1994a, 1995a; Ramil et al., 1998).— **Mediterranean:** general (Gili & Romero, 1983; Gili, Ros & Romero, 1989; Gili & Ballesteros, 1991; Boero & Bouillon, 1993a; Vervoort, 1993b; Peña Cantero, 1995).— **Western**

Atlantic: coasts of Canada and United States (Calder & Hester, 1978; Fraser, 1944a; Defenbaugh, 1972, 1974a), Bermuda (Calder, 1991a, 1993b), Gulf of Mexico (Fotheringham & Brunnenmeister, 1975; Britton & Morton, 1989), coast of Brazil (Migotto, 1996), Argentine coast (Genzano & Zamponi, 1994; Blanco, 1994a, 1994b; Genzano, 1994, 1996).— **Western Pacific:** Japan (Hirohito, 1995), South Korea (Rho & Park, 1980).— **East Pacific:** general (Fraser, 1937b), Fiji (Gibbons & Ryland, 1989), west Australia (Watson, 1996).— **Indian Ocean:** India, Bombay (Venugopalan & Wagh, 1986).

Summarising: this species has a wide distribution, occurring in all oceans (see Cornelius, 1995b); it is very common along the Atlantic coast of Africa from Cape Verde to Cape Town (Vervoort, 1959). It has previously been recorded from off Morocco (Patriiti, 1970). It is here recorded from Passe du Lévrier, Mauritania and from the Canary Islands (south coast of Fuerteventura and SW of Palma); depth records vary between 15 and 200 m.

Clytia hemisphaerica (Linnaeus, 1767)

Medusa hemisphaerica Linnaeus, 1767: 1098.

Clytia hemisphaerica; Dollfus, 1948: 23; Rees & Thursfield, 1965: 95; Millard, 1966a: 478, fig. 14A-F; Rees, 1966b: 200, fig. 1; Rees & White, 1966a: 275; Baker, 1967: 39; Millard, 1968: 253, 258-259; Rees & Rowe, 1969: 16; Robins, 1969: 331; Calder, 1970c: 1541; Day, Field & Penrith, 1970: 12; Millard & Broekhuysen, 1970: 298; Calder, 1971: 50, pl. 3 fig. G; Schmidt, 1972b: 34, 43, pl. ID; Millard & Bouillon, 1973: 7, 54; Schmidt, 1973a: 283; Hiscock, 1974: 23-24; Millard & Bouillon, 1974: 5; Calder, 1975: 300, fig. 4A-B; Cooke, 1975: 93, pl. 2 fig. 3; Millard, 1975: 217, fig. 72A-D; Withers & Thorp, 1976: 587, 603; Cooke, 1977: 89, 90, fig. 17; Evans, 1978: 51, 52; García-Corrales et al., 1978: 25, fig. 10; Millard, 1978: 190; 1979b: 131; Morri, 1979b: 306; Östman, 1979a: 5 et seq.; 1979b: 125-141, figs 1-46; Boero, 1980b: 144, fig. 4a; Morri, 1980b: 6; Boero, 1981a: 182; 1981b: 111; 1981c: 197; García-Carrascosa, 1981: 171-175, pl. 31 fig. d; Morri, 1981a: 194; 1981b: 80, fig. 27; Cornelius, 1982a: 73-82, fig. 9; Gili i Sardà, 1982: 60, fig. 23; Östman, 1982: 155 et seq., figs; Gili & Romero, 1983: 36 et seq.; Morri & Bianchi, 1983b: 79; Altuna et al., 1984: 133; Boero, 1984: fig. 1; Bouillon, 1984b: 107; Skinner, 1984: 439, 444, fig. 2; Bavestrello, 1985: 358; Boero, 1985a: 136; Boero et al., 1985: 29; Gili & Ros, 1985: 329 et seq.; Isasi Urdangarín, 1985: 57-58, figs 11-12; Morri, 1985: 117; Vervoort, 1985: 289; Woodhead & Jacobsen, 1985: 367; Boero & Fresi, 1986: 144; Bouillon, Claerebout & Seghers, 1986: 138; Cornelius & Östman, 1986: 164-165; Gili, 1986: 175, 250-251, figs 4.18C-F, 4.42B, 4.56b, 4.60g, i, j, n, q.; Isasi & Sáiz, 1986: 69; Izquierdo et al., 1986: 89, fig. 7; Boero, 1987b: 254; Cornelius, 1987d: 34, pl. 1 fig. b; García-Carrascosa, Escartí & Silvestre, 1987: 368; García-Rubies, 1987: 148; Gili, Pagès & Vives, 1987: 161; Gili, Ros & Pagès, 1987: 92; Hughes, 1987: 178; Llobet i Nadal, 1987: 143-150, fig. 40; Östman, 1987: 64, 74, 75, 76; Östman, Piraino & Roca, 1987: 300 et seq.; Roca, 1987: 210, 211; Vervoort, 1987: 96; Hayward, 1988: 51, fig. II.10; Llobet, Gili & Barangé, 1988: 40, fig. 3C; Östman, 1988: fig. 5; Riera, Gili & Pagès, 1988: 26 et seq.; Gibbons & Ryland, 1989: 402-404, figs 19-21; Gili, Murillo & Ros, 1989: 23; Gili, Ros & Romero, 1989: 282; Gili, Vervoort & Pagès, 1989: 106, fig. 30B, C; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Calder, 1990: 446, 448; Cornelius & Ryland, 1990: 131, fig. 4.10; Piraino & Morri, 1990: 53; Piraino, Morri & Boero, 1990: 387; Cairns et al., 1991: 23; Calder, 1991a: 57-61, fig. 32; 1991b: 223; 1991c: 2068 et seq.; Gili & Ballesteros, 1991: 247; Llobet, Gili & Hughes, 1991: 153 et seq.; Roca, Moreno & Barceló, 1991: 70; Cocito et al., 1992: 345; Cornelius, 1992a: 254, 257; 1992b: 79 et seq.; Dawson, 1992: 13; García-Rubies, 1992: 265; Morri, Cagnoli & Bianchi, 1992: 373; Watson, 1992a: 220; Bianchi, Ceppodomo, Cocito et al., 1993: 326; Bianchi, Ceppodomo, Niccolai et al., 1993: 299; Boero & Bouillon, 1993a: 264; Calder, 1993b: 67 et seq.; Harms, 1993: 15; Schönborn, 1993: 237, pl. 11 fig. 2; Antuna Prados, 1994a: 317-320; Park, 1994: 202, table 1; Watson, 1994a: 67; Altuna Prados, 1995a:

- 54; Álvarez-Claudio & Anadón, 1995: 240; Bouillon, 1995: 224, 236; Bouillon, Massin & Krešević, 1995: 80; Calder, 1995: 543 et seq.; Cornelius, 1995b: 252-255, fig. 57; Lucas et al., 1995: 362 et seq.; Peña Cantero, 1995: 434-440, pl. 55 figs a-d; Boero, Bouillon & Piraino, 1996: 21; Caltagirone, Pessani & Robotti, 1996: 155; Genzano, 1996b: 4-5, fig. 3; Medel & López-González, 1996: 205; Migotto, 1996: 82-84, 121, fig. 15d-f; Mills et al., 1996: 150.; Watson, 1996: 78; Ramil et al., 1998: 199.
- Clytia hemisphaerica* f. *johnstoni*; Östman, 1979a: 6 et seq., figs 3, 6-7, 11-12, 14, 16; 1983b: 6; 1984: 100; Isasi Urdangarín, 1985: fig. 12; Gibbons & Ryland, 1989: 403, fig. 19.
- Clytia* (*Phialidium*) *hemisphaericum*; Bouillon, 1984b: 26.
- Clytia* ?*hemisphaerica*; Watson, 1994b: 151-153, fig. 2A-E.
- Clytia johnstoni*; Verrill, 1879: 16; Chadwick, 1898: 7; Wood, 1901: 15, 20; Rioja y Martín, 1906: 278; Ritchie, 1910: 30-31; Bedot, 1911: 219. Fraser, 1911: 36; Linko, 1911: 222-225, fig. 42; Billard, 1912a: 461; Crawshaw, 1912: 325; Fraser, 1912c: 358, fig. 17; Stechow, 1912: 352; Fraser, 1913b: 165; Robson, 1913b: 76, 77, 78, 79, 80, 81, 82, 83; Fraser, 1914a: 146, pl. 14 fig. 43; Kudelin, 1914: 469; Müller, 1914: 303-307; Robson, 1914a: 99; Waddington, 1914: 217; Jäderholm, 1916a: 7; Fraser, 1918b: 332, 345, pl. 2 fig. 3; Stechow, 1919a: 43; Heimans, 1920: 131, figs 2, 2b; Orton, 1920: 350; Fraser, 1921: 157, fig. 40; Stechow, 1921d: 254; Bennitt, 1922: 248; Hentschel, 1922: 4; Horsman, 1922: 263; Van Benthem Jutting, 1922: lxxxvi; Elmhurst, 1923: 20; Foerster, 1923: 40-41; Stechow, 1923d: 97; Bale, 1924: 232; Prenant & Teissier, 1924: 26; Fraser, 1926: 213; McIntosh, 1926: 253; Billard, 1927c: 332; Stechow, 1927: 308; Billard, 1928a: 456; Stechow, 1929: 151; Saint-Hilaire, 1930: 553 et seq.; Billard, 1931a: 399; 1931b: 246; M.B.A., 1931: 71; Nobre, 1931: 10; Baeschlin, 1932: 263 et seq.; Leloup, 1934d: 1; Weill, 1934: 464, figs 287-288; Philbert, 1935a: 85, 86; 1935d: 18, 26; 1935e: 24; Billard, 1936: 3; Fraser, 1936c: 124; Perrier, 1936: 36; Fraser, 1937b: 74-75, pl. 15 fig. 71; Krüger & Meyer, 1937: 678; Moore, 1937: 42; Nobre, 1937: 21; Fraser, 1938b: 8, 30; Eales, 1939: 39; Fraser, 1939c: 158 et seq.; Jones, 1939: 19; Antipa, 1941: 217; Bassindale, 1941: 148; Fraser, 1943b: 88; 1944a: 138-141, pl. 24 fig. 111; Gilson, Hollick & Pantin, 1944: 234; Fraser, 1948: 208; Purchon, 1948: 296, 300; Kato, 1949: 215; Berrill, 1950a: 1 et seq., figs 1-2, 5; Picard, 1950b: 192; Teissier, 1950b: 16; Delamare Deboutteville & Nunes, 1951: 424, 426; Pearse & Williams, 1951: 136; Picard, 1951e: 278; 1951f: 261; Dawydoff, 1952: 52, 54, 56; Delamare Deboutteville & Nunes, 1952: 4, fig. 1; Picard, 1952a: 349; 1952d: 220, 221; Prokudina, 1952: 118; Rees, 1952: 6; Lewis, 1953: 529, 534; Deevey, 1954: 270; Newell, 1954: 330; Williams, 1954: 48; Picard, 1955b: 185; Remane, 1955: 61 et seq.; Hancock, Drinnan & Harris, 1956: 323; Knight Jones & Jones, 1956: 28; Spaul, 1956: 17; Bassindale & Barrett, 1957: 244; Hamond, 1957: 295, 312; M.B.A., 1957: 43; Ralph, 1957: 823, fig. 1h-u, 3a-f; Valkanov, 1957: 17; Millard, 1958: 172, fig. 3a, d, f; Paul, 1958: 535; Tortonese, 1958: 184; Riedl, 1959: 634; Burdon-Jones & Tambs-Lyche, 1960: 6; Costa, 1960: 33; Hale, 1960: 340 et seq.; Eales, 1961: 35; Manea, 1961: 850; Rossi, 1961: 79; Macnae & Kalk, 1962: 114; Redier, 1962a: 23; Bruce et al., 1963: 51; Hamond, 1963b: 12; Hale, 1964: 517-537; Pérèz & Picard, 1964: 63; Redier, 1964b: 130; Cabioch, 1965b: 56; De Haro, 1965: 109, 111, fig. 6; Hudson, 1965: 14-22, fig. 1, pls 1-4; Mammen, 1965: 22, fig. 51; Crothers, 1966: 11; Eales, 1967: 35; Manea, 1968: 281; Bellan-Santini, 1970: 340, 356; Clausade, 1970: 724; Gravier, 1970: 116; Manea, 1970a: 55 et seq.; Patriti, 1970: 32, fig. 39; Riedl, 1970: 150, pl. 41; Roosen-Runge, 1970: 215; West & Rentraw, 1970: 332; Hicks, 1971: 48; Huxtable, 1971: 64, fig; Redier, 1971a: 504; Rossi, 1971: 32, fig. 12A; Gravier-Bonnet, 1972: 4, 5; Christiansen, 1972: 293; Defenbaugh, 1972: 388; Castric-Fey, 1973: 213; Defenbaugh & Hopkins, 1973: 78, pl. 7 fig. 29; Hill-Cottingham, 1973: 283; Morris & Mogelberg, 1973: 11, fig. 7; Morton & Miller, 1973: 152, fig. 54 no. 4; Laverack & Blacker, 1974: 20; Leloup, 1974: 14; Meekel, 1974: 210; Saldanha, 1974: 325; Hughes, 1975: 291 et seq.; Chimenz Gusso & Rivošecchi Taramelli, 1976: 113, 116, 117; Relini & Romairone, 1976: 239; Riggio & Mazzola, 1976: 144, 147; Withers & Thorp, 1976: 587, 603; Boyden et al., 1977: 487; Chas Brínquez & Rodríguez Babio, 1977: 23, fig. 6A-C; Gordon & Ballantine, 1977: 100; Montanari & Morri, 1977: 295 et seq.; Kubota, 1978b: 352; Relini et al., 1979: 232; Ljubenkova, 1980: 47; Antsulevich, 1981: 186; Frasz, 1981: 15; Castric & Michel, 1982: 82, fig; McInnes, 1982: 163; González-Sanjurjo, 1982: 56; Butler et al., 1983: 42; Park, 1992: 288; García Alvarez et al., 1993: 271; Jones, 1993: 108 et seq.; Rho & Park, 1983: 19, pl. 2 fig. 4; Baker, 1994: 219.
- Campanularia johnstoni*; Whiteaves, 1901: 24; Broch, 1910b: 32, fig. 27; 1913: 12; 1918: 163; Mathisen, 1928: 7, 33, 37; Vatova, 1928: 140; Leloup, 1930c: 1-5, figs 1-2; Kramp, 1933c: 246, 247, fig. 1;

Leloup, 1933c: 6, 10, 20; Remane, 1933: 183, 218; Leloup, 1934c: 10; 1934d: 2; Kramp, 1935b: 99, fig. 45a; Perrier, 1936: 23; Leloup, 1937a: 97, 116, 117, fig. 3; 1937b: 4, 19; Kramp, 1938d: 16, 62, 67, 72; Da Cunha, 1940: 109, 118; Leloup, 1940b: 20; Kramp, 1942b: 36-37; Leloup, 1942: 3, fig. 1; Vervoort, 1942: 308; Kramp, 1943b: 43; Da Cunha, 1944: 9, 59, fig. 34; Smidt, 1944: 243; Vervoort, 1946a: 342; 1946b: 269, figs 24b, 118-119; 1946c: 342; Leloup, 1947: 22; Vervoort, 1949: 155; Caspers, 1950: 133; Da Cunha, 1950: 122, 125, 138; Kramp, 1950: 505, fig. 12; Rossi, 1950: 13; Leloup, 1952a: 150-152, figs 6C2, 82; Hummelinck, 1954: 161; Mulder, 1956: 10, 24; Buchanan, 1957: 358; Penny-cuik, 1959: 170; Vervoort, 1959: 312; Naumov, 1960: 250-251, figs 136, 137; Günzl, 1964: 516; Tiedtke, 1964: 36, 52-56; Anonymous, 1970: 2; Füller, 1970: 18, figs 18/2 & 18/3; Thiel, 1970: 489; Jägerskiöld, 1971: 61; Schmid & Tardent, 1971: 99-104; Jensen & Bender, 1973: 187; Meyer, 1973: 70 et seq.; Rasmussen, 1973: 26; Schriever, 1974: 82 et seq.; Belousov, 1975b: 655, fig. 1 no. 15; Olafsson, 1975: 18; Zelikman, 1976a: 199; Anger, 1978: 460 et seq.; Chaplygina, 1980: 58, fig. 2a; Cornelius & Garfath, 1980: 283; Cornelius, 1981a: 212; Wolff & Dankert, 1981: 27; Urgorri & Besteiro, 1983: 16; Anonymous, 1985: 271.

Clytia (*Campanularia*) *johnstoni*; Hadzi, 1915: 160, fig. 30.

Campanularia (*Phialidium*) *johnstoni*; Broch, 1928a: 73, figs 1, 71; Hummelinck, 1936: 50.

Clythia johnstoni; Dolgopolskaya, 1940: 72; Von Salvini-Plawen, 1972: 393; Camp & Ros, 1980: 201 (incorrect subsequent spelling).

Campanularia (*Clytia*) *johnstoni*; Vervoort, 1968: 96.

Campanularia (*Phialidium*) *johnstoni* f. *crassa*; Broch, 1933b: 93.

Campanularia (*Phialidium*) *johnstoni* f. *typica*; Broch, 1933b: 93.

Material.— **Azores area:** Stn 5.002: isolated pedicels with hydrothecae, mixed with *Obelia dichotoma* (Linnaeus, 1758) and developing on cirripeds; no gonothecae (RMNH-Coel. 28831, slide 2530); Stn 5.088: numerous pedicels up to 4 mm high, with gonothecae, growing on hydroid stem (RMNH-Coel. 28839, slide 2523).— **Madeira area:** Stn 1.072: numerous colonies up to 7 mm high growing on Algae, with *Obelia geniculata* (Linnaeus, 1758); many gonothecae (RMNH-Coel. 28846, slide 2536).— **Canary Islands and Selvagens Archipelago:** Stn 4.003: several pedicels on algae and associated with Bryozoa (RMNH-Coel. 28827, slide 2552); Stn 4.004: several stalks on Algae, about 2 mm high, no gonothecae (RMNH-Coel. 28841, slide 2558). Together with *Obelia dichotoma* (Linnaeus, 1758); Stn 4.007: several pedicels, up to 3 mm high, growing on Algae; single empty gonotheca present (RMNH-Coel. 28829, slide 2551); Stn 4.015: several pedicels growing on ascidians; without gonothecae (RMNH-Coel. 27984).

Remarks.— This well known species does not need to be re-described here. We believe that the record of this species from the coast of Namibia (Gili, Vervoort & Pagès, 1989) relates to *C. gracilis* (M. Sars, 1850), because of the morphology of the hydrothecal cusps.

