

Shallow-water Campanulariidae (Hydrozoa, Leptothecatae) from Northern Bahía, Brazil

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Received 30-X-2000. Corrected 14-V-2001. Accepted 5-VI-2002.

Abstract: This study provides the first semi-quantitative account of the benthic campanulariid hydroids from Northern Bahia (Brazil), down to a depth of 60 m, based largely on collections obtained since 1992. Colonies were collected from six habitats along the coast of Salvador City, Todos os Santos Bay, Itaparica Island and at the northernmost part of the coast of the State of Bahia. From the 982 colonies examined, nine species were recorded: *Campanularia hincksii*, *Clytia gracilis*, *C. hemisphaerica*, *C. hummelincki*, *C. linearis*, *C. macrotheca*, *C. noliformis*, *Obelia bidentata* and *O. dichotoma*. Following a defined abundance scale, *Clytia gracilis* and *C. noliformis* were the most abundant species, whereas *Campanularia hincksii* and *Clytia hummelincki* were rare. Cluster analysis of relative abundance data revealed sandy shores had a markedly different hydroid community from other habitats. A simplified identification key, redescrptions, illustrations and data on nematocyst compliment are provided for each species. *Campanularia hincksii*, *Clytia macrotheca* and *C. noliformis* are reported from Brazil for the first time.

Key Words: *Campanularia*, *Clytia*, *Obelia*, hydroid, cnidome, Brazil.

The Campanulariidae is a comparatively well-known hydroid family (Calder 1991) and most of its genera are nearly cosmopolitan, with records from all oceans (Cornelius 1982). Although significant progress has been made on this group, including accurate description of cnidome (Östman 1979a, 1979b, 1982a, 1987 and 1988) and biochemical taxonomy (Östman 1982b), many aspects of its biology and ecology remain unclear. This lack of knowledge is particularly evident in South America. In Brazil, research on benthic hydroids started in the 1940 (Vannucci Mendes 1946; Vannucci 1949, 1950). Some reports appeared three decades later (Narchi and Hebling 1975; Mayal 1973, 1983; Migotto 1993; Silveira and Migotto 1984, 1991, 1992; Migotto and Silveira 1987); however, except for the works of Mayal (1973, 1983), these studies concentrated mainly on species from the south coast of the country.

The State of Bahia (Northeastern Brazil) has a very extensive coastline (1 120 km) with many different ecosystems, including mangroves, rocky and sandy shores, beach rocks (bedrock appearing through an eroding sandy shore), coral-algal build ups and coral reefs. Although there are some hydroid descriptions from these environments, the general hydroid fauna is poorly known except for the taxonomic accounts of Kelmo and Peixinho (1996), Souza (1997) and Kelmo and Santa-Isabel (1998), but these did not concentrate on campanulariids. There is no complete systematic inventory of leptothecate hydroids. Many aspects of the biology and ecology of these animals remain unclear, discouraging research into the group. The purpose of this report is to provide the first semi-quantitative account of the biodiversity of benthic campanulariid hydroids from Northern Bahia, down to a depth of 60 m,

based largely on collections obtained since 1992. We present a simplified identification key, redescription and illustrations for all species.

MATERIAL AND METHODS

The present study considers material from the northernmost coast of the State of Bahia, Salvador City, Todos os Santos Bay and Itaparica Island (Fig. 1).

Hydroids were collected either along transect lines, during snorkelling and SCUBA, and/or using a Petersen's dredge. Colonies were anaesthetised in 7.8% solution of $MgCl_2$, fixed in 4% formaldehyde, preserved in 70% ethanol and stored at the Scientific Collection of Cnidarians of the Departamento de Zoologia do Instituto de Biologia da Universidade Federal da Bahia - Brazil (UFBA-CNI-HYD). In this paper, we refer the catalogue number [N] for each studied species. Colonies were examined under high-power stereoscopic and brightfield microscopy, and taxonomic identification was based on the literature cited in the text of this paper. All descriptions and illustrations provided herein are from the examined material.

The listed synonymy, following Calder (1991), Cornelius (1982, 1995) and Migotto (1993), was verified by examination of the original references. In most cases, only one significant record has been cited to document occurrences worldwide. Hydroid classification has been modified extensively by Petersen (1979, 1990), Werner (1984), Bouillon (1985) and Calder (1988, 1991, 1997); however, in the interests of simplicity, the classification adopted here follows Cornelius (1995).

Nematocysts were examined by compressing pieces of tissue, or entire individuals, between a slide and coverslip (Calder 1991). Specimens were treated with a 10% solution of sodium hypochlorite for 5-10 secs, and rinsed twice in distilled water prior to slide preparation (Kelmo and Santa-Isabel 1998). Nematocyst categories were identified according to the classification of Weill (1934) and Östman (1988). Length and width measurements were made

from undischarged nematocysts using an ocular micrometer. For each species, at least 10 nematocysts of each type were measured for determining size ranges.

Relative abundance analysis was performed on hydroid samples from each ecosystem according to the progressive scale proposed by Peixinho and Peso-Aguiar (1989). Fourth-root transformed abundance data from each ecosystem were used to compute Bray-Curtis similarity coefficients (Bray and Curtis 1957) for each pair of ecosystem. The similarity matrix was subjected to cluster analysis using the program PRIMER (Plymouth Routines in Multivariate Ecological Resource, Carr 1996). Clustering utilised a hierarchical agglomerative method with group-average linking, resulting in a dendrogram.

RESULTS

Of the 982 colonies examined, nine species were recorded: *Campanularia hincksii*, *Clytia gracilis*, *C. hemisphaerica*, *C. hummelincki*, *C. linearis*, *C. macrotheca*, *C. noliformis*, *Obelia bidentata* and *O. dichotoma* (Table 1). *Clytia gracilis* and *C. noliformis* were the most abundant species (Table 2), whereas *Campanularia hincksii* and *Clytia hummelincki* were rare (Fig. 2).

The Bray-Curtis similarity dendrogram (Fig. 3) formed three distinct clusters at 63% similarity. The first cluster isolated sandy shore samples, the second group comprised mangrove and rocky shore fauna, and the third comprised all the samples from the northern coast of the State of Bahia (beach rocks, coral-algal build ups and coral reefs).

Systematic Account

Campanularia hincksii
Alder, 1856a (Plate I a-d)

Campanularia volubilis Hincks, 1853;
Campanularia hincksii Alder, 1856; Calder,

Simplified identification key for Bahian Campanulariidae

- 1a. Pseudo-microbasic b-mastigophores present *Campanularia hincksii*
 1b. Pseudo-microbasic b-mastigophores never present 2
 2a. Erect colonies 3
 2b. Stolonal colonies 6
 3a. Gonothecae urn-shaped *Clytia gracilis*
 3b. Gonothecae cone-shaped 4
 4a. Hydrothecal margin with 10-13 bimucronate cusps *Obelia bidentata*
 4b. Hydrothecal margin different 5
 5a. Hydrothecal margin slightly crenate, 14-16 soft tooth, hydranth cylindrical *Obelia dichotoma*
 5b. Hydrothecal margin with 9-16 long cusps; hydranth elipsoid *Clytia linearis*
 6a. Very long pedicels (18-20 mm in length) *Clytia hummelincki*
 6b. Pedicels smaller than 18 mm long 7
 7a. Hydrothecal diaphragm thick *Clytia noliformis*
 7b. Hydrothecal diaphragm thin 8
 8a. Basal chamber shallow, 14 tentacles *Clytia macrotheca*
 8b. Basal chamber deeper than in 8a, 20-32 thin tentacles *Clytia hemisphaerica*



Fig. 1. Northern Coast of the State of Bahia. Scale 1:250.000.