Distribution.— **Arctic Seas:** Spitzbergen (Jäderholm, 1916a), Russia (Linko, 1911; Kudelin, 1914; Naumov, 1960; Antsulevich, 1981).— **North-eastern Atlantic:** general (Broch, 1913, 1918a; Billard, 1931b; Leloup, 1937a, 1940b; Kramp, 1938d, 1942b, 1943b; Olafsson, 1975), Norway (Mathisen, 1928; Rees, 1952; Burdon-Jones & Tambs-Lyche, 1960; Christiansen, 1972), Swedish west coast (Rees & Rowe, 1969; Jägerskiöld, 1971), Baltic Sea (Stechow, 1927; Remane, 1933, 1955; Smidt, 1944; Schriever, 1974; Schönborn, Arndt & Gasselck, 1993), North Sea, general (Broch, 1928a; Krüger & Mayer, 1937), Danish coast (Kramp, 1935b, 1950; Rasmussen, 1973), German Bight and Helgoland (Caspers, 1950; Tiedtke, 1964; Thiel, 1970; Meyer, 1973; Von Anger, 1978; Harms, 1993), Great Britain (Ritchie, 1910; Robson, 1914a; Waddington, 1914; McIntosh, 1926; M.B.A., 1931, 1957; Eales, 1939, 1961, 1967; Gilson et al., 1944; Lewis, 1953; Newell, 1954; Williams, 1954; Knight-Jones & Jones, 1952; Spaul, 1956; Hamond, 1957,

1963b; Paul, 1958; Crothers, 1966; Robins, 1969; Hiscock, 1974; Laverack & Blacker, 1974; Withers & Thorp, 1976; Cornelius, 1982a; Hayward, 1988; Cornelius & Ryland, 1990; Jones, 1993; Cornelius, 1995b), Irish Sea (Chadwick, 1898; Wood, 1901; Robson, 1913b; Horsman, 1922; Elmhurst, 1923; Moore, 1937; Jones, 1939; Bassindale, 1941; Purchon, 1948; Bassindale & Barrett, 1957; Bruce et al., 1963; Huxtable, 1971; Hill-Cottingham, 1973; Boyden et al., 1977; Evans, 1978; Skinner, 1984 (medusa); Baker, 1994), Netherlands (Heimans, 1920; Van Benthem Jutting, 1922; Leloup, 1933c; Hummelinck, 1936, 1954; Vervoort, 1946b, c; Mulder, 1956; Wolff & Dankert, 1981), Belgium (Leloup, 1930c, 1934d, 1942, 1947, 1952a), Channel coasts (Crawshey, 1912; Philbert, 1935a, d, e; Vervoort, 1949; Castric & Michel, 1982), Atlantic coast of France (Bedot, 1911; Billard, 1912a; Prenant & Teissier, 1924; Billard, 1927c; Perrier, 1936; Teissier, 1950b; Cabioch, 1965b), Bay of Biscay (Castric-Fey, 1973; Vervoort, 1985), north and north-west coast of Spain (Chas Brínquez & Rodríguez Babio, 1977; González Sanjurjo, 1982; Urgorri & Besteiro, 1983; Altuna et al., 1984; Isasi Urdangarín, 1985; Isazi & Sáiz, 1986; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a; Álvarez-Claudio & Anadón, 1995; Ramil et al., 1998), Portugal (Nobre, 1931, 1937; Da Cunha, 1940, 1944, 1950; Saldanha, 1974).— **Mediterranean:** all areas (Billard, 1931a, 1936; Leloup, 1934c; Picard, 1950b, 1951e, f, 1952a, 1952d, 1955b; Rossi, 1950, 1961, 1971; Tortonese, 1958; Riedl, 1959; Costa, 1960; Redier, 1962a; Pérès & Picard, 1964; De Haro, 1965; Bellan-Santini, 1970; Clausade, 1970; Chimez Gusso & Rivoecchi Taramelli, 1976; Riggio & Mazzola, 1976; Montanari & Morri, 1977; García-Corrales et al., 1978; Morri, 1979b, 1980b, 1981a, b, 1985; Relini et al., 1979; Camp & Ros, 1980; Boero, 1981a, 1981b, 1981c; García-Carrascosa, 1981; Gili i Sardà, 1982; Gili & Romero, 1983; Morri & Bianchi, 1983b; Bavestrello, 1985; Boero et al., 1985; Gili & Ros, 1985; Boero & Fresi, 1986; García-Carrascosa et al., 1987; García-Rubies, 1987, 1992; Gili, Pagès & Vives, 1987; Gili, Ros & Pagès, 1987; Llobet i Nadal, 1987; Llobet, Gili & Barangé, 1988; Östman, Piraino & Roca, 1987; Roca, 1987; Riera, Gili & Pagès, 1988; Gili, Murillo & Ros, 1989; Gili, Ros, Romero, 1989; Piraino & Morri, 1990; Gili & Ballester, 1991; Llobet, Gili & Hughes, 1991; Roca Moreno & Barceló, 1991; Cocito et al., 1992; Morri, Cagnoli & Bianchi, 1992; Bianchi, Ceppodomo et al., 1993; Boero & Bouillon, 1993a; Peña Cantero, 1995; Boero, Bouillon & Piraino, 1996; Medel & López-González, 1966), Adriatic (Vatova, 1928; Broch, 1933b; Riedl, 1970), Black Sea (Dolgopol'skaya, 1940; Antipa, 1941; Valkanov, 1957; Manea, 1961, 1968, 1970).— **Temperate and subtropical Atlantic:** Azores (Rees & White, 1966a; Baker, 1967; Cornelius, 1992b), Canary Islands (Izquierdo et al., 1986), west and south coast of Africa (Buchanan, 1957; Millard, 1958, 1966a, 1975, 1978; Vervoort, 1959; Patrini, 1970; Redier, 1971a; Gili, Vervoort & Pagès, 1989).— **Western Atlantic:** coasts of Canada and United States (Verrill, 1879; Whiteaves, 1901; Fraser, 1912c, 1913b, 1918b, 1921, 1936c, 1944a; Pearse & Williams, 1951; Calder, 1970c, 1971, 1975, 1990; Woodhead & Jacobsen, 1985), Bermuda (Bennitt, 1922; Calder, 1991a, 1993b, 1995), Gulf of Mexico (Deevey, 1954; Defenbaugh, 1972; Defenbaugh & Hopkins, 1973), Caribbean (Hentschel, 1922; Vervoort, 1968; Morris & Mogelberg, 1973), Central & South America (Calder, 1991b, c; Genzano, 1996b; Migotto, 1996).— **Indian Ocean:** general (Millard, 1979b), Red Sea (Schmidt, 1972b, 1973a), Cape and Indian Ocean coast of South Africa (Millard, 1968; Day, Field & Penrith, 1970; Millard & Broekhuysen, 1970), Moçambique (Macnae & Kalk, 1962), Madagascar (Gravier, 1970a; Gravier-Bonnet,

1972), Seychelles (Millard & Bouillon, 1973, 1974), India (Mammen, 1965).— **Eastern Pacific:** general (Fraser, 1938b, 1939c, 1948), Pacific coasts of Canada and United States [Fraser, 1911, 1914a, 1926, 1937b; Foerster, 1923 (medusa); Ljubenkova, 1980], Chile (Leloup, 1974), Enewetok Atoll (Cooke, 1975).— **Central Pacific:** Hawaii (Cooke, 1977).— **Western Pacific:** Sea of Okhotsk (Zelikman, 1976a), Sea of Japan (Chaplygina, 1980), South Korea (Rho & Park, 1983; Park, 1994), Indochina (Leloup, 1937b; Dawydoff, 1952), Bismarck Sea [Bouillon, 1984b; Bouillon, Claerebout & Seghers, 1986 (medusa)], Fiji (Gibbons & Ryland, 1989), Australia (Pennycuik, 1959; McInnes, 1982; Watson, 1992a, 1994a, b, 1996), New Zealand [Ralph, 1957; Hicks, 1971; Morton & Miller, 1973; Gordon & Ballantine, 1977; Dawson, 1992; Bouillon, 1995 (medusa)].

Summarising: a species with a world-wide distribution, considered near-cosmopolitan by Cornelius (1995). It is known to occur along the whole of the African coast (Gili et al., 1989), and has previously been recorded from the Azores (Rees & White, 1966; Cornelius, 1992), Morocco (Patrity, 1970) and the Canary Islands (Izquierdo et al., 1986). The present records are from the Azores (NE of São Miguel and E of Faial), from E of Madeira and from S of Lanzarote in the Canary Islands; the bathymetrical range of the CANCAP material is from 0 to 80 m.

The polyp phase of *Clytia hemisphaerica* has also been found on parasitic copepods (Dollfus, 1948; Delamare Deboutteville & Nunes, 1951, 1952).

Clytia linearis (Thornely, 1899)

Obelia linearis Thornely, 1899: 453, pl. 44 fig. 6; Mammen, 1965: 11; Cornelius, 1975a: 280.

Clytia linearis; Stechow, 1913b: 144; 1913c: 8, 66, figs 22-24; Jäderholm, 1919a: 12, pl. 3 fig. 1; Stechow, 1923b: 7; 1923d: 97; Kato, 1949: 216, fig. 1; Hakushi et al., 1957: 217, pl. 108 fig. 4; Yamada, 1959: 40; Itô & Inoue, 1962: 448, pl. 8 figs 63-64; Hirohito, 1974: 12; Saito & Suzuki, 1974: 37; Hirohito, 1977: 14-20, fig. 1; Boero, 1981a: 182; 1981b: 197; Cornelius, 1981b: 49; 1982a: 84-86, fig. 12; Altuna et al., 1983: 133, fig. 4a, b; Hirohito, 1983: 5, 16; Altuna et al., 1984: 133, fig. 14a-b; Bouillon, 1984b: 107; Boero, 1985a: 136; Boero et al., 1985: 29; Isasi Urdangarín, 1985: 58, fig. 13A; Boero & Fresi, 1986: 144; Gili, 1986: 176-177, fig. 4.19C-D; Isasi & Sáiz, 1986: 69; Templado et al., 1986: 98; Aguirrezabalaga et al., 1987: 112, fig. 3; Barangé & Gili, 1987: 49, fig. 3B; Boero & Sarà, 1987: 137; Cornelius, 1987e: 293-295, pl. 5; García-Carrascosa et al., 1987: 368; Llobet i Nadal, 1987: 150-154, fig. 44; Östman, 1987: 75, 76; Östman, Pirano & Roca, 1987: 300 et seq.; Rees & Vervoort, 1987: 94-95; Vervoort, 1987: 97; Llobet, Gili & Barangé, 1988: 35, fig. 3G; Boero & Bouillon, 1989b: 39, fig. 1 no. I; Gibbons & Ryland, 1989: 404-405, fig. 22; Gili, Murillo & Ros, 1989: 23; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Cairns et al., 1991: 23; Calder, 1991a: 62-64, fig. 34; 1991b: 223; 1991c: 2068 et seq.; Llobet, Gili & Hughes, 1991: 153 et seq.; Roca, Moreno & Barceló, 1991: 70; Cornelius, 1992a: 257; 1992b: 82 et seq.; Ramil & Vervoort, 1992a: 238, fig. 67b; Bianchi, Ceppodomo, Niccolai, Aliani et al., 1993: 299; Boero & Bouillon, 1993a: 264; Calder, 1993b: 68 et seq.; Altuna Prados, 1994a: 321-324, pl. 61 figs A-E; 1995a: 54; 1995b: 59-63, figs 1-2; Bouillon, Massin & Krešević, 1995: 80; Hirohito, 1995: 65, fig. 18h-i; Peña Cantero, 1995: 440-444, pl. 56 figs a-c; Boero, Bouillon & Piraino, 1996: 25; Calder, 1996: 258, fig. 2; Medel & López-González, 1996: 206; Migotto, 1996: 85-86, 121, fig. 16a-b.

Laomedea Gravieri Billard, 1933: 9, fig. 3; Dollfus, 1933: 127.

Clytia gravieri; Billard, 1938: 429-431, figs 1-3; Picard & Le Roch, 1949: 94; Picard, 1951e: 278; 1952a: 346, 349; 1952d: 221; 1955b: 185; 1958b: 191; Rossi, 1961: 80; Bellan-Santini, 1962: 192; Plante, 1965: 259, 307; Bellan-Santini, 1970: 338; Gravier, 1970a: 116; Gravier-Bonnet, 1972: 4, 5; Millard &

Bouillon, 1973: 7, 51, fig. 7E-G; Day, 1974: 85; Millard & Bouillon, 1974: 5; Millard, 1975: 215, fig. 71F-H; 1977b: 107; García-Corrales et al., 1978: 29, fig. 12; Millard, 1978: 190; Marinopoulos, 1979b: 120; Millard, 1979b: 131; Boero, 1981b: 110; García-Carrascosa, 1981: 178-181, pl. 32 figs d-e; Marinopoulos, 1981: 176; Flórez González, 1983b: 119, photographs 20-21; McCain, 1984: 99; Gili & García-Rubies, 1985: 43, fig. 3C; Vervoort, 1987: 97; Reyes & Campos, 1992: 108 et seq.

Campanularia (Clytia) gravieri; Vervoort, 1967: 50, fig. 16; Mergner & Wedler, 1977: 12, pl. 2 fig. 8a-b; Mergner, 1987: 187.

Campanularia gravieri; Schmidt, 1972b: 33, 41, 42, 43, 44; 1973a: 285.

Material.— **Cape Verde Islands:** Stn 6.V04: a few small colonies growing on shell of mollusc (RMNH-Coel. 28838, slide 2539).

Remarks.— This species has recently been re-described from Atlantic material by Ramil & Vervoort (1992a); the few colonies in the CANCAP material agree with that description.

Distribution.— **Eastern Atlantic:** general (Cornelius, 1982a, 1987e; Ramil & Vervoort, 1972a), north and north-west coast of Spain (Altuna et al., 1983, 1984; Isasi Urdangarín, 1985; Isasi & Sáiz, 1986; Aguirrezabalaga et al., 1987; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995b).— **Mediterranean:** general (Boero & Bouillon, 1993a), coast of Spain and Balears (García-Corrales et al., 1978; García-Carrascosa, 1981; Gili & García-Rubies, 1985; Gili, 1986; Barangé & Gili, 1987; García-Carrascosa et al., 1987; Llobet i Nadal, 1987; Llobet, Gili & Barangé, 1988; Gili, Murillo & Ros, 1989; Llobet, Gili & Hughes, 1991; Roca, Moreno & Barceló, 1991; Medel & López-González, 1996), coast of France (Picard & Le Roch, 1949; Picard, 1951e, 1952a, d, Bellan-Santini, 1962, 1970), Italy (Rossi, 1961; Boero, 1981a, b; Boero et al., 1985; Boero & Fresi, 1986; Boero & Sarà, 1987; Bianchi et al., 1993; Boero, Bouillon & Piraino, 1996), Sea of Alboran and Chafarinas Islands (Templado et al., 1986; Peña Cantero, 1995), Algeria (Picard, 1955b), eastern part (Marinopoulos, 1979b).— **Temperate and subtropical Atlantic:** Azores (Cornelius, 1992b), Atlantic coast of South Africa (Millard, 1975).— **Western Atlantic:** Bermuda (Calder, 1991a, 1993b), Central America (Calder, 1991b, c), Colombia (Flórez González, 1983b; Reyes & Campos, 1992), Brazil (Migotto, 1996).— **Indian Ocean:** general (Millard, 1977b, 1979b), Gulf of Aqaba, Red Sea (Billard, 1933; Dollfus, 1933; Vervoort, 1967; Schmidt, 1972b, 1973a; Hirohito, 1977; Mergner & Wedler, 1977; Mergner, 1987), Arabian Gulf (McCain, 1984), Moçambique (Day, 1974), Madagascar (Plante, 1965; Gravier, 1970a; Gravier-Bonnet, 1972), Seychelles (Millard & Bouillon, 1973, 1974), India (Mammen, 1965).— **Western Pacific:** Fiji (Gibbons & Ryland, 1989), Japan (Stechow, 1913b, c, 1923b; Jäderholm, 1919a; Hakushi et al., 1957; Yamada, 1959; Hirohito, 1974, 1983, 1995; Saito & Suzuki, 1974).

Summarising: a species distributed in tropical and sub-tropical waters around the world (Rees & Vervoort, 1987), previously cited from the Azores by Cornelius (1992). Though not uncommon in the CANCAP area its only record is from the Cape Verde region (south coast of São Vicente) at 63 m depth.

Clytia paulensis (Vanhöffen, 1910)

Campanularia paulensis Vanhöffen, 1910: 272, 298, fig. 19a-b; Leloup, 1934c: 11.

Clytia (?)*paulensis*; Stechow, 1919a: 45, 155.

Clytia paulensis; Stechow, 1923c: 111; 1923d: 96, 110, fig. N; 1925a: 211; Philbert, 1935d: 26; 1935e: 25, fig. 4; Picard, 1950a: 51; 1950b: 196; 1951f: 261; 1952a: 349; 1955a: 186; 1958a: 191; Riedl, 1959: 34; Costa, 1960: 33; Millard, 1966a: 481, fig. 15; Monniot, 1966: 826 et seq.; Blanco, 1968b: 205, pl. 2 figs 4-5; Millard, 1968: 253, 259; Fey, 1970: 393, 409; Calder, 1971: 51, pl. 3 fig. 1; Naumov & Stepan'yants, 1972: 34, 37, fig. 2; Millard & Bouillon, 1974: 6; Hughes, 1975: 291 et seq.; Millard, 1975: 221, fig. 73A-D; Calder, 1976: 169; Millard, 1977b: 107; Calder & Hester, 1978: 90; Millard, 1978: 190; Marinopoulos, 1979b: 120; Boero, 1981a: 182; 1981c: 197; García-Carrascosa, 1981: 175-178, pl. 9 figs a-c; Marinopoulos, 1981: 176; Castric & Michel, 1982: 82, fig; Cornelius, 1982a: 88-91, fig. 14; Boero et al., 1985: 29; Boero & Fresi, 1986: 144; Isasi Urdangarín, 1985: 58, fig. 13B-C; Gili, 1986: 176, fig. 4.17C-D; Isasi & Sáiz, 1986: 70; Aguirrezabalaga et al., 1987: 111, fig. 1d-g; García-Carrascosa et al., 1987: 368; Llobet i Nadal, 1987: 136-138, fig. 38A-B; Llobet, Gili & Barangé, 1988: 40, fig. 3E; Gili, Vervoort & Pagès, 1989: 106, fig. 31A; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Calder, 1990: 446, 448; Cornelius & Ryland, 1990: 131, fig. 4.10; Cairns et al., 1991: 23; Calder, 1991b: 223; 1991c: 2068 et seq.; Llobet, Gili & Hughes, 1991: 153 et seq.; Cornelius, 1992a: 254; Ramil & Vervoort, 1992a: 239, fig. 67c-d; Boero & Bouillon, 1993: 264; Altuna Prados, 1994a: 325-326; 1995a: 54; Álvarez-Claudio & Anadón, 1995: 240; Blanco, 1994a: 158; 1994b: 193; Watson, 1994b: 153-154, fig. 2F-G; Bouillon, Massin & Kresevic, 1995: 81; Cornelius, 1995b: 258-260, fig. 59; Hirohito, 1995: 68, fig. 20a-b, pl. 4 fig. D; Peña Cantero, 1995: 447-453, pl. 57 figs a-d; Medel & López-González, 1996: 206; Watson, 1996: 78; Calder & Mañal, 1998: 73; Ramil et al., 1998: 199-200.

Campanularia (*Clytia*) *paulensis*; Mergner & Wedler, 1977: 14, pl. 2 fig. 10a-b.

Material.— **Madeira area:** Stn 4.173: several colonies up to 2 mm high growing on *Kirchenpaueria* spec.; no gonothecae present (RMNH-Coel. 28830, slide 2556).— **Canary Islands and Selvagens Archipelago:** Stn 4.148: several pedicels growing on *Halecium delicatulum* Coughtrey, 1876, without gonothecae (RMNH-Coel. 27890).— **Cape Verde Islands:** Stn 6.076: several pedicels growing on Campanulariidae, without gonothecae (RMNH-Coel. 28812).

Distribution.— **Eastern Atlantic:** Great Britain (Cornelius, 1982a, 1995b; Cornelius & Ryland, 1990), Channel coast (Castric & Michel, 1982), France, Bay of Biscay (Fey, 1970), north and north-west coast of Spain (Isasi Urdangarín, 1985; Isasi & Sáiz, 1986; Aguirrezabalaga et al., 1987; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a; Álvarez-Claudio & Anadón, 1995; Medel & López-González, 1996; Ramil et al., 1998).— **Mediterranean:** general (Boero & Bouillon, 1993), coast of Spain (García-Carrascosa, 1981; Gili, 1986; García-Carrascosa et al., 1987; Llobet i Nadal, 1987; Llobet, Gili & Barangé, 1988; Llobet, Gili & Hughes, 1991), Alborán Sea, Chafarinas Islands (Peña Cantero, 1995), France (Leloup, 1934c; Philbert, 1935d, e; Picard, 1950b, 1951f, 1952a; Costa, 1960; Monniot, 1966), Italy (Boero, 1981a, c; Boero et al., 1985; Boero & Fresi, 1986), Algeria (Picard, 1955b), eastern part (Marinopoulos, 1979b).— **Temperate eastern Atlantic:** (Ramil & Vervoort, 1992a), Gulf of Guinea (Gili, Vervoort & Pagès, 1989), South Africa (Millard, 1966a, 1968, 1975).— **Western Atlantic:** coasts of Canada and United States (Calder, 1971, 1976, 1990; Calder & Hester, 1978), Central America (Calder, 1991b, c), coast of Brazil (Calder & Mañal, 1998), Argentine coast (Blanco, 1968b, 1994a, b).— **Subantarctic:** St Paul (Vanhöffen, 1910; Stechow, 1923c).— **Antarctic:** Adélie Land (Naumov & Stepan'yants, 1972).— **Indian Ocean:** general (Millard, 1977b), Red Sea (Mergner & Wedler, 1977), Seychelles (Millard & Bouillon, 1974).— **Western Pacific:** Japanese waters (Hirohito, 1995), Australia (Stechow, 1925a; Watson, 1994b, 1996).