TABLE 1

Systematic listing of the campanulariid hydroids from northern Bahia. The classification adopted here follows Cornelius (1995) - Ordinal and Subordinal classification follows Bouillon (1985)

Class Leptolida
Sub-Class Leptothecatae
Order Proboscoida
Suborder Campanulariida
Superfamily Campanularioidea Johnston, 1837
Family Campanulariidae Johnston, 1837
Subfamily Campanulariinae Johnston, 1837
Genus <i>Campanularia</i> Lamarck, 1816
<i>Campanularia hincksii</i> Alder, 1856a
Subfamily Clytiinae Cockrell, 1911
Genus <i>Clytia</i> Lamouroux, 1812
<i>Clytia gracilis</i> (Sars, 1850)
<i>Clytia hemisphaerica</i> (Linnaeus, 1767)
<i>Clytia hummelincki</i> (Leloup, 1935)
<i>Clytia linearis</i> (Thornely, 1900)
<i>Clytia macrotheca</i> (Perkins, 1908)
<i>Clytia noliformis</i> McCrady, 1859
Subfamily Obeliinae Haeckel, 1879
Genus <i>Obelia</i> Péron & Lesueur, 1810
<i>Obelia bidentata</i> Clarke, 1875
<i>Obelia dichotoma</i> Linnaeus, 1758

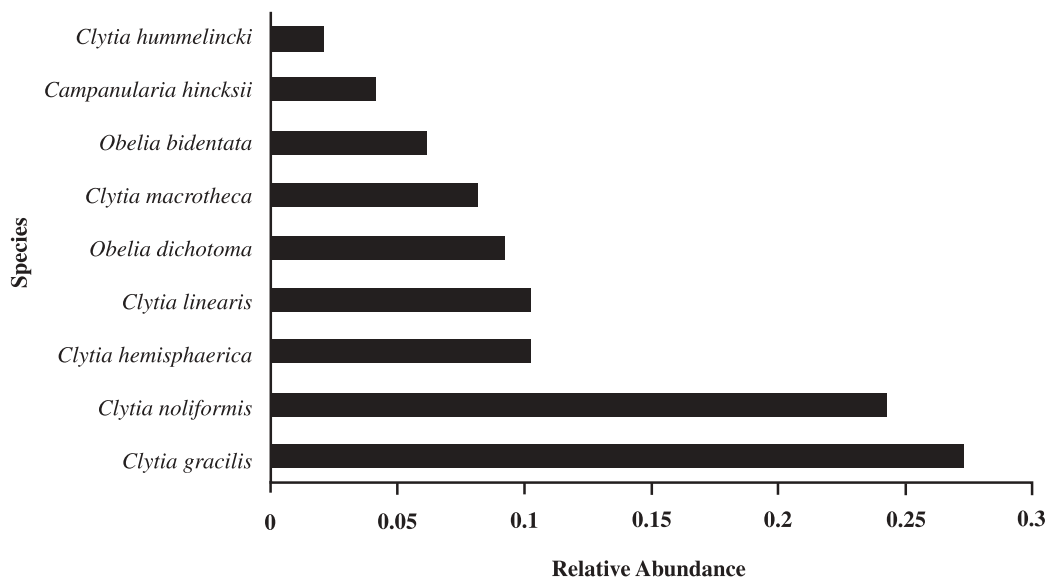


Fig. 2. Relative abundance of campanulariid hydroids from Northern Bahia.

TABLE 2
Relative Abundance of the campanulariid hydroids within different ecosystems recorded from the northern coast of the State of Bahia. M= mangroves; RS= rocky shores; SS=sand shores; BR= beach rocks; CA= coral-algal buildups; CR=coral reefs; n= total number of colonies per ecosystem; ra= relative abundance of colonies per ecosystem; N= total number of colonies, and RA= total relative abundance.

Species	M		RS		SS		BR		CA		CR		TOTAL	
	n	ra	n	ra	n	ra	n	ra	n	ra	n	ra	N	RA
<i>Campanularia hincksii</i>	00	0.00	00	0.00	00	0.00	06	0.04	09	0.03	26	0.08	41	0.04
<i>Clytia gracilis</i>	06	0.18	17	0.30	11	0.18	39	0.28	111	0.30	82	0.26	266	0.27
<i>Clytia hemisphaerica</i>	09	0.27	05	0.09	00	0.00	22	0.16	41	0.11	21	0.06	98	0.10
<i>Clytia hummelincki</i>	00	0.00	00	0.00	00	0.00	13	0.09	00	0.00	03	0.01	16	0.02
<i>Clytia linearis</i>	02	0.06	12	0.21	08	0.13	14	0.10	28	0.08	39	0.12	103	0.10
<i>Clytia macrotheca</i>	00	0.00	00	0.00	18	0.30	27	0.19	17	0.04	19	0.06	81	0.08
<i>Clytia noliformis</i>	12	0.37	18	0.32	24	0.39	01	0.01	109	0.29	67	0.21	231	0.24
<i>Obelia bidentata</i>	00	0.00	04	0.08	00	0.00	18	0.13	11	0.03	25	0.08	58	0.06
<i>Obelia dichotoma</i>	04	0.12	00	0.00	00	0.00	00	0.00	46	0.12	38	0.12	88	0.09
TOTAL	33	1.00	56	1.00	61	1.00	140	1.00	372	1.00	320	1.00	982	1.00

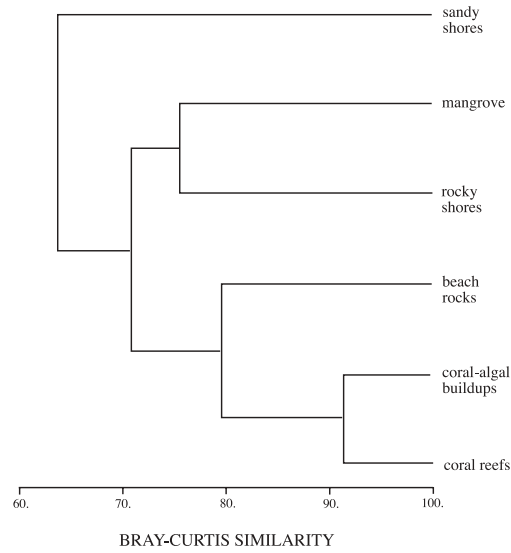


Fig. 3. Dendrogram (hierarchical clustering using group average linking) of the shadow water campanulariid hydroids community from the six different habitats assessed at Northern Bahia, based on Bray-Curtis similarity matrix of fourth-root transformed species abundance.

1991; Cornelius, 1995; *Campanularia* (*Orthopyxis*) *hincksii* Verrill, 1873; *Campanularia hincksii grandis* Billard, 1906a; *Campanularia* (*Eu-Campanularia*) *hincksii* Broch, 1933; *Campanularia emarginata* Fraser, 1938a; *Campanularia alitheca* Fraser, 1948; *Campanularia* (*Campanularia*) *hincksii* Vervoort, 1968.