Summarising: *Clytia paulensis* is a warm-water species, recorded widely from tropical and subtropical regions in Atlantic and Indo-Pacific Oceans (Cornelius, 1995b). Near the CANCAP area, it has been recorded from Guinea Bissau (Gili, Vervoort & Pagès, 1989). The present records are from Madeira (Porto Santo), Canary Islands (SW of Palma) and the Cape Verde region (SW of Boa Vista) indicating a wider distribution in the CANCAP area; the depth records are between 25 and 92 m.

Clytia spec.

Material.— **Azores area:** Stn AZO.024A: pedicels developing from stolons on abraded gastropod shell, also covered by dead *Hydractinia* spec. Nearly all hydrothecae damaged; no gonothecae (RMNH-Coel. 28843).— **Canary Islands and Selvagens Archipelago:** Stn 4.074: pedicels, some with damaged hydrothecae, arising from a stolon attached to old hydroid stem, probably *Eudendrium* spec.; no gonothecae (RMNH-Coel. 27955).— **Cape Verde Islands:** Stn 6.174: damaged hydrothecae and pedicels springing from stolonial fibres on old hydroid stem (RMNH-Coel. 27985); Stn 7.044: mutilated hydrothecae rising from stolon reptant on old hydroid stem; no gonothecae (RMNH-Coel. 27954).

Remarks.— Material in bad condition that could not be identified to the species level.

Genus *Laomedea* Lamouroux, 1812

Laomedea calceolifera (Hincks, 1871)
(figs 9, 10a)

Campanularia calceolifera Hincks, 1871: 78-79, pl. 6; Linko, 1911: 209-211, fig. 39; Babic, 1912: 460; Fraser, 1912a: 43; Sumner et al., 1913: 569; Kudelin, 1914: 465; Fraser, 1915: 308; Stechow, 1919a: 65; Neppi, 1921: 18, pl. 1 figs 11-12; Stechow, 1923d: 97; Grave, 1933: 377; Fraser, 1943b: 87; 1944a: 115-116, pl. 19 fig. 85; Vannucci-Mendes, 1949: 229, pl. 1 fig. 11; Vannucci, 1951b: 108, 112, 114, 117; Riedl, 1959: 640; Leloup, 1960: 227; Faure, 1965: 419 et seq., figs 1a, c, 2a-b, 3c-d; Stepan'yants, 1972a: 325; Wytenbach, Crowell & Suddith, 1973: 363-375; Miller & Tseng, 1974: 467; Millard, 1978: 189; Gosner, 1979: 80.

Laomedea calceolifera; Stechow, 1923d: 117, 119; Billard, 1931a: 390; Philbert, 1935d: 26; 1935e: 27; Teissier, 1950b: 15; Picard, 1952d: 221; 1955b: 187; 1958b: 191; Teissier, 1965: 18; Fey, 1970: 395; Marinopoulos, 1979b: 120; Morri, 1979b: 306; 1979c: 164, 168, 170, fig. 3; 1979d: 119-120; 1980b: 6; Boero, 1981a: 182; García-Carrascosa, 1981: 185-187, pl. 12 figs a-b, pl. 31 fig. b; Morri, 1981a: 193, 194; 1981b: 75, fig. 25; 1981d: 89; Morri & Martini, 1981: 308; Castric & Michel, 1982: 83, fig.; Cornelius, 1982a: 102-105; Morri & Bianchi, 1982: 270; Isasi Urdangarín, 1985: 66-67, fig. 14; Morri, 1985: 117; Morri & Bianchi, 1985: 119; Boero & Fresi, 1986: 144; Gili, 1986: 187-188, fig. 4.17A; Isasi & Sáiz, 1986: 70; Aguirrezabalaga et al., 1987: 111, fig. 2; Antsulevich, 1987a: 14-15, fig. 1; Barangé & Gili, 1987: 48, fig. 2A; Cornelius, 1987d: 36; Gili, Ros & Pagès, 1987: 92; Aguirrezabalaga et al., 1988: 230, fig. 11C; Chaplygina, 1989: 122; Gili, Murillo & Ros, 1989: 23; Altuna & García-Carrascosa, 1990: 54 et seq., fig.; Piraino & Morri, 1990: 53-55; Piraino, Morri & Boero, 1990: fig. 4b; Cairns et al., 1991: 23; Roca, Moreno & Barceló, 1991: 70; Chaplygina, 1992: 7-9, fig. 2; Cornelius, 1992a: 254, 257; 1992b: 82 et seq.; Harms, 1993: 15; Schönborn et al., 1993: 240-241, pl. 13 fig. 1; Altuna Prados, 1994a: 328-331, pl. 62 figs A-F; 1995a: 54; Álvarez-Claudio & Anadón, 1995: 240; Bouillon, Massin & Kresevic, 1995: 82; Cornelius, 1995a: 77, fig. 20; 1995b: 274-277, fig. 63; Medel & López-González, 1996: 206.

Eulaomedea calceolifera; Rees & Thursfield, 1965: 102.

Laomedea (*Eulaomedea*) *calceolifera*; Vervoort, 1968: 98.

Eulaomedeia calceolifera; Millard, 1975: 223, fig. 73G, K.

Lomedeia calceolifera; Boero & Bouillon, 1993a: 264 (incorrect subsequent spelling).

Laomedeia (*Eulaomedeia*) *angulata* f. *calceolifera*; Broch, 1933b: 103, fig. 43e.

Material.— **Azores area:** Stn 5.044: several detached colonies 15 mm high, with female gonothecae (RMNH-Coel. 27951); Stn 5.085: several colonies 30 mm high, growing on stem of hydroid. Majority of gonothecae not fully developed (RMNH-Coel. 27982).— **Canary Islands and Selvagens Archipelago:** Stn 4.042: several colonies 35 mm high, growing on gorgonids and with numerous male and female gonothecae (RMNH-Coel. 28842, slide 2535).— **Cape Verde Islands:** Stn 6.078: several colonies up to 20 mm high, growing on mollusc shells, with female gonothecae and two male gonothecae; hydrothecae in bad condition. With epizootic *Modeeria rotunda* (Quoy & Gaimard, 1827) (RMNH-Coel. 28844, slide 2528). An additional sample (RMNH-Coel. 28845), attached to shells of gastropods has this species and *Zygophylax biarmata* Billard, 1905.

Remarks.— We have observed male and female gonothecae on the same hydrocaulus, indicating that this species is monoecious. We saw hydrocauli with numerous female gonothecae (fig. 9c) and few male ones (fig. 9a-b), the opposite situation also occurred; both may occur in the same colony.

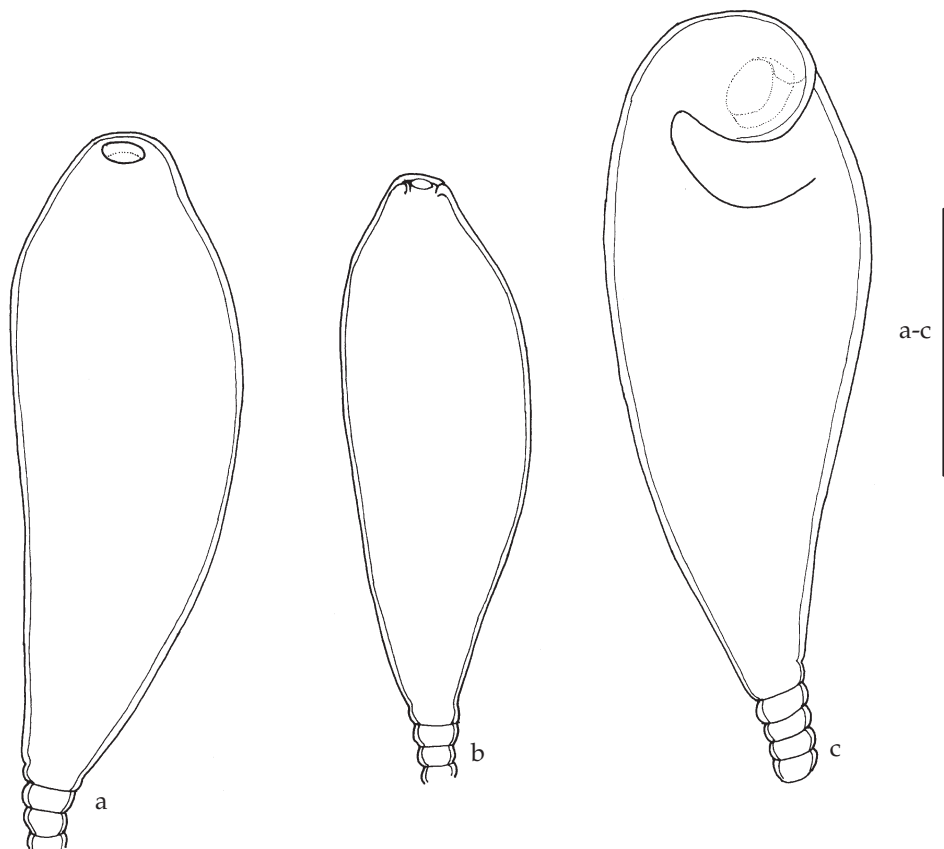


Fig. 9. *Laomedeia calceolifera* (Hincks, 1871), a-b, Stn 4.042, slide 2535; c, Stn 6.078, slide 2528; a-b, male gonothecae; c, female gonotheca. Scale: 0.5 mm.

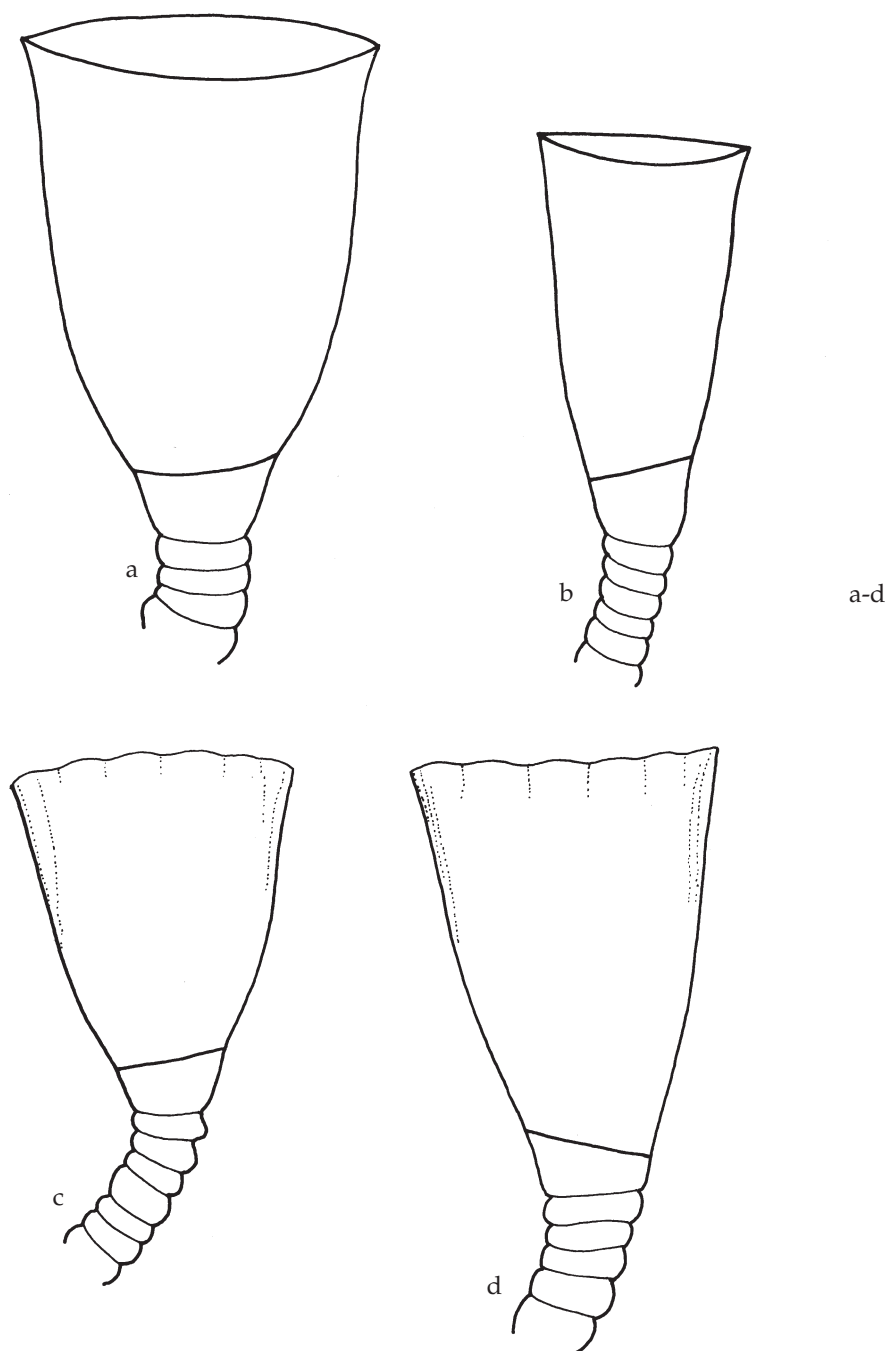


Fig. 10. Hydrothecae of: a, *Laomedea calceolifera* (Hincks, 1871), Stn 4.042, slide 2535; b, *Laomedea pseudo-dichotoma* Vervoort, 1959, Stn 4.148, slide 2549; c-d, *Obelia dichotoma* (Linnaeus, 1758); c, Stn 1.145, slide 2542; d, Stn 1.118, slide 2526. Scale: 0.5 mm.

Distribution.— **Arctic Seas:** Russia (Linko, 1911; Kudelin, 1914; Antsulevich, 1987a).— **Eastern Atlantic:** Baltic (Schönborn et al., 1993), German Bight (Harms, 1992), Great Britain (Hincks, 1971; Cornelius, 1982a, 1995b), Channel coasts (Philbert, 1935d, e; Teissier, 1950b, 1965; Castric & Michel, 1982); France, Bay of Biscay (Fey, 1970), north and north-west coast of Spain (Isasi Urdangarín, 1985; Isasi & Sáiz, 1986; Aguirrezabalaga et al., 1987, 1988; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a; Álvarez-Claudio & Anadón, 1995).— **Mediterranean:** general (Picard, 1958b; Boero & Bouillon, 1993a), coast of France (Picard, 1952d), coast of Spain (García-Carrascosa, 1981; Gili, 1986; Barangé & Gili, 1987; Gili, Ros & Pagès, 1987; Gili, Murillo & Ros, 1989; Roca, Moreno & Barceló, 1991; Medel & López-González, 1996), Italy (Neppi, 1921; Riedl, 1959; Morri, 1979b, c, d, 1980b, 1981a, b, d; Boero, 1981a; Morri & Martini, 1981; Morri & Bianchi, 1985; Boero & Fresi, 1986; Piraino & Morri, 1990), Adriatic (Broch, 1933b; Morri & Bianchi, 1982; Morri, 1985), Algeria (Picard, 1955b), eastern part (Billard, 1931a; Marinopoulos, 1979b).— **Temperate eastern Atlantic:** Azores (Cornelius, 1992b), South Africa (Millard, 1975).— **Western Atlantic:** coasts of Canada and United States (Fraser, 1912a, 1915, 1944a; Sumner et al., 1913; Grave, 1933), Caribbean (Vervoort, 1968), coast of Brazil (Vannucci-Mendes, 1949; Vannucci, 1951b).— **Western Pacific:** Sea of Japan (Chaplygina, 1989, 1992).

Summarising: the species is widely distributed in warmer parts of the North Atlantic Ocean (Cornelius, 1995b), with a few records in the eastern Atlantic (Cornelius, 1982a; Ramil, 1988). It has been previously recorded from the Azores (Cornelius, 1992a). CANCAP material originates from the Azores (S of Santa Marta and E of Faial), from the Canary Islands (S of Lanzarote) and the Cape Verde area (SW of Boa Vista), thus coming from a more extended area in the eastern Atlantic; depth records vary between 50 and 190 m.

Laomedea pseudodichotoma Vervoort, 1959
(figs 10b, 11)

Laomedea (*Eulaomedea*) *pseudodichotoma* Vervoort, 1959: 316, figs 56-57; 1966a: 104; Baker, 1967: 40.

Laomedea pseudodichotoma; Redier, 1971a: 505; Cornelius, 1982a: 111-112, fig. 21; 1992b: 79 et seq.; Ramil & Vervoort, 1992a: 240-241, fig. 67e; Álvarez-Claudio & Anadón, 1995: 240; Peña Cantero, 1995: 457-458, pl. 59 figs a-b; Álvarez-Claudio, 1996b: 197-198, fig. 1; Medel & López-González, 1996: 206.

Material.— **Madeira area:** Stn 1.020: one hydrocaulus 30 mm high with gonothecae (RMNH-Coel. 28850, slide 2554).— **Canary Islands and Selvagens Archipelago:** Stn 2.022: One colony 22 mm high, polysiphonic at base and detached; hydrothecae everted at rim; immature male gonothecae present (RMNH-Coel. 28848, slide 2545); Stn 4.015: two hydrocauli 16 mm high with male gonothecae (RMNH-Coel. 27983); Stn 4.143: two colonies 25 mm high and two fragments, polysiphonic at base; gonothecae with immature gonophores (RMNH-Coel. 28826, slides 2522 and 2555); Stn 4.148: approximately 15 detached colonies up to 35 mm high, hydrorhizae composed of numerous tubes. Male and female gonothecae present (RMNH-Coel. 27981, slide 2549).

Remarks.— Our material is in accordance with the descriptions by Vervoort (1959), Cornelius, (1982), Ramil & Vervoort (1992) and Álvarez Claudio (1996). It has been found with male and female gonothecae, the male being sac-shaped, truncated

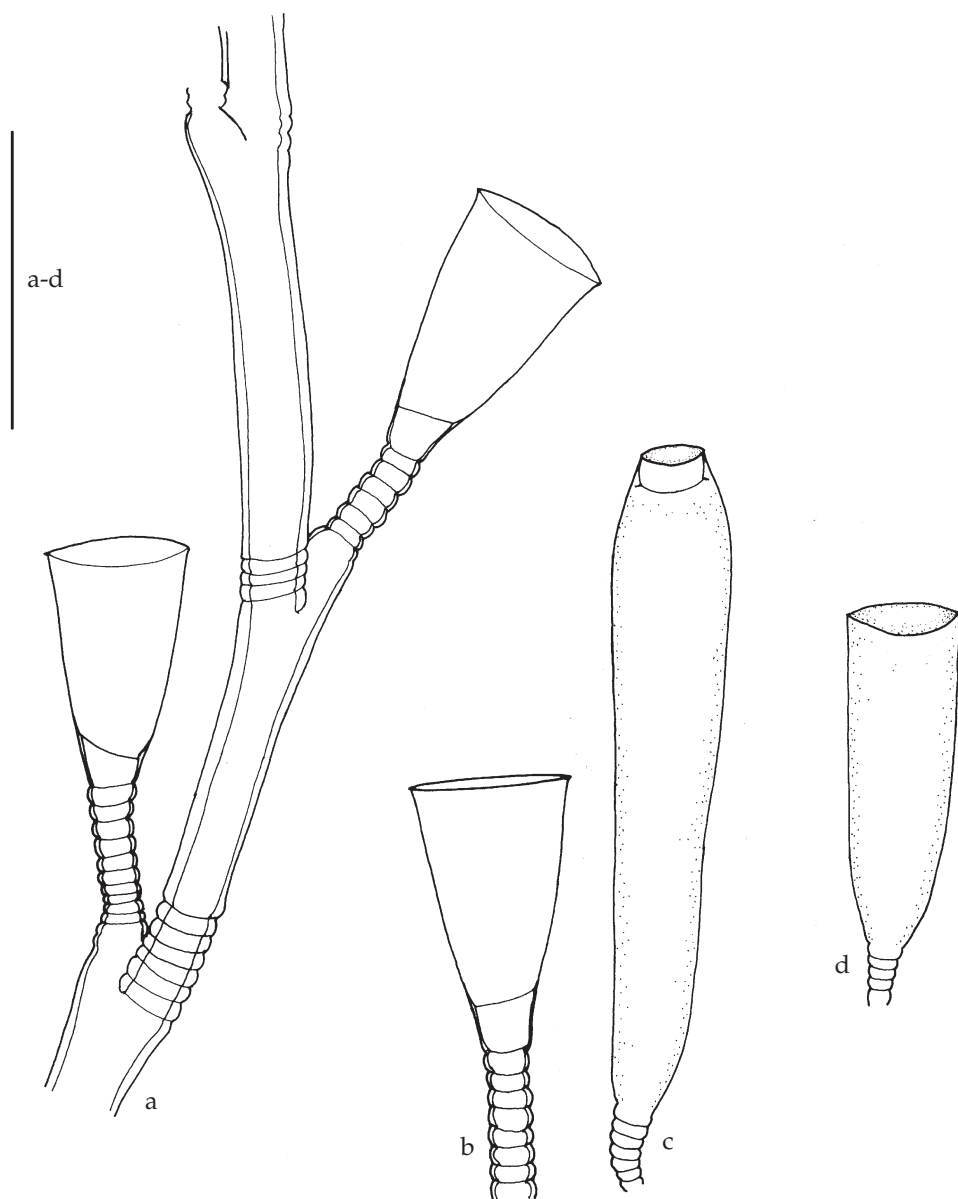


Fig. 11. *Laomedea pseudodichotoma* Vervoort, 1959, Stn 4.148, slide 2549; a, part of colony; b, hydrotheca; c, female gonotheca; d, male gonotheca. Scale 0.5 mm.

distally (fig. 11d), and the female thin, elongated and narrowing distally (fig. 11c). In absence of gonothecae, *Laomedea pseudodichotoma* can be identified by a combination of characters, like the polysiphonic stem and the morphology of the hydrothecae. These are deep, with the rim smooth and slightly everted (figs 10b, 11a-b), a common character in the genus *Laomedea*. We think that the oblique diaphragm of the hydrothe-

cae is not, considered alone, a good character to separate this species from others, as it is also present in other species of the genus (*Laomedea calceolifera*) and also in the genus *Obelia* (*Obelia dichotoma*, fig. 10c-d). A spacious basal chamber in the hydrotheca also seems quite characteristic for this species, as noted by Ramil & Vervoort (1992a).

Distribution.— **Eastern Atlantic:** Spain (Ramil & Vervoort, 1992a; Álvarez Claudio & Anadón, 1995; Álvarez Claudio, 1996b; Medel & López-González, 1996).— **Mediterranean:** Sea of Alboran and Chafarinas Islands (Peña Cantero, 1995).— **Temperate and subtropical Atlantic:** Azores (Baker, 1967; Cornelius, 1992b), Gulf of Guinea (Vervoort, 1959), Abidjan (Redier, 1971a), Senegal (Vervoort, 1959; Cornelius, 1982).

The present records are from Madeira (W of Deserta Grande) and the Canary Islands (S of Fuerteventura, S of Lanzarote and SW of Palma), falling in the known distributional area. Depth of the CANCAP records ranges between 35 and 144 m.

Genus *Obelia* Péron & Lesueur, 1810

Obelia bidentata Clark, 1875 (fig. 12)

Obelia bidentata Clark, 1875: 58-59, pl. 9 fig. 2; Billard, 1912a: 463, fig. 2; Sumner et al., 1913: 570; Prenant & Teissier, 1924: 25; Teissier, 1950b: 14; Sacchi, 1961: 55; Teissier, 1965: 16; Anonymous, 1970: 2; Fey, 1970: 303; Castric-Fey, 1973: 213; Cornelius, 1975a: 260, fig. 2; Calder, 1976: 169; Withers & Thorp, 1976: 603; Cornelius, 1977c: 174; Calder & Hester, 1978: 90; Millard, 1978: 172, 195; 1979b: 131; Morri, 1979c: 164; Haderlie et al., 1980: 47; Morri, 1981a: 193, 194; 1981b: 70, fig. 23; Morri & Martini, 1981: 308; Castric & Michel, 1982: 26, fig. 83, fig. 83; Cornelius, 1982a: 113-117; 1983: 155, fig. 1; Morri & Bianchi, 1982: 270 et seq.; 1983a: 187; Bouillon, 1984b: 108; Austin, 1985: 53; Isasi Urdangarín, 1985: 67, fig. 15; Morri, 1985: 117; Boero & Fresi, 1986: 144; Gili, 1986: 182-183, fig. 4.19A; Isasi & Sáiz, 1986: 70; Izquierdo et al., 1986: 91-93, fig. 8; Venugopalan & Wagh, 1986: 275-277; Aguirrezabalaga et al., 1987: 111-112; Cornelius, 1987d: 36; García-Carrascosa et al., 1987: 369; Östman, 1987: 73, 75-76; Vervoort, 1987: 97; Cornelius, 1988b: 76; Zamponi & Genzano, 1988b: 10A; Gibbons & Ryland, 1989: 405-406, fig. 23; Gili, Murillo & Ros, 1989: 23; Gili, Vervoort & Pagès, 1989: 106, 107, fig. 31B; Altuna & García-Carrascosa, 1990: 54 et seq., fig. 4; Calder, 1990: 446, 448; Cornelius & Ryland, 1990: 133, fig. 4.11; Cairns et al., 1991: 23; Calder, 1991a: 70-72, fig. 37; 1991b: 223; 1991c: 2068 et seq.; El Beshbeeshy, 1991: 108-111, fig. 25a; Morri et al., 1991: 317; Cornelius, 1992a: 254; 1992b: 82 et seq.; Ramil & Vervoort, 1992a: 241-243, fig. 68a-b; Boero & Bouillon, 1993a: 265; Calder, 1993b: 68 et seq.; Altuna Prados, 1994a: 334-336; Watson, 1994a: 67; Altuna Prados, 1995a: 54; Álvarez-Claudio & Anadón, 1995: 240; Bouillon, Massin & Kresevic, 1995: 84; Cornelius, 1995b: 292-295, fig. 68; Peña Cantero, 1995: 463-466, pl. 53 fig. d; Boero, Bouillon & Piraino, 1996: 27; Medel & López-González, 1996: 206; Migotto, 1996: 87-88, 123, fig. 16c; Watson, 1996: 78; Calder & Stephens, 1997: 31; Calder & Mañal, 1998: 73.

Laomedea (Gonothyrax) bidentata; Babic, 1913c: 284, fig. 1.

Obelia bicuspidata Clark, 1875: 58, pl. 9 fig. 1; Billard, 1912a: 463, fig. 2; Fraser, 1912c: 361, fig. 21; Sumner et al., 1913: 570; Prenant & Teissier, 1924: 25; Fraser, 1925: 172; Anonymous, 1928-1941: 1; Fraser, 1937b: 83, pl. 16 fig. 82; 1944a: 153-154, pl. 27 fig. 125; Behre, 1950: 7; Deevey, 1950: 334, 343; Teissier, 1950b: 14; Picard, 1951f: 261; Deevey, 1954: 270; Vannucci, 1954: 108, pl. 2 figs 2-7, 9-10; Picard, 1955b: 186; Day & Morgans, 1956: 304; Kao Cheh-Sheng, 1956: 87, fig. 18; Valkanov, 1957: 17; Millard, 1958: 174; Picard, 1958b: 191; Millard, 1959b: 249; Leloup, 1960: 227; Sacchi, 1961: 55; Mammen, 1965: 11, figs 37-38; Rees & White, 1966a: 276; Calder & Brehmer, 1967: 153; Anonymous, 1970: 2; Patrìti, 1970: 36, fig. 46; Calder, 1971: 53, pl. 3 fig. J; Blanco & Bellusci de Miralles, 1972a: 139, pl. 1 figs 1-8; Defenbaugh, 1972: 387-388; Watling & Maurer, 1972: 647; Castric-Fey,

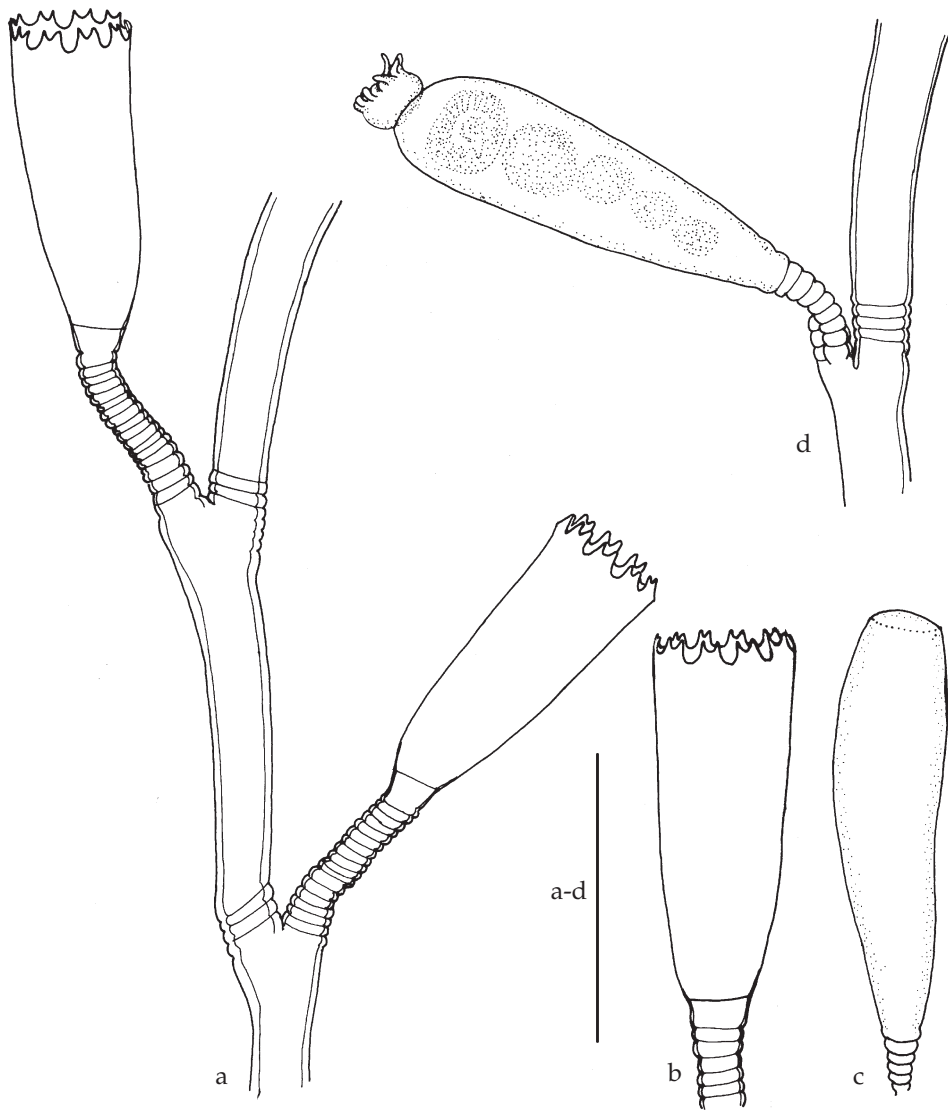


Fig. 12. *Obelia bicuspidata* Clark, 1875, a-c, Stn 6.137, after wet preparation; d, Stn 6.060, slide 2527; a, part of colony; b, hydrotheca; c, empty gonotheca; d, mature gonotheca. Scale: 0.5 mm.

1973: 213; Defenbaugh & Hopkins, 1973: 83-84, pl. 9 fig. 33; Millard & Bouillon, 1973: 7, 56; Morris & Mogelberg, 1973: 15, fig. 14; Millard & Bouillon, 1974: 6; Sarma, 1974: 156; Millard, 1975: 226, fig. 75C-E; Visweswara Rao & Hanumantha Rao, 1975: 93; Mergner & Wedler, 1977: 14, pl. 2 fig. 12; Sarma, 1977: 754; Gosner, 1979: 80; Stepan'yants, 1979: 37, pl. 7 fig. 1; García-Carrascosa, 1981: 197-200, pl. 9 figs d-g, pl. 32 figs a-c; Gili i Sardà, 1982: 66, fig. 28; Butler et al., 1983: 42; Flórez González, 1983: 120, photographs 22-23; Hirohito, 1983: 5, 16; Rho & Park, 1983: 42-43, pl. 3 figs 3-5, pl. 4 fig. 1; Gili, Ros & Pagès, 1987: 92; Huang Meijun & Liu Heng, 1987: 63, fig. 2; Park, 1990: 79; Park, 1992: 288; Blanco, 1994a: 159; 1994b: 193; Hirohito, 1995: 71-73, fig. 21a- b, pl. 5 fig. A;

Park, 1995: 11; Migotto, 1996: 123; Calder & Stephens, 1997: 31.

Gonothyræa bicuspidata; Babic, 1921: 95; Stechow, 1923b: 7; Vannucci Mendes, 1946: 556, pl. 3 figs. 23; Vannucci, 1949: 235; 1951b: 110, 116; Yamada, 1959: 42; Itô & Inoue, 1962: 449, pl. 8 figs 74-75.

?*Obelia bicuspidata*; Billard, 1927d: 472.

Laomedea (Obelia) bicuspidata; Hummelinck, 1936: 53, fig. 8; Hamond, 1957: 295, 312, figs 20-21; Vervoort, 1959: 315; 1968: 19, 97, fig. 7; 1972a: 92, fig. 26d; García-Corrales et al., 1978: 31 fig. 13; Mergner, 1987: 187.

Laomedea bicuspidata; Leloup, 1937a: 99, fig. 4; 1937b: 4, 20; 1938a: 2; 1940b: 20; Vervoort, 1946a: 344, fig. 10a-b; 1946b: 298, fig. 132; Leloup, 1947: 23, fig. 14; Caspers, 1951: 52; Dawydoff, 1952: 54; Leloup, 1952a: 157, fig. 89; Hummelinck, 1954: 161; Buchanan, 1956: 277; 1957: 359; Wedler, 1973: 34, fig. 3; Wedler, 1975: 332 et seq.; Palacios, 1979: 120; Wolff & Dankert, 1981: 27.

Obelia ?bicuspidata; Millard, 1968: 253, 259.

Hydroid of the subfamily Obeliinae; Raghu-Kumar, 1988: 254, fig. 2g.

Material.— **Atlantic coast of Morocco and Mauritania:** Stn 3.134: several colonies 40-50 mm high with polysiphonic stem, on Cirripecta. Gonothecae present. Hydrothecae in bad shape (RMNH-Coel. 28851).— **Azores area:** Stn 5.008: single detached old colony 70 mm high, strongly polysiphonic, without gonothecae (RMNH-Coel. 28821); Stn 5.056: ten hydrocauli up to 40 mm high, polysiphonic at their base and with apical stolons; no gonothecae (RMNH-Coel. 28837, slide 2529); Stn 5.088: single polysiphonic and branched colony, 65 mm high; condition bad (RMNH-Coel. 28832, slide 2532).— **Canary Islands and Selvagens Archipelago:** Stn 4.039: several colonies on shell concretions, up to 40 mm high and without gonothecae (RMNH-Coel. 28822, slide 2533).— **Cape Verde Islands:** Stn 6.042: one detached colony, 35 mm high and without gonothecae (RMNH-Coel. 28819); Stn 6.060: three hydrocauli 33 mm high growing on shell, polysiphonic and branched; with gonothecae. Condition bad. In addition three detached hydrocauli without gonothecae, 20 mm high (RMNH-Coel. 28835, slide 2527); Stn 6.069: several detached hydrocauli up to 20 mm high on shell fragments, polysiphonic at the base and without gonothecae; Stn 6.072: several colonies, polysiphonic at their base, up to 20 mm high, growing on *Nemertesia* spec; a few gonothecae present (RMNH-Coel. 28814); Stn 6.076: one colony 65 mm high, with gonothecae; in bad condition (RMNH-Coel. 27952); Stn 6.108: two colonies 5 and 10 mm high, no gonothecae (slide 2467, RMNH-Coel. 28857); Stn 6.137: two colonies up to 35 mm high, one growing on a polychaete tube, polysiphonic and branched; with gonothecae, mostly empty (RMNH-Coel. 27987); Stn 6.146: three polysiphonic colonies, without gonothecae, up to 20 mm high, growing on Bryozoa and calcareous substrate (RMNH-Coel. 28817); Stn 6.148: 10-15 colonies, polysiphonic at base and with some gonothecae, 30 mm high, growing on *Nemertesia* spec. In addition, one small colony growing on the same species, 12 mm high and without gonothecae; another colony 30 mm high on calcareous fragments (RMNH-Coel. 28816); Stn 7.058: two fragments 7 mm high may belong here (RMNH-Coel. 28847, slides 2540); Stn 7.115: 10-15 old, polysiphonic hydrocauli, growing on a hydroid stem; no gonothecae and only a few hydrothecae (RMNH-Coel. 28818).

Remarks.— According to Cornelius (1995), the longitudinal folds in the hydrothecal wall are artifacts produced when microslide preparations are made (fig. 12a-b). Gonothecae from our material are without a distinct neck (fig. 12c-d).

Distribution.— **Eastern Atlantic:** general (Leloup, 1937a; 1940b), Great Britain (Hamond, 1957; Cornelius, 1975a, 1982a, 1988b, 1995b; Withers & Thorpe, 1976; Cornelius & Ryland, 1990), Netherlands (Hummelinck, 1936, 1954; Vervoort, 1946b; Wolff & Dankert, 1981), Belgium (Leloup, 1947, 1952a), Atlantic coast of France, Roscoff (Billard, 1912a; Prenant & Teissier, 1924; Teissier, 1950b, 1965), Bretagne (Castric & Michel, 1982), Bay of Biscay (Fey, 1970; Castric-Fey, 1973), north & north-west coasts of Spain (Isasi Urdangarín, 1985; Isasi & Sáiz, 1986; Aguirrezabalaga et al., 1987; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a; Álvarez-Claudio & Anadón, 1995).— **Mediterranean:** general (Boero & Bouillon, 1993a; Picard, 1958b),

coast of Spain (García-Corrales et al., 1978; García-Carrascosa, 1981; Gili i Sardà, 1982; Gili, 1986; García-Carrascosa et al., 1987; Gili, Ros & Pagès, 1987; Gili, Murillo & Ros, 1989; Medel & López-González, 1996), Sea of Alborán, Chafarinas Islands (Peña Cantero, 1995), coast of France (Picard, 1951f), Italy (Sacchi, 1961; Morri, 1979c, 1981a, b; Morri & Martini, 1981; Boero & Fresi, 1986; Morri et al., 1991), Adriatic (Babic, 1913c, 1921; Morri & Bianchi, 1982, 1983a; Morri, 1985), Algeria (Picard, 1955b), Black Sea (Caspers, 1951; Valkanov, 1957).— **Eastern temperate and subtropical Atlantic:** general (Ramil & Vervoort, 1992a), Azores (Rees & White, 1966a; Cornelius, 1992b), Morocco (Patriti, 1970), Canary Islands (Izquierdo et al., 1986), Gulf of Guinea (Gili, Vervoort & Pagès, 1989; Billard, 1927d; Buchanan, 1956), South Africa (Millard, 1959b, 1975).— **Western Atlantic:** coasts of Canada and United States (Fraser, 1912c; Sumner et al., 1913; Leloup, 1938a; Fraser, 1944a; Calder & Brehmer, 1967; Calder, 1971, 1976, 1990; Watling & Maurer, 1972; Calder & Hester, 1978, 1990), Bermuda (Calder, 1991a), Caribbean (Vervoort, 1968; Morris & Mogelberg, 1973), Gulf of Mexico (Behre, 1950; Deevey, 1950, 1954; Defenbaugh, 1972; Defenbaugh & Hopkins, 1973), Central America (Calder, 1991b, c, 1993b), Colombia (Flórez González, 1983b; Wedler, 1973, 1975; Palacios, 1979), Brazil (Vannucci Mendes, 1946; Vannucci, 1949, 1951b, 1954; Migotto, 1996; Calder & Mañal, 1998), Argentina (Blanco & Bellusci de Miralles, 1972a; Zamponi & Genzano, 1988b; El Beshbeeshy, 1991; Blanco, 1994a, b).— **Indian Ocean:** general (Millard, 1979b), Red Sea (Mergner & Wedler, 1977; Mergner, 1987), Indian Ocean coast South Africa (Day & Morgans, 1956; Millard, 1958, 1975), Seychelles (Millard & Bouillon, 1973, 1974), India (Mammen, 1965; Sarma, 1974, 1977; Rao & Hanumantha Rao, 1975; Venugopalan & Wagh, 1986).— **Western Pacific:** Japanese waters (Yamada, 1959; Ito & Inoue, 1962; Hirohito, 1983, 1995), South Korea (Rho & Park, 1983; Park, 1990, 1992, 1995), Indochina (Leloup, 1937b; Dawydoff, 1952), Fiji (Gibbons & Ryland, 1989), Australia (Watson, 1994a, 1996).— **Eastern Pacific:** cold temperate north-eastern Pacific (Austin, 1985), California (Fraser, 1925; Haderlie et al., 1980).— **Antarctic** (Stepan'yants, 1979).