Material studied: Arembepe Beach, on external bank of beach rocks, 10-11 m depth, 6.iv.1996, six colonies, 5- 6.5 mm high, female gonophores observed [N 1752]; Northern coast of Bahia, on coral algal buildups, 20-25 m depth, 20.xii.1992, four colonies, 6-6.8 mm high, male gonophores [N 1755]; 30 m depth, 16.iii.1993, two colonies, 5.5 and 6.2 mm high, without gonophores [N 1768]; Arembepe region, 22 m depth, 10.xi.1996, three colonies, 6-6.5 mm high, male and female gonophores [N 1775]; Guarajuba Beach, on shallow bank coral reefs, 18 m depth, 16.viii.1996, fourteen colonies, 6.5-6.8 mm high, male and female gonophores [N 1788]; Praia do Forte Beach, on shallow bank coral reefs, 12 m depth,

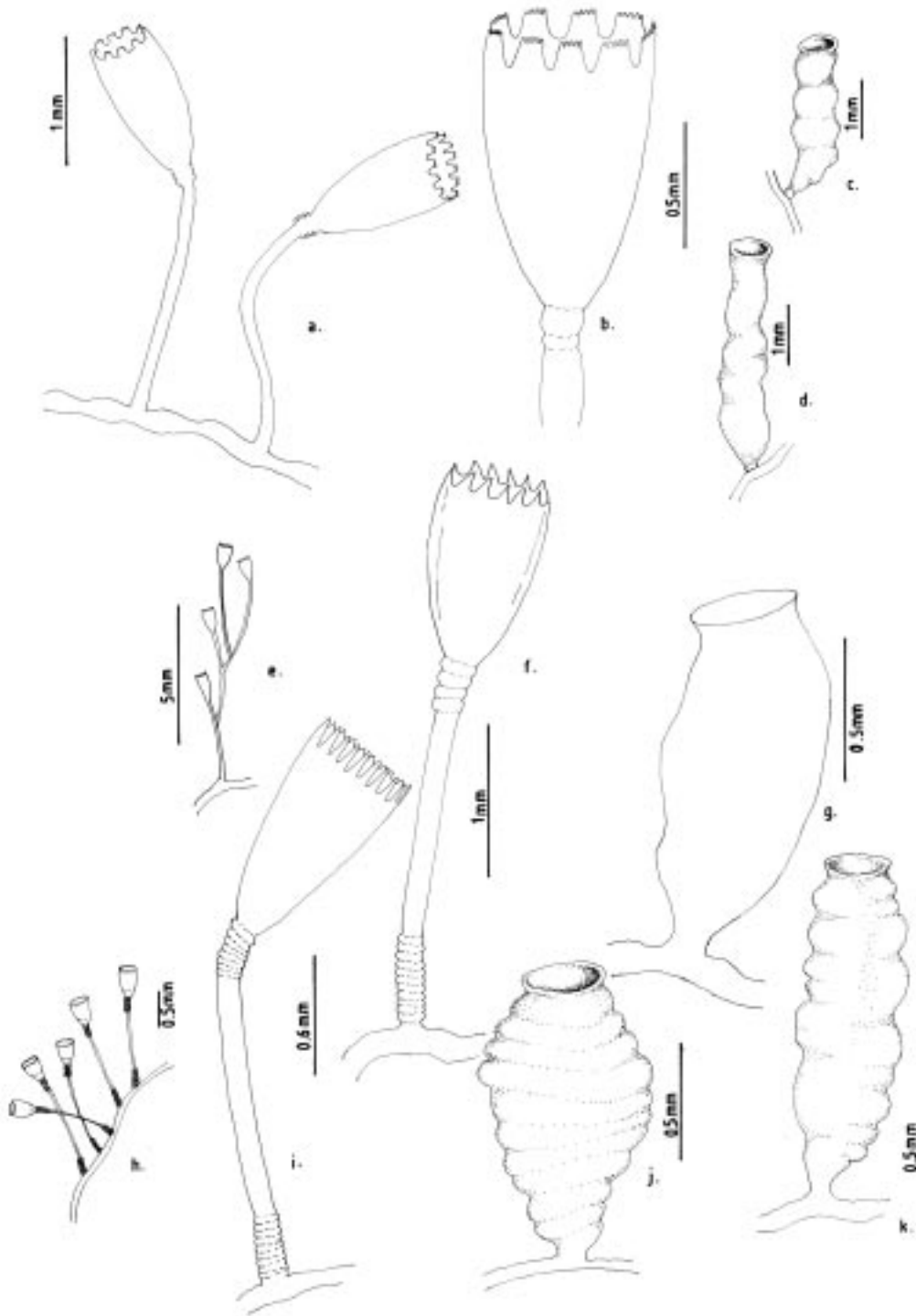


Fig. 4. *Campanularia hinckisii*: a- part of colony; b- hydrotheca; c- male gonotheca; d- female gonotheca. *Clusia gracilis*: e- aspect of a colony; f- part of hydrocaulus and hydrotheca; g- gonotheca. *Clytia hemisphaerica*: h- aspect of colony; i- part of colony with hydrocaulus and hydrotheca; j- male gonotheca; k- female gonotheca.

24.iv.1997, eight colonies, 6.0-6.4 mm high, without gonophores [N 1792]; 21.ix.1997, 14 m depth, four colonies, 6.5-6.8 mm high, gonophores not observed [N 1795].

Description: Soft brown or yellowish stolonial colony, up to 6.8 mm high, arising from a creeping hydrorhiza. Long pedicels, 3.4-4.6 µm in length, 50-68 µm in diameter; pedicel base with 2, 3 or 4 annulations; perisarc thick. Hydrothecae strongly campanulate, 640-975 µm long, 275-398 µm wide at margin, 69-76 µm wide at basal annular thickening; hydrothecal walls with thin perisarc, convex just above basal chamber, quite straight elsewhere. Hydrothecal margin with 9, 11 or occasionally 12 (never 10) cusps separated by U-shaped conspicuous embayments. Each marginal tooth with a distal concavity. Hydrothecal wall scalloped in cross section, with an U-shaped pleat extending outwards from hydrothecal cavity between adjacent cusp; basal chamber cup-shaped, 18-23 slightly filiform tentacles, 0.65-0.68 mm long. Gonothecae, yellowish, dimorphic; both types born on stolon; short and conspicuous pedicel; terminal aperture wide. Male gonothecae short, 1.42-1.85 mm long, 0.28-0.33 mm in diameter; sub-cylindrical; irregularly sinuous in a loose succession of incomplete rings. Female gonothecae, long, 1.88-2.23 mm in length, 0.30-0.35 mm in diameter; asymmetric, broadest near base, truncate below, tapering gradually above; incompletely ringed and/or irregularly folded. Nematocyst complement represented by microbasic b-mastigophores of two different sizes: (i) A-type: 5.5-7.2 µm x 1.5-2.6 µm; (ii) B-type: 7.5-9.8 µm x 2.2-2.8 µm. The A-type is abundant throughout the entire colony, especially on tentacles, whilst the B-type is less abundant and never occurs on tentacles. Pseudo-microbasic b-mastigophores (Östman, 1988), 14.4 -19.5 µm x 2.1-3.6 µm, were not abundant.

Known range: Brazil: first record. Circumglobal distribution: western Atlantic (Fraser 1944); eastern Atlantic (Cornelius 1982, 1995); Indian Ocean (Millard 1975); western Pacific (Hirohito 1983); eastern Pacific (Fraser 1948), Bermuda (Calder 1991).

Clytia gracilis
(Sars, 1850) (Plate I e-g)

Laomedea gracilis Sars, 1850; *Laomedea* (*Campanulariai*) *gracilis* Sars, 1857; *Clytia* (*Platypyxis*) *cylindrica* L. Agassiz, 1862; *Clytia cylindrica* L. Agassiz, 1862; *Platypyxis cylindrica* L. Agassiz, 1862; *Gonothyreae gracilis* Allman, 1864; *Campanularia gracilis* van Beneden, 1867; *Clytia laevis* Weismann, 1883; *Campanularia pelagica* van Breemen, 1905; *Campanularia* (*Clytia*) *pelagica* van Breemen, 1905; *Clytia coronata* Fraser, 1912; *Clytia elsae-oswaldae* Stechow, 1914; *Clytia pelagica* Billard, 1917; *Clytia gracilis* Stechow, 1923c; Calder, 1991; Migotto, 1993; Cornelius, 1995; *Laomedea* (*Phialidium*) *pelagica* Hummelinck, 1930; *Laomedea* (*Phialidium*) *gracilis* Hummelinck, 1930; *Laomedea pelagica* Hummelinck, 1930; *Laomedea* (*Clytia*) *gracilis* Broch, 1933; *Laomedea gracilis* forma *pelagica* Leloup, 1933; *Clytia* (*Campanularia*) *pelagica* Künne, 1937; *Laomedea cylindrica* Leloup, 1937a; *Clytia stechowi* Hargitt, 1927; *Clytia hemisphaerica* Millard, 1966; Cornelius, 1982; *Clytia elsaeoswaldae* Vervoort, 1968; *Campanularia* (*Clytia*) *cylindrica* Vervoort, 1968; *Clytia sarsi* Cornelius, 1982.

Material studied: Todos os Santos Bay, Fontes Island, on the sponge *Haliclona* sp., 4.ix.1994, 1-2 m depth, six colonies, 4-8.5 mm high, gonophores observed [N 1753]; Itaparica Island, Mar Grande region, on coral reef building, 10.ix.1997, 5-6 m depth, nine colonies, 8 mm high, gonophores not seen [N 1898]; Salvador City, Ponta de Itapuã, on rock outcrop, 16.xii.1994, 18 m depth, nine colonies, 6-12 mm high, gonophores observed [N 1754]; Farol da Barra, on rock outcrop, 9.ii.1995, 6 m depth, eight colonies, 6-10.5 mm high, without gonophores [N 1761]; Ribeira Beach, on ascidians *Styella plicata* and *Falusia nigra*, 18.xi.1993, shallow subtidal, eleven colonies, 6.5-12 mm high, without gonophores [N 1762]; Northern Coast, Emissário beach, on internal beach rock bank, 15.xi.1995, shallow subtidal, twenty colonies, 4-8.5 mm high, without gonophores [N 1769]; Arembepe beach, on

external beach rock bank, 15.xi.1995, 1-2 m depth, six colonies, 5-9.5 mm high, without gonophores [N 1771]; Arembepe beach, on embayment beach rock bank, 15.xi.1995, 2 m depth, thirteen colonies, 6-9 mm high, without gonophores [N 1772]; Arembepe region, on coral algal buildup, 20.xii.1992, 25 m depth, forty six colonies, 5-9 mm high, without gonophores [N 1774]; 17.iii.1993, 16 m depth, thirty four colonies, 6-10 mm high, gonophores observed [N 1782]; 24.ix.1996, 42 m depth, thirty one colonies, 4-6 mm high, gonophores not seen [N 1783]; Guarajuba beach, on coral reef wall, 4.xi.1995, 6-7 m depth, twenty six colonies, 8-12 mm high, gonophores observed [N 1784]; Itacimirim beach, on coral reef bank, 10.viii.1996, 11 m depth, ten colonies, 8-11 mm high, gonophores not observed [N 1785]; Praia do Forte beach, on shallow bank reef, 14.viii.1996, 18 m depth, thirty seven colonies, 6-10 mm high, gonophores not seen [N 1896].

Description: Colonies orange or dark golden, erect, fragile, sparingly and irregularly branched, up to 12 mm high, always arising from a creeping hydrorhiza. Hydrocaulus monosiphonic; each branch arising from a slightly curved aphophysis given off below hydrothecae of pedicel from which it arises. Branches resemble primary pedicels and directed abruptly upwards, 8-11 annulations proximally and 4 - 6 distally placed. Pedicels about 0.5-0.4 mm high, 101-142 μm in diameter, annulated basally and distally, with annuli or wrinkles elsewhere. Hydrothecae deeply campanulate, quite cone-shaped, about 727-935 μm long, 387-528 μm wide at margin, 159-241 μm wide at diaphragm, with thin perisarc. Walls convex above diaphragm, nearly straight elsewhere; margin with about 11 to 17 deeply cut, blunt, triangular cusps separated by U-shaped incisions. Diaphragm thin, straight; the basal chamber varied in depth but typically deep and cup-shaped. Tentacles short, 18-21 in number, occasionally 24. Gonothecae, orange, urn-shaped, about 965-997 μm long, and 401-434 μm in diameter; usually symmetric; wide-mouthed, orifice diameter about 305-342 μm , constricted just below aperture to about 320 μm

wide, arising from hydrorhiza on short inconspicuous pedicels; walls smooth, constricted below aperture. Nematocyst complement comprising isorhizas about 5.9-6.5 x 1.5-1.9 μm and microbasic mastigophores of three distinct sizes; (i) small 6.3-8.0 x 1.9-2.5 μm ; (ii) medium 8.5-9.3 x 2.8-3.2 μm ; and (iii) large 13.6-16.8 x 3.3-4.1 μm .

Known range: Brazil: São Sebastião (São Paulo), Ponta do Jerobá, Parque de Cultivo de Mexilhões and Ponta do Baleeiro (Migotto, 1993). Circumglobal distribution: western Atlantic [Vervoort 1968, as *Laomedea* (*Phialidium*) *pelagica*]; eastern Atlantic (Vervoort 1946a, as *Laomedea pelagica*; Cornelius 1995); Indian Ocean (Mammen 1965); western Pacific (Yamada 1959); eastern Pacific (Fraser 1948, as *Gonothyraea gracilis*); Bermuda (Calder 1991).

Clytia hemisphaerica
(Linnaeus, 1767) (Plate I h-k)

Medusa hemisphaerica Linnaeus, 1767 [Medusa]; *Sertularia uniflora* Ellis, 1768; *Sertularia volubilis* Ellis and Solander, 1786; *Oceania flavidula* Péron and Lesueur, 1810; *Oceania hemisphaerica* Péron and Lesueur, 1810; *Thaumantias hemisphaerica* Eschscholtz, 1829; *Campanularia johnstoni* Alder, 1856; *Campanularia gegenbaurii* Sars, 1857; *Campanularia volubilis* Sars, 1857; *Campanularia noliformis* McCrady, 1859; *Clytia bicophora* L. Agassiz, 1862; *Clytia* (*Trachopyxis*) *bicophoba* L. Agassiz, 1862; *Campanularia bicophora* Allman, 1864; *Clytia johnstoni* A. Agassiz, 1865; *Clytia* (*Campanularia*) *volubilis* du Plessis, 1871; *Campanularia* (*Clytia*) *johnstoni* Hincks, 1872; *Campanularia coronata* Clarke, 1879; *Epenthesis bicophora* Haeckel, 1879; *Clytia flavidula* Metschnikoff, 1886; *Campanularia edwardsi* Nutting, 1901a; *Clytia grayi* Nutting, 1901a; *Campanularia minuta* Fraser, 1912b; *Phialidium hemisphaericum* Mayer, 1910; *Campanularia* (*Clytia*) *johnstoni* Broch, 1912; *Clytia minuta* Fraser, 1912b; *Clytia uniflora* Stechow, 1923a; *Clytia similis* Fraser, 1947;

Phialidium noliformis Kramp, 1959; *Phialidium noliforme* Kramp, 1961; *Campanularia (Clytia) coronata* Vervoort, 1968; *Clytia (Campanularia) hemisphaerica* Gili, 1982; *Clytia hemisphaerica* Calder, 1991; Migotto, 1993; Cornelius, 1982, 1995.

Material studied: Todos os Santos Bay, Fontes Island, on *Eudendrium carneum*, 3.vi.1995, 1-2 m depth, nine colonies, up to 2 mm high, with male gonophores [N 1792]; Itaparica Island, Berlinque Beach, on shallow coral reef bank, 11.i.1993, 5 m depth, twenty one colonies, up to 8 mm high, with male and female gonophores [N 1790]; Salvador City, Boa Viagem beach, on rock outcrop, 23.v.1992, 8 m depth, five colonies, 6.5-9.4 mm high, without gonophores [N 1787]; Northern Coast, Emissário Beach, on internal beach rock bank, 15.xi.1995, intertidal zone, ten colonies, up to 4 mm high, with female gonophores [N 1793]; Arembepe Beach, on external beach rock bank, 15.xi.1995, 6 m depth, twelve colonies, up to 2.5 mm high, with female gonophores [N 1789]; Arembepe region, on coral algal buildups, 13.x.1996, 35 m depth, twenty three colonies, up to 3 mm high, with male and female gonophores [N 1786]; 10.ii.1997, 28 m depth, eighteen colonies, up to 3 mm high, gonophores not observed [N 1791].