Summarising: the species occurs mainly in warmer water of Atlantic and Indo-Pacific (Calder, 1991; Cornelius, 1995) and the Mediterranean (Boero & Bouillon, 1993; Medel and López-González, 1996). It is common in the CANCAP area, being recorded from the Canary Islands (Izquierdo et. al., 1986), the Azores (Rees & White, 1966, as *O. bicuspidata*; Cornelius, 1992) and from Morocco (Patriti, 1970, as *O. bicuspidata*).

The CANCAP records are from the Azores (S of São Miguel and E of Faial), from off Mauritania, from the Canary Islands (S of Lanzarote) and from the Cape Verde region (W of Fogo, SE and SW of Boa Vista, SW of Santa Lucia, S and SW of São Vicente, and S of Razo); they confirm the wide distribution in the eastern Atlantic. The depth records of that material vary between 50 and 200 m.

Obelia dichotoma (Linnaeus, 1758)
(fig. 10c-d)

Sertularia dichotoma Linnaeus, 1758: 812.

Laomedea dichotoma; Anonymous, 1869: 13; Broch, 1913: 13; 1914a: 37; Soot-Ryen, 1924: 15; Mathisen, 1928: 37; Vatova, 1928: 141; Leloup, 1933c: 10, 21; 1934c: 8; 1937a: 100, 116; 1937b: 4, 22, fig. 13; Fraser, 1938b: 8, 36; 1938d: 133; Kramp, 1938d: 20, 63, 67, 73; Leloup, 1938a: 2, 5; 1940b: 20; Leloup

& Miller, 1940: 51; Kramp, 1942b: 39-40; Vervoort, 1942: 309; Kramp, 1943b: 43; Vervoort, 1946b: 292, fig. 128; 1946c: 344; Leloup, 1947: 24, fig. 13; Vervoort, 1949: 158; Dawydoff, 1952: 54; Leloup, 1952a: 164-165, figs 9a, 95; Rees, 1952: 7; Hummelinck, 1954: 161; Buchanan, 1957: 359; Leloup, 1960: 222; Swennen, 1961: 209, 213, 219; Kühl, 1962: 226; Kühne & Rachor, 1966: 440 et seq.; Füller, 1970: 19; Jägerskiöld, 1971: 63; Schmidt, 1972b: 1; Rasmussen, 1973: 27; Schmidt, 1973a: 286; Olafsson, 1975: 8, 20, fig. 8; Wedler, 1975: 332; Gulliksen, 1978: 367; Anonymous, 1979: 110; Bromley, 1979: 520; Östman, 1979a: 7; Estrada, 1980: 8-9; Gulliksen, 1980: 128, 130; Wolff & Dankert, 1981: 47.

Campanularia dichotoma; Lenz, 1875: 9.

Obelia dichotoma; Verrill, 1879: 16; Lameere, 1894: 20; Whiteaves, 1901: 23; Wood, 1901: 16, 20; Rioja y Martín, 1906: 278; Ritchie, 1910: 31; Fraser, 1911: 38; Billard, 1912a: 464; Fraser, 1912c: 362, fig. 22; Stechow, 1912a: 356; Babic, 1913a: 189, fig. 1; Fraser, 1913a: 151; 1913b: 167; Robson, 1913b: 79, 80, 82, 83; Sumner et al., 1913: 569; Bigelow, 1914b: 15-16; Fraser, 1914a: 151, pl. 15 fig. 50; Robson, 1914a: 100; Stechow, 1914: 130; Pratt, 1916: 113, fig. 187; Fraser, 1918b: 332, 349; Stechow, 1919a: 49; Fraser, 1921: 159, fig. 47; Foerster, 1923: 38; Stechow, 1923d: 117; Prenant & Teissier, 1924: 25; Billard, 1926: 94; 1927c: 332; Fraser, 1927: 326; Schodduyn, 1927: 25; Stechow, 1929: 152; Teissier, 1929a: 8; Saint-Hillaire, 1930: 540 et seq.; Teissier, 1930a: 184; Billard, 1931a: 390; 1931b: 246; M.B.A., 1931: 72; Préfontaine, 1931: 77; Fraser, 1932: 51; Leloup, 1932d: 5, fig. 4; Fraser, 1933b: 261, 262, 263; Leloup, 1934c: 1; Johnson & Snook, 1935: 59, fig. 42; Philbert, 1935d: 26; Weill, 1935c: 67; Billard, 1936: 3; Fraser, 1936c: 124; Perrier, 1936: 24; Sartory, 1936: 219; Fraser, 1937b: 85, pl. 17 fig. 86; Moore, 1937: 42; Nobre, 1937: 22; Fraser, 1938b: 8, 36; Kramp, 1938d: 13; Purchon, 1938: 323, 327; Eales, 1939: 39; Fraser, 1939c: 159; Jones, 1939: 19; Fraser, 1940b: 40; Bassindale, 1941: 149; Fraser, 1943b: 88; 1944a: 155-157, pl. 28 fig. 127; Hewatt, 1946: 197; Kramp, 1947a: 55; Fraser, 1948: 214; Purchon, 1948: 289, 296; Weiss, 1948: 158; Kato, 1949: 215; Deevey, 1950: 334, 343; Hedgpeth, 1950: 73; Picard, 1950b: 192; Teissier, 1950b: 15; Yamada, 1950b: 8, pl. 1 fig. 6; Franc, 1951: 28; Picard, 1951a: 111; 1951e: 278; 1951f: 261; Day, Millard & Harrison, 1952: 404; Picard, 1952a: 347, 349; 1952d: 220; Deevey, 1954: 270; Newell, 1954: 330; Williams, 1954: 18; Hure, 1955: 6; Day & Morgans, 1956: 301; Kao Cheh-Sheng, 1956: 83-84, fig. 14; Knight-Jones & Jones, 1956: 29; Spaul, 1956: 17; Aleem, 1957: 47, fig. 1; Bassindale & Barrett, 1957: 244; M.B.A., 1957: 43; Millard, 1957: 198; Barrett & Yonge, 1958: 53, fig. 15d; Kao Cheh-Sheng et al., 1958: 84-85, pl. 4 fig. 2; Millard, 1958: 174; Picard, 1958b: 191; Bousfield & Leim, 1959: 14; Markowski, 1959: 252; Millard, 1959b: 250; Riedl, 1959: 635; Yamada, 1959: 41; Burdon-Jones & Tambs-Lyche, 1960: 7; Costa, 1960: 33, 47; Kato, Nakamura, Hirai & Kakinuma, 1961: 195; Bellan-Santini, 1962: 192; Préfontaine & Brunel, 1962: 245; Bruce et al., 1963: 51; Uchida et al., 1963: 14; Pérès & Picard, 1964: 86; Redier, 1964b: 131; Ricketts & Calvin, 1964: 415; Cabioch, 1965: 56; Kensler & Crisp, 1965: 508; Nishihira, 1965: 77; Rees & Thursfield, 1965: 98; Rottini, 1965: 621, 623; Teissier, 1965: 16; Booth, 1966: 76, 78; Crothers, 1966: 11; Grindley & Kensley, 1966: 6; Millard, 1966a: 483; Monniot, 1966: 826 et seq.; Redier, 1966a: 44; Rees & White, 1966a: 276; Davis, 1967: 17; Eales, 1967: 35; Kikuchi, 1968: 166; Millard, 1968: 253, 259; Nishihira, 1968d: 126; Vidal, 1968: 189; Hirohito, 1969: 8; Rees & Rowe, 1969: 17; Robins, 1969: 331; Bellan-Santini, 1970: 340; Brunel, 1970: 18; Clausade, 1970: 727; Day, Field & Penrith, 1970: 12; Fey, 1970: 394; Patrity, 1970: 36, fig. 45; Calder, 1971: 55, pl. 4 fig. B; Leloup, 1971: 1; Rossi, 1971: 32, fig. 12E-F; Defenbaugh, 1972: 387-388; Elkaim, 1972: 205; Williams, 1972: 950; Brusca, 1973: 48; Castric-Fey, 1973: 213; Defenbaugh & Hopkins, 1973: 85-87, pl. 10 fig. 34; Hill-Cottingham, 1973: 283; Nishihira, 1973: 409; Rebion et al., 1973: 7 et seq.; Morris & Mogelberg, 1973: 15; Defenbaugh, 1974b: 118; Hiscock, 1974: 24; Laverack & Blacker, 1974: 21; Leloup, 1974: 18; Millard & Bouillon, 1974: 6; Saito & Suzuki, 1974: 37; Saldanha, 1974: 325; Calder, 1975: 303, fig. 4D; Cooke, 1975: 89, fig. 16; Cornelius, 1975a: 265-272, figs 3-4; Fotheringham & Brunenmeister, 1975: 35, fig. 2.22; Fry, 1975: 528; Hughes, 1975: 291 et seq; Millard, 1975: 227, fig. 75F-J; Chimenz Gusso & Rivosecchi Taramelli, 1976: 113, 117; Logan, 1976: 29; Calder, 1976: 169; Standing, 1976: 156; Withers & Thorp, 1976: 603; Boyden et al., 1977: 487; Cornelius, 1977c: 174; Hamond & Williams, 1977: 67; Montanari & Morri, 1977: 295 et seq; Cuadras & Pereira, 1977: 303; Calder & Hester, 1978: 90; Evans, 1978: 55; Millard, 1978: 195; Anonymous, 1979: 110; Morri, 1979b: 306; 1979c: 164, 168, 170, fig. 2; Estrada, 1980: 8-9; Haderlie et al., 1980: 47; Ljubenkov, 1980:

- 47; Morri, 1980b: 6; Stepan'yants, 1980b: 116, 120, fig. 7; Boero, 1981a: 182; 1981c: 197; García-Carrascosa, 1981: 196, pl. 10 figs c-e; Morri, 1981a: 193, 194; 1981b: 66, fig. 21; 1981d: 88; Morri & Martini, 1981: 308; Vader et al., 1981: 47; Castric & Michel, 1982: 26, fig. 83; Cornelius, 1982a: 117-119; Gili i Sardà, 1982: 67, fig. 29; Morri & Bianchi, 1982: 270 et seq.; Östman, 1982: 155 et seq., figs; Altuna et al., 1983: 133; Butler et al., 1983: 42; Cornelius, 1983: 154, fig. 1; Flórez González, 1983b: 120; Gili & Romero, 1983: 36; Hirohito, 1983: 6, 16; Kozloff, 1983: 49; Morri & Bianchi, 1983b: 78; Östman, 1983a: 227 et seq., figs 2, 4-5, 10, 17-20, 38-42, 45-50, 53; Rho & Park, 1983: 20-21, pl. 3 figs 1-3; Altuna et al., 1984: 133; Boero, 1984: 95, 97; Bouillon, 1984b: 107-108; Headstrom, 1984: 62, figs; Östman, 1984: 100; Austin, 1985: 53; Boero et al., 1985: 29; Gili & Castelló, 1985: 15-16, fig. 4C; Gili & García-Rubies, 1985: 43, fig. 3H, J; Gili & Ros, 1985: 329; Isasi Urdangarín, 1985: 70, fig. 16; Morri, 1985: 117; Vervoort, 1985: 290; Woodhead & Jacobsen, 1985: 367; Boero & Fresi, 1986: 144; Calder, 1986b: 136, fig. 38; Gili, 1986: 184-185, fig. 4.20B; Isasi & Sáiz, 1986: 70; Venugopalan & Wagh, 1986: 276; Bandel & Wedler, 1987: 41; Cornelius, 1987d: 36, pl. 1 fig. c; De Boer, 1987: 54; García-Carrascosa et al., 1987: 369; Gili, Ros & Pagès, 1987: 92; Huang Meijun & Liu Heng, 1987: 64; Llobet i Nadal, 1987: 157-160, fig. 47; García-Rubies, 1987: 146, 149; Östman, 1987: 68, 72, 75-76; Vervoort, 1987: 98; Zamponi, 1987: 3-9, figs 1, 3; Cornelius, 1988b: 76; Hayward, 1988: 52, fig. II.12; Llobet, Gili & Barangé, 1988: 40, fig. 3B; Zamponi & Arca-Tellechea, 1988: 77-78, figs 8-9; Zamponi & Genzano, 1988b: 10A; Britton & Morton, 1989: 344, fig. 3.5B; Gili, Murillo & Ros, 1989: 23; Gili, Ros & Romero, 1989: 282; Gili, Vervoort & Pagès, 1989: 107-108, fig. 32A-B; Letunov & Stepan'yants, 1986: 17; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Calder, 1990: 446, 448; Cornelius & Ryland, 1990: 133, fig. 4.11; Park, 1990: 79; Zamponi & Genzano, 1990b: 21-22, fig.; Cairns et al., 1991: 24; Calder, 1991a: 72-76, fig. 38; 1991b: 223; 1991c: 2068 et seq.; El Beshbeeshy, 1991: 111-113, fig. 25b; Genzano, Cuartas & Excoffon, 1991: 69-70, fig. 5F; Gili & Ballesteros, 1991: 247; Llobet, Gili & Hughes, 1991: 153 et seq.; Zamponi & Suarez, 1991: 19; Cornelius, 1992a: 254; 1992b: 98; Dawson, 1992: 13; Genzano & Zamponi, 1992: 29-31, fig. 13; Park, 1992: 288; Ramil & Vervoort, 1992a: 243-244, fig. 68c; Bianchi, Ceppodomo, Niccolai et al., 1993: 299; Boero & Bouillon, 1993a: 265; Calder, 1993b: 68 et seq.; Harms, 1993: 15; Vervoort, 1993b: 558; Altuna Prados, 1994a: 336-340, pl. 64 figs A-C; 1995a: 54; Álvarez-Claudio & Anadón, 1995: 240; Bouillon, Massin & Kresevic, 1995: 84; Calder, 1995: 543 et seq.; Cornelius, 1995b: 296-300, fig. 69; Hirohito, 1995: 74-76, fig. 21d-k; Peña Cantero, 1995: 466-472, pl. 60 figs b-c; Boero, Bouillon & Piraino, 1996: 26; Brinckmann-Voss, 1996: 95, 96; Caltagirone et al., 1996: 155; Gili, Hughes & Alvà, 1996: 52; Medel & López-González, 1996: 206; Migotto, 1996: 88-90, 123, fig. 16d; Ramil et al., 1998: 200.
- Laomedea (Obelia) dichotoma*; Broch, 1912a: 54-56, fig. 19; Hadzi, 1915: 163, figs 31-32; Broch, 1928a: 74, fig. 74B; 1928b: 127; Hummelinck, 1936: 52, fig. 6; Broch, 1933b: 105, fig. 46; Hamond, 1957: 295, 312; Vervoort, 1959: 315; 1968: 97; Schmidt, 1972b: 35, 43, 45; Mergner & Wedler, 1977: 14, pl. 2 fig. 11; García-Corrales et al., 1978: 34, fig. 14; Mergner, 1987: 146, 149.
- ?*Obelia dichotoma*; Jäderholm, 1916a: 7.
- Obelia (?) dichotoma*; Scheuring, 1922: 160, 172.
- Clytia dichotoma*; Rossi, 1962: 80.
- Obelia dicotoma*; Relini & Romairone, 1976: 239 et seq. (incorrect subsequent spelling).

Material.— **Azores area:** AZO.037A: numerous colonies up to 10 mm high on *Sargassum* spec., with some gonothecae (RMNH-Coel. 28833; slide 2534); AZO.038: numerous colonies on Cirripedia, without gonothecae, may belong here (RMNH-Coel. 28828, slide 2548); Stn 5.002: numerous young colonies, 10-15 mm high, on cirripeds, no gonothecae; with *Clytia hemisphaerica* (Linnaeus, 1767) (RMNH-Coel. 28831, slide 2530).— **Atlantic coast of Morocco and Mauritania:** Stn 1.118: several colonies up to 8 mm high, on *Nemertesia* spec.; without gonothecae (RMNH-Coel. 27950, slide 2526); Stn 1.145: several colonies up to 13 mm high on other hydroids; gonothecae present (RMNH-Coel. 28823, slides 2542 and 2543); Stn MAU.072: numerous hydrocauli, up to 5 mm, on *Nemertesia* spec. and without gonothecae (RMNH-Coel. 28813).— **Madeira area:** Stn 4.176: c. 20 mm long colony, no gonothecae (slide 2553, RMNH-Coel. 28858).— **Canary Islands and Selvagens Archipelago:** Stn 4.004: several colonies up to 20 mm high, on Algae, with some gonothecae (RMNH-Coel. 28841, slide

2557); together with *Clytia hemisphaerica* (Linnaeus, 1767); Stn 4.015: one 6 mm high colony growing on *Halecium* sp. and without gonothecae may belong here (RMNH-Coel. 28849, slide 2547).— **Cape Verde Islands:** Stn 6.D10: one small detached fragment 5 mm high with juvenile gonothecae (RMNH-Coel. 28815).