Description: Colonies pale yellow to golden, particularly stolonal, arising from a creeping hydrotheca. Tall hydrothecal pedicels, arising at close intervals. Hydrothecae of moderately thin perisarc, campanulated, urn-shaped, 587-976 μm long, 95-137 μm wide at diaphragm, 229-399 μm wide at margin; convex walls above diaphragm, nearly straight elsewhere. Pedicels usually straight, with 3-14 rings at top, and 2-11 at the base; specimens collected from rock outcrop with 8-9 central rings. Occasionally some pedicels with secondary pedicels arising from them. Hydrothecal margin with 13-17, but usually 14, rounded triangular cusps, separated by U-shaped incisions. Hydrothecal walls weakly scalloped in cross section at margin, with each cusp having a shallow, U-shaped pleat extending inwards towards hydrothecal cavity. Hydrothecal diaphragm quite thin and straight;

basal chamber is rather deep and cup-shaped. Hydranth ovoid, with 20 to 32 thin tentacles, about 1.4 mm long. Gonothecae yellowish, dimorphic. Male gonotheca, 0.89-1.01 mm long, 0.45-0.61 mm wide, broad and asymmetric, with smooth walls and sub-terminal constriction; irregular annulations or folds at distal part; large terminal aperture, about 0.26 mm in diameter; pedicel short and usually inconspicuous. Female gonotheca, longer than male, 0.91-1.08 mm long, 0.42-0.46 mm wide, sub-cylindrical, distinct but irregular ribs; terminal aperture about 0.28 mm in diameter; short slender pedicel. Nematocyst complement consists of microbasic b-mastigophores of two sizes: (i) A-type: 6.9-8.1 x 1.9-3.1 μm , throughout the colony; (ii) B-type: 15.3-17.5 x 3.5-4.2 μm , never occurs in tentacles.

Known range: Brazil: São Sebastião (São Paulo) (Migotto 1993). Circumglobal distribution: western Atlantic (Calder 1975); eastern Atlantic (Cornelius 1982, 1995); Indian Ocean (Mammen 1965); eastern Pacific (Fraser 1948, as *C. johnstoni*); Bermuda (Calder 1991).

Clytia hummelincki
(Leloup, 1935) (Plate II a-b)

Laomedea hummelincki Leloup, 1935; *Campanularia hummelincki* Fraser, 1944; *Clytia hummelincki* Millard, 1966; Calder, 1991; Migotto, 1993; *Campanularia (Clytia) hummelincki* Vervoort, 1968.

Material studied: Northern Coast, Emissário Beach, on internal beach rock bank, 15th November 1995, 3 m depth, thirteen colonies, 3-4 mm high, with gonophores [N 1795]; Guarajuba Beach, on the sponge *Dysidea variabilis* from the shallow bank reef, 10th April 1996, 19 m depth, three colonies, gonophores not seen [N 1796].

Description: Whitish or pale yellowish stolonal colonies, up to 4 mm high; creeping hydrotheca. Pedicels very long, about 18-20 mm, thick perisarc, with 3-4 occasional groups of annuli irregularly placed along length; groups with 3-7 annuli; distal end of pedicel with slight swelling just beneath a sub-hydrothecal

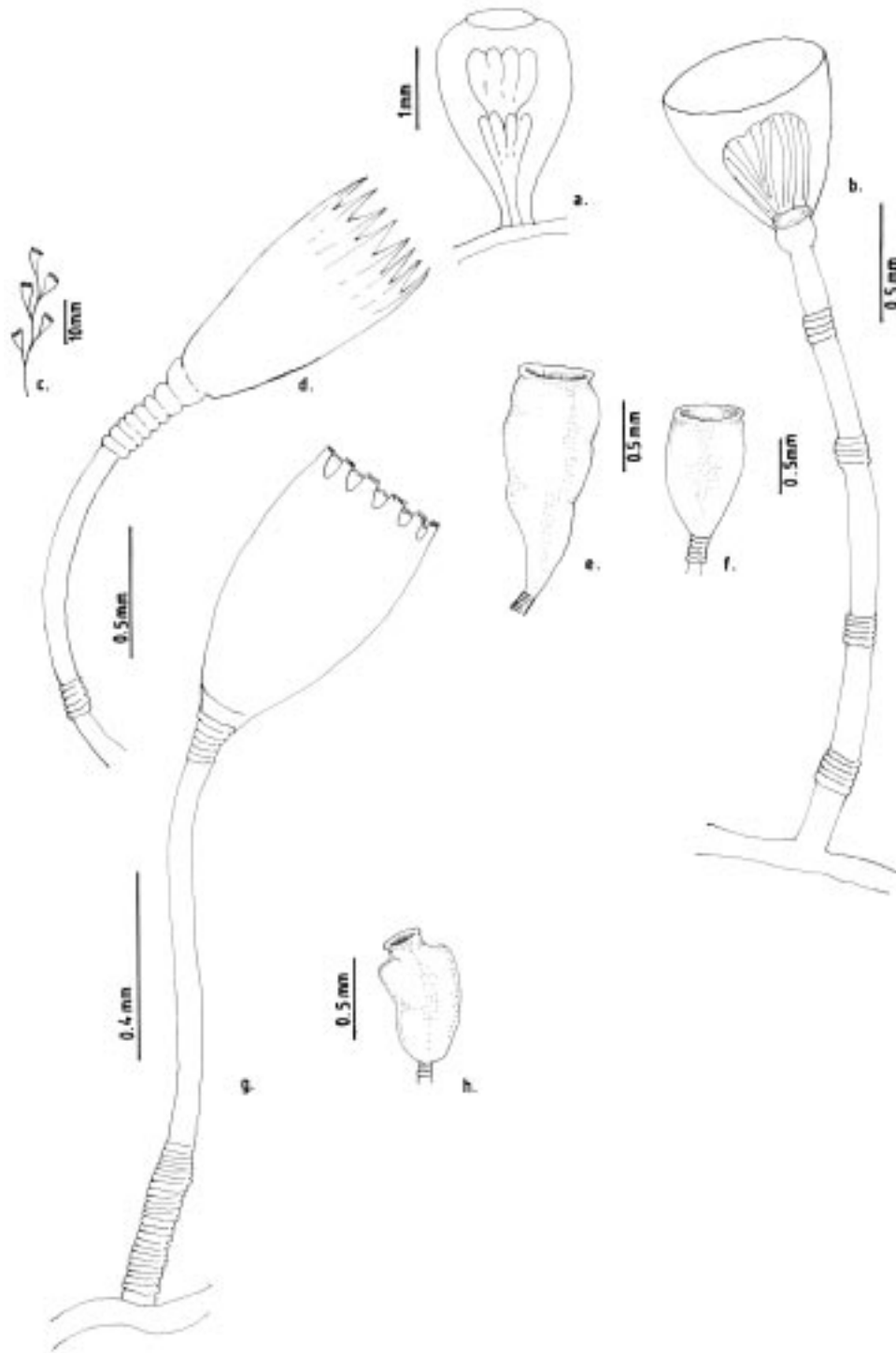


Fig. 5. *Clytia kummelincki*: a- gonotheca; b- part of colony and hydrotheca. *Clytia linearis*: c- aspect of a colony; d- part of hydrocaulus and hydrotheca; e- mature gonotheca; f- young gonotheca. *Clytia macrotheca*: g- part of a colony with hydrocaulus and hydrotheca; h- gonotheca.

spherule. Hydrothecae short, 299-314 μm long, and wide, 310-323 μm at margin, and 160-169 μm at diaphragm; margin entire, usually parallel or slightly sinuous; diaphragm thin, delicate and quite oblique in lateral view; basal chamber short. Hydranth with sub-spherical hypostome and 18-20 soft tentacles, about 2.6 mm long. Gonothecae, whitish, sessile, truncate, pear-shaped and short, 0.76-0.88 mm long; about 0.23 mm in diameter at base and 0.39 at margin; usually symmetric; terminal aperture rounded and wide; two medusa buds in successive development. Nematocyst complement represented by small microbasic b-mastigophores, 3.1-3.4 μm x 0.55-0.59 μm , throughout the colony.

Known range: Brazil: São Sebastião (São Paulo) (Migotto 1993). Circumglobal distribution: western Atlantic (Leloup 1935); eastern Atlantic (Millard 1975, Cornelius 1982); Bermuda (Calder 1991).

Clytia linearis

(Thornely, 1900) (Plate II c-f)

Obelia linearis Thornely, 1900; *Campanularia gravieri* Billard, 1904; *Campanularia linearis* Borradaile, 1905; *Obelia striata* Clarke, 1907; *Clytia fragilis* Congdon, 1907; *Clytia striata* Vanhöffen, 1910; *Clytia linearis* Stechow, 1913; *Laomedea striata* Kramp, 1922; *Clytia alternata* Hargitt, 1924; *Laomedea (Obelia) bistriata* Leloup, 1931; *Laomedea bistriata* Leloup, 1932; *Laomedea gravieri* Billard, 1933; *Laomedea tottoni* Leloup, 1935; *Laomedea fragilis* Leloup, 1935; *Clytia gravieri* Billard, 1938; *Clytia acutidentata* Fraser, 1938; *Clytia carinadentata* Fraser, 1938; *Gonothyraea serialis* Fraser, 1938; *Clytia obliqua* Picard, 1950; *Clytia serrata* Millard, 1958; *Campanularia (Clytia) gravieri* Vervoort, 1967; *Laomedea (Phialidium) tottoni* Vervoort, 1968; *Clytia linearis* Calder, 1991; Migotto, 1993.

Material studied: Todos os Santos Bay, Pati Island, on the sponge *Tedania ignis*, intertidal zone, 2.vi.1995, two colonies, 5 mm high, gonophores observed [N 1794]; Mar Grande - Coroa Beach, on biogenic rock, 4m depth, 20.x.1994, 13 colonies, 10-12 mm high,

gonophores observed [N 1805]; Salvador City, Farol da Barra, on rock outcrop, 17 m depth, 30.x.1993, five colonies, 10- 14 mm high, without gonophores [N 1797]; Pituba Beach, on rock outcrop, 4-5 m depth, 15.viii.1996, seven colonies, 8 - 10 mm high, gonophores observed [N 1798]; Ribeira beach, on the bivalve *Anomalocardia brasiliiana*, intertidal zone, 18.xi.1993, eight colonies, 9.5 - 13 mm high, gonophores observed [N 1799]; Northern Coast, Arembepe beach, on external beach rock bank, 8-9 m depth, 15.xi.1995, fourteen colonies, up to 6 mm high, gonophores observed [N 1781]; Arembepe region, on coral algal buildup, 38 m depth, 20.iv.1996, sixteen colonies, 5 - 6.5 mm high, gonophores not seen [N 1801]; 22 m depth, 14.vi.1996, twelve colonies, 6-6.5 mm high, gonophores not seen [N 1802]; Guarajuba Beach, on coral reef wall, 9 m depth, 12.iv.1996, eleven colonies, 8-10 mm high, gonophores not seen [N 1803]; Praia do Forte, on shallow bank reef, 16 m depth, 14.iv.1996, fifteen colonies, 8-10 mm high, gonophores not observed [N 1804].

Description: Stolonal or erect colonies, with brownish and thick perisarc. Stolonal forms, up to 6 mm high, arising from a creeping hydrorhiza; erect forms branching sympodially up to 13 mm high, but usually 10 mm. Hydrocaulus always unbranched, monosiphonic, divided by internodes at regular intervals. Internodes long, about 1.6 mm in length, slender, straight or sometimes slightly curved; a group of 6-9 annuli are basally or sub-basally placed; distal end with a hydrothecal pedicel composed of 5-7 narrow annuli. All internodes with apophysis, except terminal ones. Apophysis short, curved upwards, alternating from side to side, each supporting an internode. Hydrothecae strongly campanulated, long, 760-988 μm in length, 316-478 μm wide at margin and 145-199 μm wide at diaphragm, sometimes asymmetric. Hydrothecal margin with 9-16 long cusps, separated by U-shaped incisions; each cusp with internal stiffening strip reaching to tip and extending downwards sometimes to middle of hydrotheca; diaphragm thin and oblique, occasionally

transverse; basal chamber cup-shaped, of varied size. Hydranth more or less ellipsoid, with 10-16 long tentacles, about 465 μm long. Gonothecae cone-shaped. Young ones light brown, elongated, 650-712 μm long, pedicel of 3-4 rings, usually on stolon, but sometimes on erect shoot in axil; wide in centre, about 310 μm in diameter, and sometimes at terminal end, tapering below, 230 μm wide; gonophores with 1 or 2 rows of developing medusae. Mature gonotheca, dark orange, longer, 960-989 μm long, placed like the young ones; asymmetric; wide terminal orifice, about 330 μm in diameter, usually constricted just below margin; short pedicel, 4-6 annuli; 2-4 developing medusae. Nematocyst complement (excluding medusae) represented by microbasic b-mastigophores of two different sizes: (i) A-type: 7.8-9.2 x 2.4-3.1 μm and, (ii) B-type: 12.2-13.5 x 3.5 - 4.4 μm .

Known range: Brazil: São Sebastião (São Paulo) (Migotto 1993). Circumglobal distribution: western Atlantic [Vervoort 1968, as *Laomedea (Phialidium) tottoni*]; eastern Atlantic (García, Aguirre and González 1978, as *Clytia gravieri*; Cornelius 1982); Indian Ocean (Millard 1975 as *Clytia gravieri*); western Pacific (Yamada 1959); eastern Pacific (Fraser 1938a, as *C. acutidentata*, *C. carinadentata*, and *Gonothyraea serialis*); Bermuda (Calder 1991).

Clytia macrotheca
(Perkins, 1908) (Plate II g-h)

Campanularia macrotheca Perkins, 1908; *Clytia macrotheca* Stechow, 1923; *Laomedea macrotheca* Leloup, 1935; *Campanularia (Clytia) macrotheca* Vervoort, 1968; *Clytia macrotheca* Calder, 1991.

Material studied: Salvador City, Ribeira Beach, on the hydroid *Thyrosocyphus ramosus*, 2 m depth, 18.xi.1993, eighteen colonies, 5 mm high, gonophores observed [N 1806]; Northern Coast, Arembepe region, on embayment beach rock bank, 3-4 m depth, 15.xi.1995, three colonies, 3-3.5 mm high, gonophores not

observed [N 1807]; on external beach rock bank, 6-8 m depth, 15.xi.1995, twenty four colonies, 3 mm high, gonophores observed [N 1808]; on coral algal buildup, 30 m depth, 4.iii.1994, eleven colonies, up to 2 mm high, gonophores not seen [N 1809]; 55 m depth, 16.v.1994, six colonies, up to 2.5 mm high, gonophores not seen [N 1810]; Guarajuba Beach, on shallow coral reef bank, 19 m depth, 30.iv.1996, seven colonies, 3-4 mm high, without gonophores [N 1811]; Papa Gente Beach, on coastal emergent reef wall, 5-6 m depth, 1.v.1997, twelve colonies, 3 mm high, without gonophores [N 1812].