Distribution.— **Arctic Seas:** Barents Sea (Scheuring, 1922), Spitzbergen (Jäderholm, 1916a), East Greenland (Kramp, 1938b).— **Eastern Atlantic:** general (Broch, 1913; Leloup, 1940b), Iceland (Kramp, 1938d; Olafsson, 1975), White Sea (Letunov & Stepan'yants, 1986), coast of Norway (Soot-Ryen, 1924; Mathisen, 1928; Rees, 1952; Burdon-Jones & Tambs-Lyche, 1960; Gulliksen, 1978, 1980), Faroe (Kramp, 1942b), west coast of Sweden (Rees & Rowe, 1969; Jägerskiöld, 1971; Östman, 1983a), Baltic (Kühl, 1962; Füller, 1970), Denmark (Rasmussen, 1973), North Sea (Broch, 1928a, b), Great Britain (Ritchie, 1911; Robson, 1914a; M.B.A., 1931, 1957; Eales, 1939, 1961, 1967; Newell, 1954; Knight-Jones & Jones, 1956; Spaul, 1956; Hamond, 1957; Crothers, 1966; Davis, 1967; Robinson, 1969; Hiscock, 1970; Laverack & Blacker, 1974; Cornelius, 1975a, 1982a, 1983, 1988b, 1995b; Hamond & Williams, 1977; Cornelius & Ryland, 1990), Irish Sea (Wood, 1901; Robson, 1913b; Moore, 1937; N.S. Jones, 1939; Fry, 1975), Bristol Channel (Purchon, 1938, 1948; Bassindale, 1941; Bassindale & Barrett, 1957; Hill-Cottingham, 1973; Boyden et al., 1977), Ireland (Williams, 1954), German Bight (Kühne & Rachor, 1966; Harms, 1993), Netherlands (Leloup, 1933c; Hummelinck, 1936, 1954; Vervoort, 1946b, c; Swennen, 1961; Wolff & Dankert, 1981; De Boer, 1987), Belgium (Lameere, 1894; Leloup & Miller, 1940; Leloup, 1947, 1952a), French Channel coasts and Roscoff (Billard, 1912a, 1927c; Prenant & Teissier, 1923; Teissier, 1929a, 1930a, 1950b, 1965; Philbert, 1935d; Perrier, 1936; Sartori, 1936; Vervoort, 1949; Franc, 1951; Cabioch, 1965; Booth, 1966; Redier, 1966a; Withers & Thorp, 1976; Castric & Michel, 1982), Bay of Biscay (Fey, 1970; Castric-Fey, 1973; Vervoort, 1985), north and north-west coast of Spain (Rioja & Martín, 1906; Estrada, 1980; Altuna et al., 1983, 1984; Isasi Urdangarin, 1985; Isasi & Sáiz, 1986; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a; Álvarez Claudio & Anadón, 1995; Ramil et al., 1998), Portugal (Nobre, 1937; Saldanha, 1974).— **Mediterranean:** general (Picard, 1950b, 1958b; Pérès & Picard, 1964; Boero & Bouillon, 19930), coast of Spain and Balears (García-Corrales et al., 1978; García-Carrascosa, 1981; Gili i Sardà, 1982; Gili & Romero, 1983; Gili & Castelló, 1985; Gili & García-Rubies, 1985; Gili & Ros, 1985; Gili, 1986; García-Carrascosa et al., 1987; Gili, Ros & Pagès, 1987; Llobet i Nadal, 1987; García-Rubies, 1987; Llobet, Gili & Barangé, 1988; Gili, Murillo & Ros, 1989; Gili, Ros & Romero, 1989; Gili & Ballesteros, 1991; Llobet, Gili & Hughes, 1991; Medel & López-González, 1996), Alborán Sea, Chafarinas Islands (Peña Cantero, 1995), coast of France (Schodduyn, 1923; Leloup, 1934c; Picard, 1951e, f, 1952a, d; Bellan-Santini, 1962, 1970; Monniot, 1966; Vidal, 1968; Costa, 1969; Clausade, 1970), Italy (Riedl, 1959; Rossi, 1962, 1971; Chimenz Gusso & Rivoecchi Tarameli, 1976; Relini & Romairone, 1976; Montanari & Morri, 1977; Morri, 1979b, c, 1980b, 1981a, b, d; Boero, 1981a, c; Morri & Martini, 1981; Morri & Bianchi, 1983b; Boero, Chessa et al., 1985; Boero & Fresi, 1986; Bianchi, Ceppodomo, Niccolai et al., 1993; Caltaglione et al., 1996), Adriatic (Anonymous, 1869; Babic, 1913a; Broch, 1912a; 1933b; Vatova, 1928; Morri & Bianchi, 1982; Morri, 1985), eastern part (Billard, 1931a; 1936; Vervoort, 1993b).— **Eastern temperate and tropical Atlantic:** (Billard, 1931b; Leloup, 1937a; Ramil & Vervoort, 1992a),

Azores (Rees & White, 1966a; Cornelius, 1992b), Morocco (Patrity, 1970; Elkaïm, 1972), Senegal (Picard, 1951a), Baie du Levrier, Mauritania (Leloup, 1971), Gold Coast (Buchanan, 1957), Gulf of Guinea (Vervoort, 1959; Gili, Vervoort & Pagès, 1989), West Africa (Broch, 1914a), mouth Orange River (Grindley & Kensley, 1966), south and south-west coasts of Africa, including the Cape (Millard, 1957, 1959b, 1975; Day, Field & Penrith, 1970).— **Western Atlantic:** coasts of Canada and United States (Verrill, 1879; Whiteaves, 1901; Fraser, 1912c, 1913b, 1918b, 1921, 1944a; Sumner et al., 1913; Bigelow, 1914b; Préfontaine, 1931; Leloup, 1938a; Préfontaine & Brunel, 1962; Brunel, 1970; Calder, 1971, 1975, 1976; Calder & Hester, 1978; Bromley, 1979; Woodhead & Jacobsen, 1985; Calder, 1990), Bermuda (Calder, 1986b, 1991a, 1993b, 1995), Caribbean, including Gulf of Mexico (Weiss, 1948; Deevey, 1950, 1954; Hedgpeth, 1950; Defenbaugh, 1972, 1974b; Brusca, 1973; Defenbaugh & Hopkins, 1973; Morris & Mogelberg, 1973; Fotheringham & Brunnenmeister, 1975; Britton & Morton, 1989), Belize (Calder, 1991b, c), Colombia (Wedler, 1975; Flórez González, 1983b; Bandel & Wedler, 1987), coast of Brazil (Migotto, 1996), Argentine waters (Zamponi, 1987; Zamponi & Genzano, 1988b, 1990b; El Beshbeeshy, 1991; Genzano, Cuartas & Excoffon, 1991; Zamponi & Soares, 1991; Genzano & Zamponi, 1992).— **East Pacific:** general (Fraser, 1938b, d, 1939c; 1948), Pacific coasts of Canada and United States (Fraser, 1911, 1913a, 1914a, 1932, 1936c, 1937b, 1940; Foerster, 1923; Johnson & Snook, 1935; Hewatt, 1946; Aleem, 1957; Ricketts & Calvin, 1964; Haderlie et al., 1980; Ljubenkov, 1980; Kozloff, 1983; Austin, 1985; Brinckmann-Voss, 1996), Chili (Leloup, 1974).— **Indian Ocean:** Suez Canal (Billard, 1926), Gulf of Aqaba (Schmidt, 1972b), Red Sea (Schmidt, 1973; Mergner & Wedler, 1977; Mergner, 1987), coasts of South Africa (Day, Millard & Harrison, 1952; Day & Morgans, 1956; Millard, 1958, 1975), Seychelles (Millard & Bouillon, 1974), India, Bombay (Venugopalan & Wagh, 1986).— **Western Pacific:** Indochina (Leloup, 1937b, Dawydoff, 1952), South Korea (Rho & Park, 1983; Park, 1990, 1992), Japanese waters (Yamada, 1950b, 1959; Nakamura et al., 1961; Uchida et al., 1963; Nishihira, 1965; Kikuchi, 1968; Hirohito, 1969, 1983, 1995; Saito & Suzuki, 1974), Marshall Islands, Enewetok Atoll (Cooke, 1975), New Zealand (Dawson, 1992).

Summarising: *Obelia dichotoma* can best be described as a cosmopolitan species (Millard, 1975; Ramil & Vervoort, 1992). It has been recorded previously from Morocco (Patrity, 1970), the Azores (Rees & White, 1966; Cornelius, 1992), and also from areas near the CANCAP region (Gulf of Guinea: Vervoort, 1959; Guinea Bissau: Gili, Vervoort & Pàges, 1989). The present records are from the Azores (Porto das Lajes and Porto do Fajã Grande, Flores; NE of São Miguel), Morocco (off Cape Dra and off Cape Blanc du Nord), Mauritania (off Banc d'Arguin), Madeira (Porto Santo), the Canary Islands (S of Lanzarote), and the Cape Verde region (S coast of São Vicente); they indicate a wide distribution in the CANCAP area. The depth distribution varies between 0 and 100 m.

This species has also been found pelagic (Leloup, 1932d), and attached to Isopods (*Syscenus* spec., Vader et al., 1981), Lamellibrachia (*Mya arenaria*, Rebion et al., 1973), crabs (*Dardanus* spec., Cuadras & Pereira, 1977), and Polychaeta (Stechow, 1929).

Obelia geniculata (Linnaeus, 1758)

Sertularia geniculata Linnaeus, 1758: 812.

Campanularia (Laomedea) geniculata; De D  midoff, 1840: 705.

Laomedea geniculata; Ansted & Lathan, 1862: 240; Anonymous, 1869: 13; Broch, 1910b: 35, fig. 30; Arndt, 1913: 122; Grieg, 1913: 146; Broch, 1914a: 37; Kramp, 1916: 213, pl. 3 figs 1-2; Broch, 1918a: 166-167; Billard, 1927c: 332; Dons, 1927: 4, fig. 3; Kramp, 1927: 125; Mathisen, 1928: 7, 34, 37; Leloup, 1931c: 1-3, figs 1-2; Kramp, 1932c: 66, 69; Leloup, 1933c: 7, 21; Kramp, 1934: 67, fig. 5; Leloup, 1934c: 1; Kramp, 1935b: 108, fig. 47; 1938d: 18, 63, 67, 73, fig. 1; Leloup, 1938a: 2; 1939a: 419, fig. 2; Da Cunha, 1940: 109, 118; Leloup, 1940b: 21; Kramp, 1942b: 39, fig. 5; Vervoort, 1942: 309; Kramp, 1943b: 43; Da Cunha, 1944: 10, 60, fig. 35; Vervoort, 1946b: 294, figs 129-131; 1946c: 346; Leloup, 1947: 25, fig. 15; Caspers, 1949: 238; Vervoort, 1949: 158; Da Cunha, 1950: 122, 125, 140; Naumov, 1950: 1126, fig. 2b; Rossi, 1950: 15, fig. 6; Buchanan, 1957: 359, fig. 21; Swennen, 1961: 209, 213, 219; K  hl, 1962: 226; Ohm, 1964: 58; K  hne & Rachor, 1966: 440 et seq.; Manea, 1968: 282, fig. 2; Anonymous, 1970: 2; F  ller, 1970: 19; Thiel, 1970: 489; J  gerski  ld, 1971: 63; Rasmussen, 1973: 27; Schmidt, 1973a: 284; Leloup, 1974: 19, fig. 16; Olafsson, 1975: 7, 20, fig. 6; Wedler, 1975: 332; Anger, 1978: 460; Bromley, 1979: 526; Prud'homme van Reine, 1981: 139; Wolff & Dankert, 1981: 27; Masunari, 1983: 82-84.

Obelia geniculata; Verrill, 1879: 16; Lameere, 1894: 20; Murray, 1896: 414; Chadwick, 1898: 7; Whiteaves, 1901: 23; Wood, 1901: 16, 20; Shidlovskii, 1902: 122, pl. 3 fig. 19; Rioja y Mart  n, 1906: 278; Bartlett, 1907: 42; Th  el, 1907: 59; Morey, 1909: 217; Koehler, 1910: 493; Ritchie, 1910: 31; Bedot, 1911: 219; Fraser, 1911: 39; Linko, 1911: 227-231, fig. 43; Appell  f, 1912: 467, 470, fig. 328; Billard, 1912a: 461; Fraser, 1912c: 362, fig. 23; Massy, 1912: 216; Stechow, 1912a: 353; Fraser, 1913b: 167, pl. 12 figs 1-2; Heinsius & Jaspers, 1913: 105, fig. 25E; Meek & Storrow, 1913: 66; Robson, 1913b: 76-79, 83; Stechow, 1913c: 8, 22, 69-71, figs 26-27; Sumner, 1913: 569, 570; Walton, 1913: 106; Bigelow, 1914: 14; M  ller, 1914: 309-321; Mulder & Trebilcock, 1914: 44-45, pl. 6; Robson, 1914: 100; Woods, 1914: 358; Fraser, 1915: 308, 311-314; Pratt, 1916: 114, fig. 188; Wilson, 1917: 19; Fraser, 1918b: 332, 350; Stechow, 1919a: 50; Orton, 1920: 350; Renouf, 1920: 115; Fraser, 1921: 160, fig. 49; Stechow, 1921e: 221-223, fig. 1; Hentschel, 1922: 5; Migot, 1922: 272, fig. 3; Van Benthem Jutting, 1922: lxxxvi; Billard, 1923: 14; Elmhurst, 1923: 20; Foerster, 1923: 38; Lebour, 1923: 78; Peacock, 1923: 93; Stechow, 1923b: 7; 1923d: 114; Bale, 1924: 230; Coy, 1924: 56; Mathews, 1924: 46; Peacock 1924: 57; Prenant & Teissier, 1924: 26; Elmhurst, 1925: 358, 359; Uchida, 1925: 90; Billard, 1926: 94; Fraser, 1926: 213; J  derholm, 1926: 3; McIntosh, 1926: 256; Dons, 1927: 4, fig. 3; Fraser, 1927: 326; Stechow, 1927: 309; Faulkner, 1929: 225-240; Percival, 1929: 88; Stechow, 1929: 153; Saint-Hilaire, 1930: 550 et seq.; M.B.A., 1931: 72; Nobre, 1931: 10; Pr  fontaine, 1931: 77; Alexander, 1932: 39; Thiel, 1932a: 145; 1932b: 443; Weill, 1934: 468, fig. 293a-b; Alexander et al., 1935: 49; Johnson & Snook, 1935: 60, fig. 43; Philbert, 1935a: 86; 1935c: 18; 1935e: 26; Thiel, 1935: 163, 164, 166, 171, 172; Billard, 1936: 4; Cart & Crichton, 1936: 264; Fraser, 1936: 124; Perrier, 1936: 24; Sartory, 1936: 219, pl. 15 fig. 2; Valkanov, 1936: 237; Fraser, 1937b: 87, pl. 17 fig. 89; Moore, 1937: 42; Bright, 1938: 64; Fraser, 1938b: 8, 37; 1938d: 133; Kramp, 1938d: 13; Briggs, 1939: 14; Eales, 1939: 39, pl. 3 fig. 9; Fraser, 1939c: 159; Hiro (= Utinomi), 1939: 174, fig. 6; Zirpolo, 1939: 1-6, figs 1-2; Moore & Sproston, 1940: 320; Palombi, 1940: 150 et seq.; Zirpolo, 1940: 127, figs 1-2; Bassindale, 1941: 149; Cotton & Godfrey, 1941: 4, fig. Blackburn, 1942: 106; Fraser, 1943b: 88; Morley, 1943: 76; Fraser, 1944: 158-160, pl. 28 fig. 130; Gilson et al., 1944: 234; Vannucci-Mendes, 1946: 551, pl. 2 figs 14-15; Kramp, 1947a: 55; Berrill, 1948: 94, fig. 3; Dollfus, 1948: 23; Fraser, 1948: 214; Yashnov, 1948: 73; Sproston, 1949: 139; Vannucci, 1949: 232; Deevey, 1950: 334, 345; Hodgson, 1950: 3, figs 1-4; Kulka, 1950: 80, fig. 1; Naumov, 1950: 1126, fig. 2b; Picard, 1950b: 192; Teissier, 1950b: 14; Vannucci, 1950: 84; Delamare Deboutteville & Nunes, 1951: 425, 426; Drach, 1951: 510; Picard, 1951a: 111; 1951e: 278; Vannucci, 1951b: 108, 111, 113, 115, 117; Dawydoff, 1952: 52, 56; Delamare Deboutteville & Nunes, 1952: 5; Leloup, 1952: 152-154, fig. 85; Picard, 1952a: 349; 1952d: 220; Rees, 1952: 7; Crowell, 1953: 321 et seq.; Lewis, 1953: 534; Callame, 1954: 470; Chiu, 1954: 50; Deevey, 1954: 270; Newell, 1954: 330; Williams, 1954: 48; Picard, 1955b: 186; Batham, 1956: 456; Kao Cheh-Sheng, 1956: 84-85, fig. 15;

Knight-Jones & Jones, 1956: 27; Ralph, 1956: 281, figs 1, 2b; Spaul, 1956: 17; Bassindale & Barrett, 1957: 245; Millard, 1957: 198; M.B.A., 1957: 43; Nakushi et al., 1957: 217, pl. 108 fig. 3; Ralph, 1957: 831, fig. 4i; Barrett & Yonge, 1958: 53, fig. 15c; Paul, 1958: 535; Picard, 1958b: 191; Yamada, 1958: 51, 54; Bousfield & Leim, 1959: 14; Millard, 1959b: 250; Riedl, 1959: 636; Yamada, 1959: 41; Kerneis, 1960: 163; Naumov, 1960: 261-263, figs 15B, 37, 147, 148; Cabioch, 1961: 36; Eales, 1961: 35, pl. 3 fig. 9; Kato et al., 1961: 195; Ralph, 1961c: 104, 107; 1961d: 236; Itô & Inoue, 1962: 449, pl. 8 fig. 67; Kawahara, 1962: 33; Préfontaine & Brunel, 1962: 245; Brotskaya et al., 1963: 174; Bruce et al., 1963: 51; Taege, 1963: 252, fig. 3; Redier, 1964b: 132; Blanco, 1965: 162, 165, pl. 1 figs 10-11; Cabioch, 1965: 56; De Haro, 1965: 109, 111, fig. 5; Mammen, 1965: 14, figs 39-40; Nishihira, 1965: 77; Rees & Thursfield, 1965: 100; Teissier, 1965: 16; Wear, 1965: 7, fig. 3D; Yamada, 1965: 361; Brattegård, 1966: 12; Crothers, 1966: 12; Millard, 1966a: 483; Millard, 1966b: 491; Nishihira, 1966: 187; Redier, 1966a: 45; Eales, 1967: 35, pl. 3 fig. 9; Rho, 1967: 342-343, fig. 1; Cabioch, 1968: 587; De Haro, 1968: 302, 303; Micallef & Evans, 1968: 2; Nishihira, 1968c: 120; 1968d: 126; Ralph & Thomson, 1968: 1-21, pls 1-3; Berrisford, 1969: 394; Fey, 1969: 394; Hirohito, 1969: 9; Rho, 1969: 164-165, figs 3-4; Robins, 1969: 331; Anonymous, 1970: 2; Calder, 1970c: 1522, pl. 4 fig. 7; Day, Field & Penrith, 1970: 12; Füller, 1970: 26, fig. 26/1; Gravier, 1970: 116; Patrity, 1970: 35, figs 44-44bis; Riedl, 1970: 150, pl. 41; Shepherd & Watson, 1970: 140; Anonymous, 1971: 305; Bouillon & Levi, 1971: 221; Calder, 1971: 55, pl. 4 fig. C; Huxtable, 1971: 64, fig; Millard, 1971: 404; Nichols et al., 1971: 9, fig; Nishihira, 1971: 104; Rossi, 1971: 32, 43, fig. 12C-D, 16G; Christiansen, 1972: 294; Defenbaugh, 1972: 388; Roberts, 1972: 300 et seq.; Rho & Chang, 1972: 4; Stepan'yants, 1972: 325; Von Salvini-Plawen, 1972: 393; Castric-Fey, 1973: 213; Defenbaugh & Hopkins, 1973: 88-89, pl. 10 fig. 36; Morris & Mogelberg, 1973: 15, fig. 16; Morton & Miller, 1973: 152; Defenbaugh, 1974: 118; Hiscock, 1974: 24; Laverack & Blacker, 1974: 21; Millard & Bouillon, 1974: 6; Rho & Chang, 1974: 140; Saito & Suzuki, 1974: 37; Saldanha, 1974: 325; Belousov, 1975b: 655, fig. 1 no. 14, fig. 2B, D; Calder, 1975: 303, figs 4E-F; Cornelius, 1975a: 272, figs 1, 5; Millard, 1975: 229, fig. 75A-B; Arnaud et al., 1976: 49; Chimenz Gusso & Rivosecchi Taramelli, 1976: 113, 117; Riggio & Mazzola, 1976: 144, 147; Relini & Romairone, 1976: 239 et seq.; Logan, 1976: 29; Withers & Thorp, 1976: 603; Blanco & Morris, 1977: 91-93, figs; Boyden et al., 1977: 487; Chas Brínquez & Rodríguez Babio, 1977: 25, fig. 8A-C; Cornelius, 1977c: 174; Cuadras & Pereira, 1977: 303; Gordon & Ballantine, 1977: 100; Rho, 1977: 259, 417, fig. 9A, pl. 17 fig. 72; Shuvalov & Pavshits, 1977: 22; Calder & Hester, 1978: 90; Evans, 1978: 56, 57; García-Corrales et al., 1978: 37, figs 15-16; Honma & Kitami, 1978: 10; Millard, 1978: 195 et seq.; Kapler, 1979: 184, fig. 7; Marinopoulos, 1979b: 120; Morri, 1979b: 306; Östman, 1979a: 7; Stepan'yants, 1979: 36, pl. 5 fig. 7; Camp & Ros, 1980: 201; Haderlie et al., 1980: 47; Ljubenkova, 1980: 47; Morri, 1980b: 6; Stepan'yants, 1980b: 116, 119, fig. 5; Boero, 1981a: 182; 1981b: 111; García-Carrascosa, 1981: 190-193, pl. 10 figs a-b, pl. 31 fig. a; Morri, 1981a: 194; 1981b: 69, fig. 22, pl. 1 fig. 8; Morri & Martini, 1981: 308; Castric & Michel, 1982: 26, fig. 83; Cornelius, 1982a: 119-120; 1982b: 155, fig. 1; Gili i Sardà, 1982: 68, fig. 30; Östman, 1982: 155 et seq., figs; Altuna et al., 1983: 133; Butler et al., 1983: 42; Flórez González, 1983b: 120, photograph 24; Hirohito, 1983: 6, 17; Kozloff, 1983: 49; Morri & Bianchi, 1983b: 79; Östman, 1983a: 227 et seq., figs 1, 12-13, 15, 43, 44, 50-51, 53; 1983b: 6; Roper et al., 1983: 270; Urgorri & Besteiro, 1983: 25; Bouillon, 1984b: 107, 108; Headstrom, 1984: 64; Austin, 1985: 53; Boero, 1985a: 136; Boero et al., 1985: 29; Gili & Castelló, 1985: 16, fig. 4l; Isasi Urdangarín, 1985: 72, fig. 17; Makarenkova, Makarenkov & Letunov, 1985: 1615 et seq.; Maluquer, 1985: 25; Stepan'yants, 1985a: 130; 1985b: 85; Boero & Fresi, 1986: 144; Gili, 1986: 183-184, fig. 4.20A; Isasi & Sáiz, 1986: 70; Antsulevich, 1987a: 16; Bandel & Wedler, 1987: 41; Cornelius, 1987d: 36; Duris, 1987: 182, fig; García-Carrascosa et al., 1987: 369; García-Rubies, 1987: 146, 149, 151; Llobet i Nadal, 1987: 154-157, fig. 46; Östman, 1987: 72, 75-76; Östman, Piraino & Roca, 1987: 300 et seq.; Roca, 1987: 211; Staples & Watson, 1987: 218; Vervoort, 1987: 98; Hayward, 1988: 51, pl. 1 figs 5-6; Malyutin & Marfenin, 1988: 99; Llobet, Gili & Barangé, 1988: 40, fig. 3H; Vietti & Boero, 1988: 220; Zamponi & Genzano, 1988: 10A; Gili, Murillo & Ros, 1989: 23; Gili, Vervoort & Pagès, 1989: 108, fig. 32C; Lin Sheng, 1989: 341; Stepan'yants, 1989b: 412 et seq.; Malyutin & Marfenin, 1989: 71; Marfenin & Khomenko, 1989: 82; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Cornelius & Ryland, 1990: 133, fig. 4.11; Harris, 1990: 246, fig. 11.11; Kosevich, 1990: 26 et seq.; Park, 1990: 79; Piraino, Morri & Boero, 1990: 387; Cairns et al., 1991: 23; Crowell,

1991: 71, figs 1A, 2; El Beshbeeshy, 1991: 114-117, fig. 26; Genzano, Cuartas & Excoffon, 1991: 70, fig. 5G; Llobet, Gili & Hughes, 1991: 153 et seq.; Cornelius, 1992a: 254; 1992b: 98; Dawson, 1992: 13; Park, 1992: 288; Watson, 1992: 220; Boero & Bouillon, 1993: 265; Branch & Williams, 1993: 9, fig.; García Alvarez et al., 1993: 271; Harms, 1993: 15; Schönborn et al., 1993: 243, pl. 13 fig. 3; Vervoort, 1993b: 558-559; Altuna Prados, 1994a: 340-342; Blanco, 1994a: 159; 1994b: 194; Watson, 1994b: 66; Altuna Prados, 1995a: 54; Bouillon, Massin & Krešević, 1995: 84; Cornelius, 1995b: 301-303, fig. 70; Hirohito, 1995: 76-78, fig. 22a-b; Kalk, 1995: 199, fig. 7.20; Peña Cantero, 1995: 472-475, pl. 60 fig. a; Boero, Bouillon & Piraino, 1996: 26; Caltagirone et al., 1996: 155; Medel & López-González, 1996: 206; Migotto, 1996: 90-91, 123, fig. 16e; Stepan'yants, Svoboda & Vervoort, 1996: 14; Watson, 1996: 78; Ramil et al., 1998: 200-201.

?*Obelia geniculata*; Kramp, 1913d: 418; Skerman, 1959: 57.

Clytia geniculata; Bennitt, 1922: 248.

Laomedea (Obelia) geniculata; Broch, 1928a: 73, fig. 72; 1928b: 125-126, fig. 30; Caspers, 1941: 4; Berezina, 1948: 60, pl. 16 fig. 6; Hamond, 1957: 295, 312; Luther & Fiedler, 1965: 237, pl. 37; Vervoort, 1968: 97; Schmidt, 1972b: 45.

Obelia (Laomedea) geniculata; Gislén, 1930: 338.

Campanularia geniculata; Coulon, 1931: 55; Thiel, 1935a: 163, 164, 166, 171, 172; Kato, 1949: 215.

Orthopyxis geniculata; Picard, 1958c: 1.

Material.— **Madeira area:** Stn 1.072: numerous colonies up to 10 mm high growing on *Zostera* spec. without gonothecae (RMNH-Coel. 28846, slide 2537).

Distribution.— **Arctic:** Greenland (Kramp, 1932c, 1943b), Barents Sea (Stepan'yants, 1985b), Russia (Linko, 1911; Berezina, 1948; Yashnov, 1948; Naumov, 1960; Antsulevich, 1986a).— **Eastern Atlantic:** White Sea (Shidlovskii, 1902; Brodskaya et al., 1963; Stepan'yants, 1985a), Norwegian Sea (Appellöf, 1912; Broch, 1918a), Iceland (Kramp, 1938d; Olafsson, 1975), Norway (Broch, 1910b; Grieg, 1913; Dons, 1927; Mathisen, 1928; Rees, 1952; Brattegård, 1966; Christiansen, 1972), Farøer (Kramp, 1942b), south-west coast of Sweden (Théel, 1907; Östman, 1982a; Gislén, 1930; Jägerskiöld, 1971), Denmark (Kramp, 1934b; Rasmussen, 1973), Baltic (Stechow, 1927; Ohm, 1964; Thiel, 1970; Schönborn et al., 1993), German Bight (Caspers, 1941, 1949b; Kühn, 1962; Kühne & Rachor, 1966; Von Anger, 1978; Harms, 1993), North Sea (Broch, 1928a, b), Great Britain (Robson, 1914a; Woods, 1914; McIntosh, 1926; Percival, 1929; M.B.A., 1931, 1957; Cart & Crighton, 1936; Sartory, 1936; Eales, 1939, 1961, 1967; Moore & Sproston, 1940; Morley, 1943; Gilson et al., 1944; Lewis, 1953; Newell, 1954; Williams, 1954; Knight-Jones & Jones, 1956; Spaul, 1956; Hamond, 1957; Paul, 1958; Crothers, 1966; Robins, 1969; Hiscock, 1974; Laverack & Blacker, 1974; Cornelius, 1975a, 1982a, 1995b; Withers & Thorp, 1976; Cornelius & Ryland, 1990), Irish Sea and Bristol Channel (Chadwick, 1898; Wood, 1901; Massy, 1912; Meek & Storrow, 1913; Robson, 1913b; Walton, 1913; Renouf, 1920; Peacock, 1923, 1924; Coy, 1924; Mathews, 1924; Alexander, 1932; Alexander et al., 1935a, c; Moore, 1937; Bassindale, 1941; Bassindale & Barnett, 1957; Bruce et al., 1963; Huxtable, 1971; Logan, 1976; Boyden et al., 1977; Evans, 1978), Channel, Channel Islands and Roscoff (Ansted & Lathan, 1862; Morey, 1909; Bedot, 1911; Billard, 1912a; Prenant & Teissier, 1924; Philbert, 1935a; Vervoort, 1949; Teissier, 1950b, 1965; Cabioch, 1961, 1965, 1968; Redier, 1966c; Castric & Michel, 1982), Netherlands (Heinsius & Jaspers, 1913; Van Benthem Jutting, 1922; Leloup, 1933c; Vervoort, 1946b, c; Swennen, 1961; Prudhomme van Reine, 1981; Wolff & Dankert, 1981), Belgium (Lameere, 1894; Leloup, 1947, 1952), Atlantic coast of

France (Billard, 1923, 1927c; Perrier, 1936), Bay of Biscay (Fey, 1970; Castric-Fey, 1973), north and north-west coast of Spain (Rioja y Martín, 1906; Chas Brinquez & Rodríguez Babio, 1977; Altuna et al., 1983; Urgorri & Besteiro, 1983; Isasi Urdangarín, 1985; Isasi & Sáiz, 1986; Altuna & García-Carrascosa, 1990; García-Carrascosa et al., 1993; Altuna Prados, 1994a, 1995a; Ramil et al., 1998), Portugal (Nobre, 1931; Saldanha, 1974; Da Cunha, 1940, 1944, 1950).— **Mediterranean:** general (Picard, 1950b, 1958b; Luther & Fiedler, 1965; Boero & Bouillon, 1993a), coast of Spain and Balears (De Haro, 1965; García-Corrales et al., 1978; Camp & Ros, 1980; García-Carrascosa, 1981; Gili i Sardà, 1982; Gili & Castelló, 1985; Maluquer, 1985; Gili, 1986; García-Carrascosa et al., 1987; García-Rubies, 1987; Llobet i Nadal, 1987; Roca, 1987; Llobet, Gili & Barangé, 1988; Gili, Murillo & Ros, 1989; Llobet, Gili & Hughes, 1991; Medel & López-González, 1996), Alborán Sea, Chafarinas Islands (Peña Cantero, 1995), coast of France (Leloup, 1934c; Philbert, 1935e; Picard, 1951e, 1952a, d; Kerneis, 1960), Italy (Rossi, 1950, 1971; Riedl, 1959; Chimenz Gusso & Rivosecchi Taramelli, 1976; Riggio & Mazzola, 1976; Morri, 1979b, 1980b, 1981a, b; Boero, 1981a, b, 1985a; Morri & Martini, 1981; Morri & Bianchi, 1983b; Boero, Chessa et al., 1985; Boero & Fresi, 1986; Caltagirone et al., 1996), Adriatic (Anonymous, 1869; Riedl, 1970), Malta (Micalef & Evans, 1968), Algeria (Picard, 1955b), eastern part (Billard, 1936; Picard, 1958c; Marinopoulos, 1979b; Vervoort, 1993b), Black Sea (De Démiroff, 1840; Thiel, 1935a; Valkanov, 1936; Manea, 1968).— **Eastern temperate and (sub)tropical Atlantic:** general (Leloup, 1940b), Azores (Cornelius, 1992b), Morocco (Patrioti, 1970), West Africa (Broch, 1914a), Senegal (Picard, 1951a), Gold Coast (Buchanan, 1957), Gulf of Guinea (Gili, Vervoort & Pagès, 1989), Congo (Leloup, 1939a), coast of south-west Africa and Cape (Bright, 1938; Millard, 1957, 1959b, 1966a, b, 1975; Day Field & Penrith, 1970; Arnaud et al., 1976), Vema Seamount (Millard, 1966b; Berrisford, 1969).— **Western Atlantic:** coasts of Canada and United States [Verrill, 1879; Whiteaves, 1901; Fraser, 1912c, 1913b, 1915, 1921, 1936c, 1944a; Sumner et al., 1913; Foerster, 1923 (medusa); Préfontaine, 1931; Bousfield & Leim, 1959; Préfontaine & Brunel, 1962; Calder, 1971, 1975; Calder & Hester, 1978], Bermuda (Bennett, 1922), Caribbean, including Gulf of Mexico (Hentschel, 1922; Deevey, 1950, 1954; Defenbaugh, 1972, 1974; Defenbaugh & Hopkins, 1973; Morris & Mogelberg, 1973), Colombia (Wedler, 1975; Flórez González, 1983b; Bandel & Wedler, 1987), Brazil (Vannucci Mendes, 1946, 1949; Vannucci, 1950, 1951b; Masunari, 1983; Migotto, 1996), Argentine waters (Blanco, 1965, 1994a, b; Blanco & Morris, 1977; Zamponi & Genzano, 1988; El Beshbeeshy, 1991; Genzano, Cuartas & Excoffon, 1991).— **Subantarctic:** Marion & St Paul (Millard, 1971; Branch & Williams, 1993), Kerguelen (Murray, 1896).— **Antarctic:** general (Jäderholm, 1926; Briggs, 1939; Stepan'yants, 1979).— **Eastern Pacific:** general (Fraser, 1938b, d, 1939c, 1948), Pacific coasts of Canada and United States (Fraser, 1911, 1937b, Johnson & Snook, 1935; Haderlie et al., 1980; Ljubenkova, 1980; Kozloff, 1983; Austin, 1985), Chile (Leloup, 1974).— **Western Pacific:** Japanese waters (Stechow, 1913c, 1923b; Hiro, 1939; Yamada, 1958, 1959, 1965; Kato et al., 1961; Kawahara, 1962; Mishihira, 1965, 1966, 1968c, d, 1971; Hirohito, 1969, 1983, 1995; Anonymous, 1971; Saito & Suzuki, 1974; Honma & Kitami, 1978), Korea (Rho, 1967, 1969; Rho & Chang, 1972, 1974; Rho, 1977; Park, 1990, 1992), Yellow Sea (Lin Sheng, 1989), Indochina (Dawydoff, 1952), Bismarck Sea (Bouillon, 1984b, medusa); Australia (Bartlett, 1907; Mulder & Trebilcock, 1914; Cotton & Godfrey, 1941; Blackburn, 1942; Shepherd & Watson, 1970; Staples &

Watson, 1987; Watson, 1992a, 1994b, 1996), Tasmania (Hodgson, 1950), New Zealand [(Kulka, 1950; Batham, 1956; Ralph, 1956, 1957, 1961c, d; Wear, 1965 (medusa); Ralph & Thomson, 1968; Roberts, 1972; Morton & Miller, 1973; Gordon & Ballantine, 1977; Dawson, 1992].— **Indian Ocean:** Red Sea (Schmidt, 1973a), Suez Canal (Billard, 1926), Gulf of Aqaba (Schmidt, 1972b), coasts of South Africa (Kalk, 1995), Madagascar (Gravier, 1970a), Seychelles (Millard & Bouillon, 1974), India (Mammen, 1965).

Summarising: a cosmopolitan species known to occur in all oceans and penetrating high latitudes on the northern hemisphere (Stepan'yants, 1989) and into subantarctic waters on the southern hemisphere (Genzano & Zamponi, 1997). It is widely distributed over the Atlantic, including the Mediterranean, and over the Indo-west Pacific and eastern Pacific. From the CANCAP area it was previously recorded from Morocco (Patrioti, 1970); it is here recorded east of Madeira, the depth record is 80 m depth. The species mainly inhabits the littoral zone which may account for the paucity of CANCAP records, that are largely from deeper waters.

Obelia geniculata has been found pelagic (Fraser, 1915; Stepan'yants, 1972a), and epizootic on Isopoda (Stechow, 1921e, 1929); crabs (Hiro, 1939; Cuadras & Pereira, 1977); fishes (Zirpolo, 1939, 1940), and parasitic copepods (Dollfus, 1948; Delamare Deboutteville & Nunes, 1951, 1952).

Genus *Orthopyxis* L. Agassiz, 1862

Orthopyxis crenata (Hartlaub, 1901) (fig. 13a)

Eucopella crenata Hartlaub, 1901: 350, 464, pl. 2 figs 27-31, 33-35.

Orthopyxis crenata; Bale, 1924: 232, fig. 3; Stechow, 1925a: 210; Trebilcock, 1928: 3; Bale, 1934: 273; Kulka, 1950: 80, fig. 3a-b; Picard, 1952d: 220; Vannucci, 1954: 111; Batham, 1956: 456; Picard, 1958b: 191; Pennycuik, 1959: 172; Ralph, 1961c: 104; Rees & Thursfield, 1965: 104; Miller & Batt, 1973: 42; Morton & Miller, 1973: 152, fig. 54 no. 2; Leloup, 1974: 17, fig. 15; Marinopoulos, 1979b: 120; Cornelius, 1982a: 58-60, fig. 5; Isasi Urdangarín, 1985: 56-57, fig. 10; Gili, 1986: 177-178, fig. 4.18A; Isasi & Sáiz, 1986: 69; Gili, Murillo & Ros, 1989: 23; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Llobet et al., 1991: 283-291, fig. 1; Cornelius, 1992a: 257; 1992b: 98; Boero & Bouillon, 1993a: 265; Altuna Prados, 1994a: 344-347; 1995a: 54, fig. 4E-F; Bouillon, 1995: 236; Bouillon, Massin & Kresevic, 1995: 85; Peña Cantero, 1995: 479-481, pl. 61 fig. e; Medel & López-González, 1996: 207; Migotto, 1996: 123; Watson, 1996: 78; Ramil et al., 1998: 201.

Campanularia crenata; Picard, 1951f: 261; Millard & Bouillon, 1973: 47, fig. 6B-F; Millard & Bouillon, 1974: 5; Millard, 1975: 204, fig. 68A-F; García-Corrales et al., 1978: 19, fig. 7; Millard, 1978: 189; Boero, 1981a: 182; García-Carrascosa, 1981: 167-168, pl. 33 fig. c; Austin, 1985: 52; Gili & García-Rubies, 1985: 43, fig. 3G, I; Cairns et al., 1991: 23; Watson, 1994a: 67; Hirohito, 1995: 53-54, fig. 15e-k

Orthopyxis crenata f. *crenata*; Ralph, 1957: 838, fig. 65g-v.

Campanularia ?crenata; Millard, 1958: 170, fig. 2a-c, e.

Eucopella crenata; Hirohito, 1969: 7, fig. 7. .

Orthopyxis crenata crenata; Dawson, 1992: 13.

Material.— **Madeira area:** Stn 1.K14: numerous colonies up to 3 mm high on Algae, without gonothecae. Hydrothecae with more or less developed wide and shallow teeth, many hydrothecae with even rim (RMNH-Coel. 28834, slide 2524).

Remarks.— The hydrothecal cusps in our material are shallow; the rim being even in many hydrothecae, which is characteristic for *Orthopyxis integra* (see Medel, 1996: 242-245; also reported by Cornelius, 1995: 238). We bring this material to *O. crenata* because cusps are quite distinct in some of the hydrothecae (fig. 13a). Specific distinction between *O. crenata* and *O. integra* can, in our opinion, be difficult in the absence of medusae.

Distribution.— **Eastern Atlantic:** Great Britain (Cornelius, 1982a), north and north-west coast of Spain (Isasi Urdangarín, 1985; Isasi & Sáiz, 1986; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a; Medel & López-González, 1996; Ramil et al., 1998).— **Mediterranean:** general (Picard, 1958b; Boero & Bouillon, 1993a; Medel & López-González, 1996), coast of Spain (Gili, 1986; Gili, Murillo & Ros, 1989; Llobet et al., 1991; García-Corrales et al., 1978; García-Carrascosa, 1981; Gili & García-Rubies, 1985), Alborán Sea, Chafarinas Islands (Peña Cantero, 1995), coast of France (Picard, 1951f, 1952d), Italy (Boero, 1981a), eastern part (Marinopoulos, 1979b).— **Temperate and (sub)tropical Atlantic:** Azores (Cornelius, 1992b), South Africa (Millard, 1975).— **Western Atlantic:** Brazil (Vannucci, 1954; Migotto, 1996).— **Eastern Pacific:** coasts of Canada and United States (Austin, 1985, Chili (Hartlaub, 1901; Leloup, 1974).— **Western Pacific:** Japanese waters (Hirohito, 1969, 1995), Australia (Stechow, 1925a; Bale, 1924, 1934; Pennycuik, 1959; Watson, 1994a, 1996), New Zealand [Trebilcock, 1928; Kulka, 1950; Batham, 1956; Ralph, 1957, 1961c; Miller & Batt, 1973; Morton & Miller, 1973; Bouillon, 1995a (medusa); Dawson, 1992].— **Indian Ocean:** Seychelles (Millard & Bouillon, 1973, 1974).

Summarizing: *Orthopyxis crenata* is a warm water species distributed over all oceans (Millard, 1975) and penetrating into subantarctic waters (Argentine waters, Genzano & Zamponi, 1997). In the north-eastern Atlantic the species may well be an Indo-Pacific immigrant having reached the Atlantic by means of the Suez Canal and the Mediterranean. It has been cited from the Azores (Cornelius, 1992B) and the Cape Verde region (Millard, 1975, no further details) in the CANCAP area. The present record is from the littoral zone at the SE coast of Madeira (W of Caniçal).