Description: Whitish or sometimes yellowish stolonial colonies, up to 5 mm high, arising from a creeping hydrorhiza. Delicate pedicels, 0.8-5.0 mm high, 35-50 μm in diameter, with a group of 22-25 basally placed annuli, and 6-8 annuli at distal end. No subhydrothecal spherule. Perisarc relatively thick, usually yellowish. Hydrothecae champagne-glass-shaped, 440-581 μm long, cylindrical distally, slightly constricted basally, 160-199 μm at margin, and 48-83 μm at diaphragm; margin with 9-11 truncated cusps separated by U-shaped incisions. Hydrothecal diaphragm thin, usually horizontal, but sometimes oblique; basal chamber shallow and cup-shaped. Hydranth ovoid, whitish, with 14 tentacles, each about 400 μm long. Gonothecae white, irregularly pear-shaped, and sometimes cone-shaped; always asymmetric; short, about 620 μm long, 200 μm in maximum diameter at distal end, tapering towards the base, and these about 138 mm; terminal aperture wide, about 190 μm in diameter, slightly constricted below margin; short pedicels with 3-5 annuli. Nematocyst complement represented by microbasic b-mastigophores of two sizes: (i) A-type: 5.5-6.0 x 1.8-2.0 μm , very abundant throughout the colony, and (ii) B-type: 8.0-8.5 x 2.5-2.8 μm , less numerous than A-type.

Known range: Brazil: first record. Circumglobal distribution: western Atlantic (Fraser 1944); Bermuda (Calder 1991).

Clytia noliformis
McCrary, 1859 (Plate III a-c)

Clytia volubilis Marktanner-Turneretscher, 1890; Verluys, 1899; Hargitt, 1909; *Clytia noliformis* Nutting, 1901a; Wallace, 1909; Fraser, 1912a, 1918, 1921, 1943, 1944, 1946, 1947; Bennitt, 1922; Timmermann, 1932; Burkenroad, 1939; Picard, 1949; Behre, 1950; Deevey, 1950; Mammen, 1965; Rees and Thursfield, 1965; Rees and White, 1966; Gravier, 1970; Gosner, 1971; Morris and Mogelberg, 1973; Defenbaugh and Hopkins, 1973; Defenbaugh, 1974; Ryland, 1974; Boero, 1981a, 1981b, 1987a; Spracklin, 1982; Flórez González, 1983; Calder, 1986, 1991; Llobet, Gili and Barangé, 1986; Östman, Piraino and Roca, 1987. *Clytia simplex* Congdon, 1907; *Campanularia (Clytia) noliformis* Winge, 1923; Leloup, 1932; Germain, 1935; Vervoort, 1968; *Campanularia noliformis* McCrary, 1859; *Clytia folleata* Vannucci Mendes, 1946.

Material studied: Todos os Santos Bay, Fontes Island, on the octocoral *Caryjoa riisei*, 1-2 m depth, 20.viii.1994, nine colonies, 2 mm high, without gonophores [N 1813]; Pati Island, on the sponge *Haliclona carbonaria*, intertidal zone, 3.xii.1994, three colonies, 2 mm high, without gonophores [N 1814]; Berlinque Beach, on coral reef bank, 9 m depth, 22.xii.1993, twenty nine colonies, up to 3 mm high, female gonophores observed [N 1833]; Salvador City, Farol da Barra, on rock outcrop, 18 m depth, 1.iii.1993, four colonies, 2.5 mm high, without gonophores [N 1815]; Pituba Beach, on rock outcrop, 2-3 m depth, 10.v.1996, six colonies, 2 mm high, without gonophores [N 1816]; Ponta de Itapuã, on rock outcrop, intertidal zone, 30.i.1997, eight colonies, up to 3 mm high, male and female gonophores observed [N 1817]; Ribeira Beach, on ascidian *Botrylloides niger*, shallow subtidal zone, 14.ii.1995, eighteen colonies, up to 3 mm high, male and female gonophores observed [N 1818]; Porto da Barra, on ascidian *Styella plicata*, 6-8 m depth, 23.xi.1996, six colonies, up to 3 mm high, male gonophores observed [N 1819]; Northern Coast, Arembepe Beach, on external beach rock bank,

4-5 m depth, 15.xi.1995, one colony, 2 mm high, female gonophore observed [N 1820]; Arembepe region, on coral algal buildup, 25 m depth, 30.iii.1994, thirteen colonies, up to 2 mm high, without gonophores [N 1821]; 37 m depth, 18.vi.1992, twenty two colonies, up to 2 mm high, without gonophores [N 1822]; 50 m depth, 20.ix.1995, six colonies, up to 2 mm high, female gonophores observed [N 1823]; 42 m depth, 10.x.1996, seventeen colonies, up to 2 mm high, male and female gonophores observed [N 1824]; 17 m depth, 30.i.1997, nineteen colonies, up to 2 mm high, male and female gonophores observed [N 1825]; 22 m depth, 5.v.1997, thirty two colonies, up to 2 mm high, without gonophores [N 1826]; Guarajuba Beach, on shallow bank reef, 18 m depth, 18.iv.1996, twenty seven colonies, up to 3 mm high, without gonophores [N 1834]; Itacimirim beach, on coastal emergent reef wall, 4-5 m depth, 20.iv.1996, eleven colonies, 2- 2.5 mm high, without gonophores [N 1835].

Description: Yellowish stolonial colonies, up to 3 mm high, arising from a creeping hydrorhiza. Pedicels with thick perisarc, strong, straight or slightly sinuous, relatively short, 1.1-2.6 mm high, 65-88 µm in maximum diameter; group of 18-20 strong annuli placed basally, and of 20-22 distally; usually smooth in between, but occasionally slightly waved. Hydrothecae with thick perisarc, campanulate, moderately shallow, 400-520 µm deep, 350-465 µm wide at margin, 135-190 µm wide at diaphragm; margin with 14 or 15 blunt pyramidal cusps, separately by shallow U-shaped incisions. Hydrothecal diaphragm thick, pale or crystalline, usually straight; basal chamber sub-spherical and shallow. Hydranth yellow or pale, spherical, with 25-28 tentacles, about 810 µm long each. Gonothecae dimorphic, usually golden or brownish, both arising from hydrorhiza on short annulated pedicels. Male: sub-cylindrical, irregularly folded, and usually asymmetric; short, about 650 µm long, 250 µm in maximum diameter; terminal aperture about 180 µm wide, placed on a semi-tubular neck. Female, cone-shaped, symmetric, longer, about 780 µm long, 410 µm in maximum diameter; terminal