Orthopyxis integra (Macgillivray, 1842)
(fig. 13b-c)

Campanularia integra Macgillivray, 1842: 465; Hincks, 1868: 163-164, pl. 31 fig. 1; Ansted & Lathan, 1862: 240; Anonymous, 1869: 13; Verrill, 1879: 16; Holm, 1889: 171; Wood, 1901: 20; Shidlovskii, 1902: 126; Fraser, 1911: 31; Kramp, 1911: 388; Fraser, 1912c: 356, fig. 13; Kramp, 1913b: 28; Stechow, 1913b: 144; 1913c: 8, 73, figs 30-36; Dons, 1914: 51; Fraser, 1914a: 137, pl. 11 fig. 31; 1914b: 217, 218; Kudelin, 1914: 465; Robson, 1914: 96; Deryugin, 1915: 308; Hadzi, 1915: 156, fig. 29; Hartlaub & Scheuring, 1916: 73, pl. 18 figs 10-12; Jäderholm, 1917: 6; Billard, 1917a: 208; Broch, 1918a: 159-162, pl. 1 fig. 1; Fraser, 1918b: 332, 344; Jäderholm, 1919b: 4; Fraser, 1921: 155, fig. 32; Scheuring, 1922: 160, 173; Billard, 1923: 14; Totton, 1925: 2; Dons, 1927: 2, fig. 2; Fraser, 1927: 326; Spasskii, 1927: 362; Mathisen, 1928: 7, 32, 37; Vatova, 1928: 140; Teissier, 1930a: 183; Fraser, 1931: 479, 480; 1932: 51; Kramp, 1932b: 20; 1932c: 63, 69; Ushakov, 1932: 146; Fraser, 1933a: 564, 565; Kramp, 1933a: 15; Leloup, 1933c: 21; Bale, 1934: 273-275; Leloup, 1934c: 10; Fraser, 1935b: 144; Kramp, 1935b: 103, fig. 45d; Fraser, 1936c: 123; 1937b: 64-65, pl. 13 fig. 57; Leloup, 1937b: 4, 19; Ushakov, 1937: 25; Kramp, 1938d: 17, 63, 67, 73, 78; Leloup, 1940b: 19; Bassindale, 1941: 148; Kramp, 1942b: 35; 1943b: 18, 43; Fraser, 1944a: 122-123, pl. 21 fig. 94; Vervoort, 1946b: 274, figs

- 120-121; Leloup, 1947: 22, fig. 12; Berezina, 1948: 59, pl. 16 fig. 5; Fraser, 1948: 204; Vervoort, 1949: 156; Rossi, 1950: 10, fig. 5; Dawydoff, 1952: 54; Leloup, 1952a: 149-150, fig. 81; Yamada, 1955: 121, fig. 1A; Kao Cheh-Sheng, 1956: 77-78, fig. 7; Hamond, 1957: 295, 312; Millard, 1957: 193; Naumov, 1960: 258-259, figs 17A, 54, 145; Macnae & Kalk, 1962: 114; Hamond, 1963b: 14; Blanco, 1965: 152, 156, pl. 1 fig. 8; Penzlin, 1965: 600; Millard, 1966a: 472, fig. 13A-D; Anonymous, 1970: 2; Calder, 1970c: 1518, pl. 4 fig. 2; Day, Field & Penrith, 1970: 12; Füller, 1970: 18; Anonymous, 1971: 305; Jägerskiöld, 1971: 61; Manea, 1972: 411, fig. 2; Millard & Bouillon, 1974: 5; Belousov, 1975b: 655, fig. 1 no. 22, fig. 2E; Millard, 1975: 208, fig. 69; Olafsson, 1975: 17; Millard, 1978: 189; Morri, 1979b: 306; Östman, 1979a: 8 et seq., figs 13, 17-18; Chaplygina, 1980: 56; Ljubenkov, 1980: 46; Morri, 1980b: 6; Stepan'yants, 1980b: 116; Boero, 1981b: 109, fig. 3; García-Carrascosa, 1981: 158-161, pl. 8 figs a-d, pl. 33 figs a-b; Wolff & Dankert, 1981: 27; Gili i Sardá, 1982: 57, fig. 21B; Östman, 1982a: 155 et seq., figs; 1983b: 6; Boero, 1984: 99, 103; Östman, 1984: 100; Gili & Castelló, 1985: 15, fig. 4G; Stepan'yants, 1985a: 129; 1985b: 86; Boero & Fresi, 1986: 144; Wacasey & Atkinson, 1987: 16 et seq.; Stapels & Watson, 1987: 218; Stepan'yants, 1989b: 412 et seq.; Dawson, 1992: 13; Jensen & Frederiksen, 1992: 64; Blanco, 1994a: 159; 1994b: 192; Stepan'yants, 1994: 122 et seq.; Watson, 1994a: 67.
- Campanularia integra* f. *typica*; Linko, 1911: 165-170, fig. 28; Naumov, 1950: 112.
- ?*Campanularia integra*; Stechow, 1923b: 7.
- Campanularia (Agastra) integra*; Broch, 1928a: 73, fig. 3; 1928b: 125, fig. 28.
- Orthopyxis integra*; Billard, 1927c: 335; Johnson & Snook, 1935: 57, fig. 38; Philbert, 1935a: 85-86, 88; 1935c: 18; 1935d: 26; 1935e: 28; Perrier, 1936: 23; Teissier, 1950a: 5; 1950b: 17; Hamond, 1963a: 665, fig. 3; Rees & Thursfield, 1965: 104; Teissier, 1965: 17, 36; Evans, 1978: 59; Cornelius, 1982a: 60, 67, fig. 6; Altuna et al., 1983: 132; Aguirrezabalaga et al., 1984: 91; Bouillon, 1984b: 108; Austin, 1985: 53; Isasi Urdangarín, 1985: 55-56, fig. 9; Gili, 1986: 178-179, fig. 4.16C; Isasi & Sáiz, 1986: 69; Antsulevich, 1987b: 35-36; Boero, 1987b: 251 et seq.; García-Carrascosa et al., 1987: 368; Östman, 1987: 75, 76; Östman, Piraino & Roca, 1987: 304 et seq.; Vervoort, 1987: 97; Hayward, 1988: 51, fig. II.9; Boero & Bouillon, 1989b: 39, pl. 1 fig. II; Gili, Murillo & Ros, 1989: 23; Gili, Vervoort & Pagès, 1989: 108, 109, fig. 33; Altuna & García-Carrascosa, 1990: 54 et seq., fig; Cornelius & Ryland, 1990: 134, fig. 4.10; Piraino, Morri & Boero, 1990: 388, 389; Antsulevich & Pogrebov, 1991: 69; Cairns et al., 1991: 24; Crowell, 1991: 71, fig. 1B; Antsulevich, 1992: 215; Cornelius, 1992a: 254, 257; 1992b: 79 et seq.; Boero & Bouillon, 1993a: 265; Vervoort, 1993b: 559-560; Altuna Prados, 1994a: 347-349; 1995a: 54; Bouillon, Massin & Kresevic, 1995: 85; Cornelius, 1995b: 235-239, fig. 54; Peña Cantero, 1995: 481-483, pl. 61 figs b-d; Brinckmann-Voss, 1996: 95, 96; Medel & López-González, 1996: 207; Stepan'yants, Svoboda & Vervoort, 1996: 14; Watson, 1996: 78.
- Orthopyxis (Laomedea) integra*; Cornelius, 1981a: 210.
- Campanularia caliculata* Hincks, 1853: 178-179, pl. 5 fig. B; 1868: 164-167, pl. 31 fig. 2.
- Campanularia integra* f. *caliculata*; Östman, 1983b: 6.
- Agastra mira* Hartlaub, 1897: 452, 504-506, pl. 22 figs 5, 8-10; Vervoort, 1946b: 274, figs 120-121; Teissier, 1950b: 27.
- Campanularia* sp. Ling, 1938: 180, figs 8-9.

Material.— **Azores area:** Stn AZO.38: Pedicels from stolon growing on *Sargassum* sp., with some laterally compressed gonothecae, slightly undulated, opening with a short neck, and pedunculated at the base. Hydrothecae frequently not well developed, they typically have thickened walls and a smooth though not even rim (fig. 13b-c, RMNH-Coel. 27991, slide 4028).

Distribution.— **Arctic Seas:** general (Hartlaub & Scheuring, 1916; Jäderholm, 1919b; Scheuring, 1922; Stepan'yants, 1989b), Greenland (Holm, 1899; Kramp, 1911, 1913b, 1932b, c, 1933a, 1943b; Totton, 1925; Fraser, 1933a), east Siberian seas (Stepan'yants, 1994), Franz Joseph (Ushakov, 1932; Antsulevich & Pogrebov, 1991), Barents Sea (Spaskii, 1929; Stepan'yants, 1985a).— **North-eastern Atlantic:** White Sea

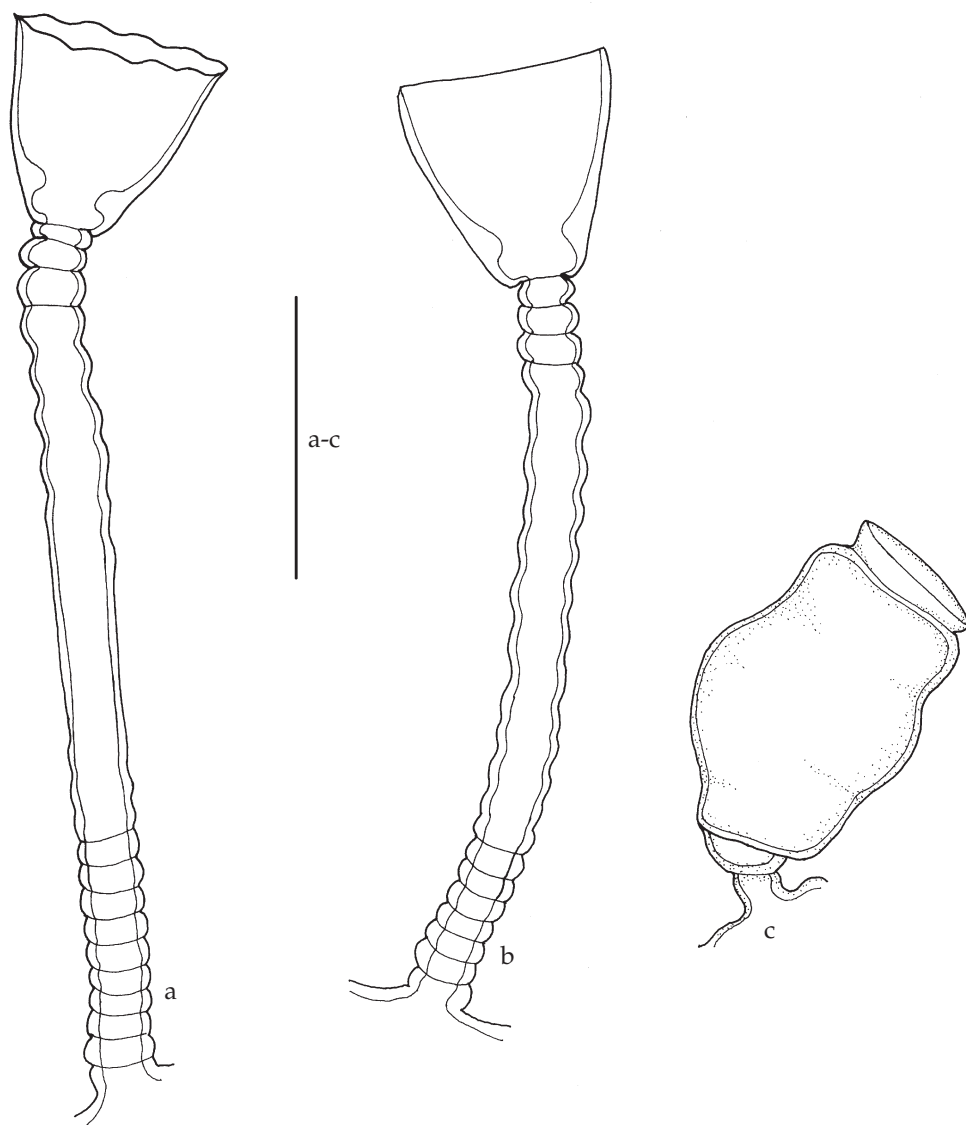


Fig. 13a. *Orthopyxis crenata* (Hartlaub, 1901), Stn 1.K14, hydrotheca; b-c, *Orthopyxis integra* (Macgillivray, 1842), Stn AZO.38, slide 4028; b, hydrotheca; c, gonotheca. Scale: 0.5 mm.

(Shidlovskii, 1902; Stepan'yants, 1985a), Russia (Linko, 1911; Kudelin, 1914; Deryugin, 1915; Ushakov, 1937; Berezina, 1948; Naumov, 1960), north Atlantic (Broch, 1918a), Iceland (Billard, 1917a; Kramp, 1938d; Olafsson, 1975), Faroer (Kramp, 1942b; Jensen & Fredericksen, 1992), Norway (Dons, 1914, 1927; Mathisen, 1928), west coast of Sweden (Jägerskiöld, 1971; Östman, 1982a, 1983b, 1984), Denmark (Kramp, 1935b), North Sea (Broch, 1928a, b), Great Britain (Macgillivray, 1842; Hincks, 1868; Robson, 1914a; Hamond, 1957, 1963a, b; Cornelius, 1982a, 1995b; Cornelius & Ryland, 1990), Irish Sea

and Bristol Channel (Wood, 1901; Bassindale, 1941; Evans, 1978), Netherlands (Leloup, 1933c; Vervoort, 1946b; Wolff & Dankert, 1981), Belgium (Leloup, 1942c, 1947), English Channel, Channel Islands and Roscoff (Ansted & Latham, 1862; Teissier, 1930a; Philbert, 1935a, c, d; Teisier, 1950b, 1965; Vervoort, 1949), France, general (Billard, 1927c; Perrier, 1936), Bay of Biscay (Billard, 1923), north and north-west coast of Spain (Altuna et al., 1983; Aguirrezabalaga et al., 1984; Isasi Urdangarín, 1985; Isasi & Sáiz, 1986; Altuna & García-Carrascosa, 1990; Altuna Prados, 1994a, 1995a).— **Mediterranean:** general (Boero & Bouillon, 1993a), coast of Spain (García-Carrascosa, 1981; Gili i Sardà, 1982; Gili & Castelló, 1985; Gili, 1986; García-Carrascosa et al., 1987; Gili, Murillo & Ros, 1989; Medel & López-González, 1996), Alborán Sea, Chafarinas Islands (Peña Cantero, 1995), coast of France (Leloup, 1934c], Italy (Rossi, 1950; Morri, 1979b, 1980b; Boero, 1981b; Boero & Fresi, 1986), Adriatic (Anonymous, 1869; Vatova, 1928), eastern part (Vervoort, 1993b), Black Sea (Manea, 1970).— **Temperate and (sub)tropical Atlantic:** Azores (Cornelius, 1992b), Gulf of Guinea (Gili, Vervoort & Pagès, 1989), west coast South Africa and Cape (Millard, 1958, 1966a, 1975; Day, Field & Penrith, 1970).— **Western Atlantic:** Hudson Bay (Fraser, 1931), Atlantic coasts of Canada and United States (Verrill, 1879; Fraser, 1912a, 1918b, 1921, 1932, 1944a; Calder, 1970a), Argentine waters (Blanco, 1965, 1994a, b).— **Eastern Pacific:** general (Fraser, 1948), Pacific coasts of Canada and United States (Fraser, 1911, 1914a, b, 1935b, 1936c, 1937b; Ljubenkova, 1980; Johnson & Snook, 1935; Austin, 1985; Brinckmann-Voss, 1996).— **Western Pacific:** Kurile Islands (Antsulevich, 1987b, 1992), Japan (Stechow, 1913b, c; Yamada, 1955; Anonymous, 1971; Chaplygina, 1980), China, East Saddle Island (Ling, 1938), Indochina (Leloup, 1937b; Dawydoff, 1952), Australia (Staples & Watson, 1987; Watson, 1994a, 1996), New Zealand (Dawson, 1992).— **Indian Ocean:** Moçambique (Macnae & Kalk, 1962), Seychelles (Millard & Bouillon, 1974).

Summarising: a cosmopolitan species with a wider distribution in warmer waters, recorded from the Arctic (Stepan'yants, 1989) to the coasts of South America (Blanco, 1994a), South Africa, and New Zealand. In the CANCAP area it was previously recorded from Morocco (Patriiti, 1970), the Azores (Cornelius, 1992), and from the Cape Verde Islands (Rees & Thurdfield, 1965). The present material originates from the Azores (W coast of Flores, Porto da Fajã Grande) and was collected in the littoral zone.

Campanularia/Orthopyxis spec.
(fig. 14a-b)

Material.— **Canary Islands and Selvagens Archipelago:** Stn 4.004: Colonies growing on algae, up to 5 mm high, hydrothecae with spherule and thick pseudodiaphragm, very wide distally and marginal teeth deep; walls not thickened (RMNH-Coel. 28841, slide 2559).

Remarks.— This material could not properly be identified.

References

In principal references are given from papers published since 1910; older refer-

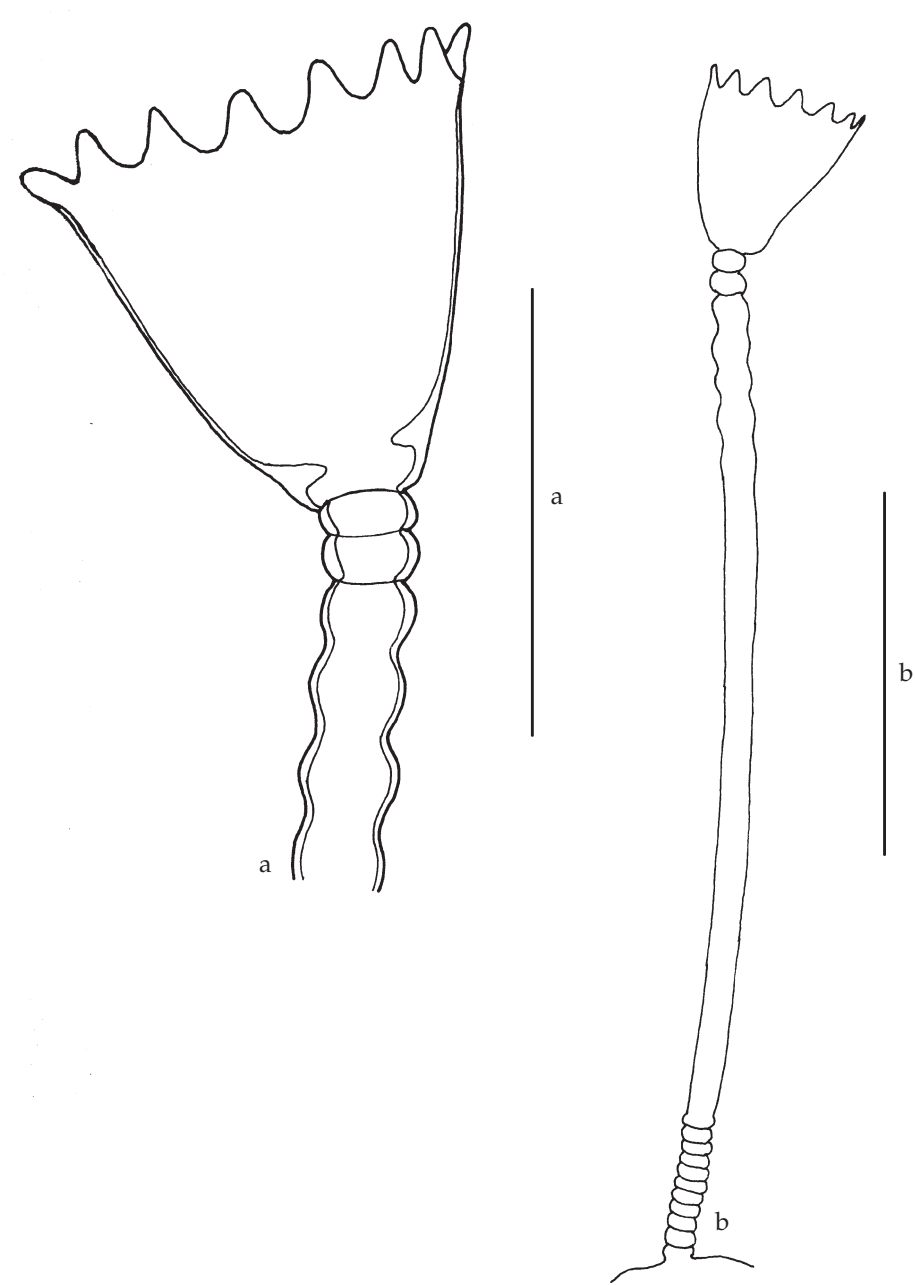


Fig. 14a-b. *Campanularia/Orthopyxis* spec., Stn 4.004, slide 2559, hydrothecae. Scales: a, 0.5 mm; b, 1 mm.

ences can be taken from Bedot's "Matériaux" (1901-1925). A few papers not cited by Bedot have here been included. For leptolid literature from the period 1911-1995 we refer to Vervoort (1995): papers published since 1995 are also listed below.

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