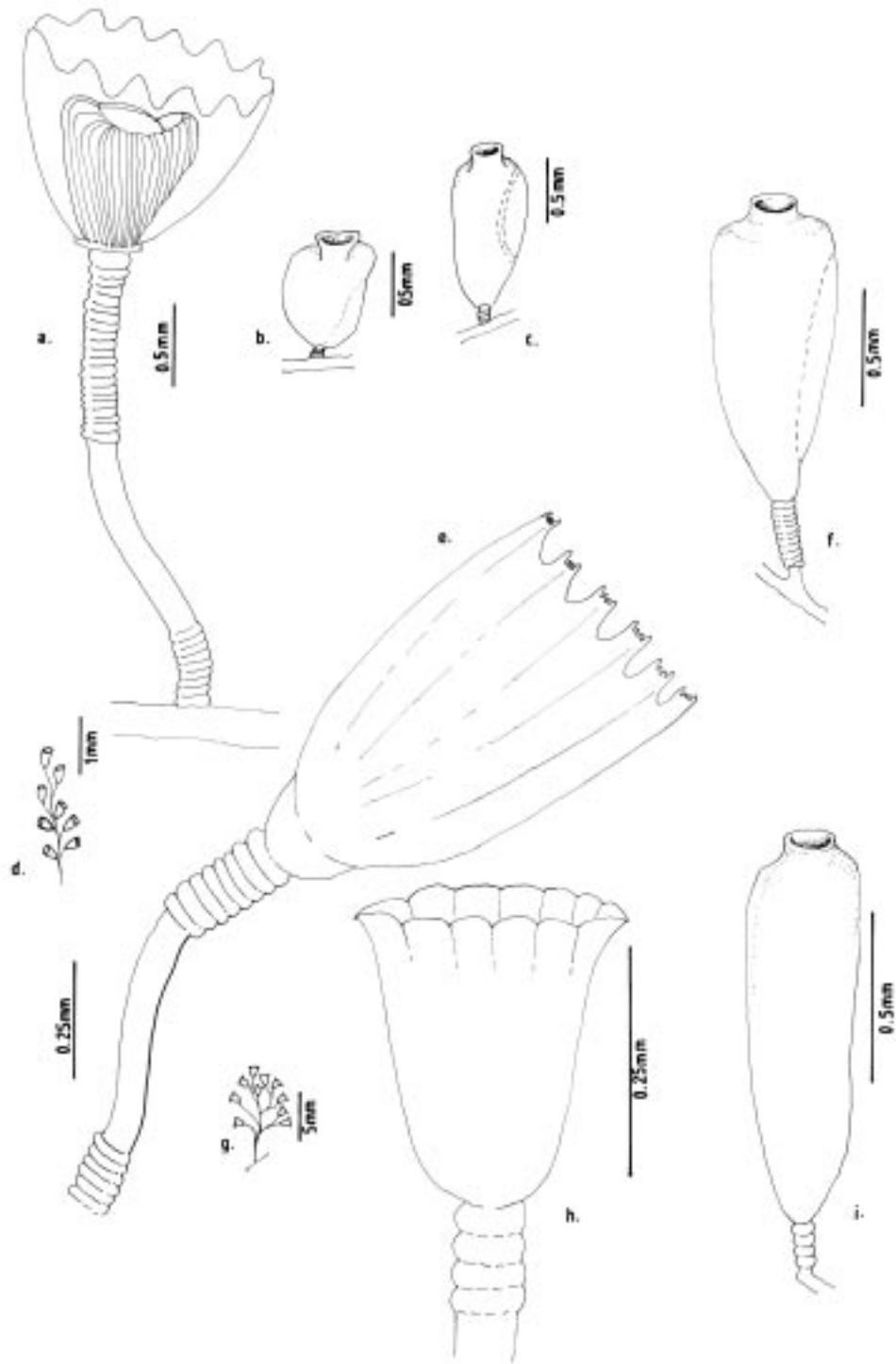


Fig. 6. *Clytia noliformis*: a- part of colony and hydrotheca; b- male gonotheca; c- female gonotheca. *Obelia bidentata*: d- aspect of a colony; e- part of hydrocaulus and hydrotheca; f- gonotheca. *Obelia dichotoma*: g- aspect of a colony; h- hydrotheca; i- gonotheca.

aperture about 220 μm wide, placed on a tubular neck. Nematocyst complement is represented by microbasic b-mastigophores of two sizes: (i) A-type: 4.0-5.0 x 1.2-1.5 μm , very abundant throughout the colony, and (ii) B-type: 8.5-9.1 x 2.4-2.9 μm , less numerous than A-type.

Known range: Brazil: first record. Circumglobal distribution: western Atlantic (Fraser 1944); eastern Atlantic (Picard 1949); Indian Ocean (Mammen 1965); eastern Pacific (Fraser 1948); Bermuda (Congdon 1907, Bennett 1922, Burkenroad 1939, Morris and Mogelberg 1973, Ryland 1974, Calder 1986a, 1991).

Obelia bidentata

Clarke, 1875 (Plate III d-f)

Obelia bidentata Clarke, 1875; Calder, 1991; Migotto, 1993; Cornelius, 1982, 1995; *Obelia bicuspidata* Clarke, 1875; *Obelia longicyatha* Allman, 1877; *Obelia andersoni* Hincks, 1887; *Gonothyrea longicyatha* Thornely, 1900; *Clytia longicyatha* Billard, 1906; *Laomedea (Gonothyrea) bidentata* Babic, 1913; *Obelia spinulosa* Annandale, 1915; *Gonothyrea bicuspidata* Stechow, 1919; *Clytia longitheca* Hargitt, 1924; *Obelia longitheca* Hargitt, 1924; *Obelia tenuata* Hargitt, 1924; *Laomedea (Obelia) spinulosa* var. *minor* Leloup, 1932; *Laomedea spinulosa* Leloup, 1933; *Laomedea longicyatha* Leloup, 1935; *Laomedea (Obelia) bicuspidata* Hummelincki, 1936; *Laomedea bicuspidata* Vervoort, 1946; *Laomedea bicuspidata* var. *tenuis* Vervoort, 1946; *Laomedea (Obelia) longicyatha* Vervoort, 1968.

Material studied: Salvador City, Farol da Barra, on rock outcrop, 18 m depth, 1.iii.1993, four colonies, 4 mm high, without gonophores [N 1836]; Northern Coast, Arembepe Beach, on external beach rock bank, 6-8 m depth, 15.xi.1995, eighteen colonies, up to 4 mm high, gonophores observed [N 1837]; Arembepe region, on coral-algal buildup, 37 m depth, 18.vi.1992, eleven colonies, 3-4 mm high, without gonophores [N 1838]; Guarajuba Beach, on coastal emergent reef wall, 6-8 m depth,

23.iv.1997, five colonies, 4 mm high, without gonophores [N 1839]; Praia do Forte Beach, on coastal emergent reef wall, 5-6 m depth, 25.iv.1997, twenty colonies, 3-4 mm high, without gonophores [N 1840].

Description: Brownish erect colonies, sympodial, up to 4 mm high, arising from a creeping hydrorhiza. Hydrocaulus unbranched or irregularly branched in older colonies, monosiphonic and straight, divided into internodes at more or less regular intervals. Perisarc thick. Internodes long, about 520 μm , with a group of 6 basally placed annuli; each internode supporting a hydrothecal pedicel from a distal apophysis; hydrothecal pedicel composed by 8-13 semi-spiral annulations, up to 200 μm in length; apophysis alternating from side to side. Hydrothecae deeply campanulate, semi-cylindric, 480-530 μm long, 167-210 μm wide at margin, and 60-83 μm wide at diaphragm; sometimes asymmetric; 6-8 conspicuous folds in hydrothecal walls runs downwards from the margin; diaphragm always oblique; margin with 10-13 bimucronate cusps, never uniform, separated by U-shaped incisions. Hydrothecal diaphragm thin, delicate; basal chamber shallow, about 66-74 μm deep. Hydranth soft brown or pale, small, cylindrical, about 320 μm from diaphragm to tentacles. Tentacles short, 19-23 in number, about 265 μm long. Gonothecae cone-shaped, pale to whitish, 760-830 μm long, 420-440 μm wide at distal end, tapering towards the base, 55-70 μm wide, usually symmetrical. Terminal aperture, about 96 μm wide, placed on a collar neck. Base with a long pedicel, with 8-14 annulations. Nematocyst complement represented by microbasic b-mastigophores A-type, 6.1-6.5 x 2.0-2.6 μm and by isorhizas 5.1-6.5 x 1.1-2.0 μm .

Known range: Brazil: Baía de Guanabara (Vannucci 1949 as *Gonothyrea bicuspidata*); São Sebastião (São Paulo) (Migotto 1993). Circumglobal distribution: western Atlantic (Fraser 1944); eastern Atlantic (Cornelius 1975b, 1982, 1995); Indian Ocean (Mammen 1965); western Pacific (Hirohito 1983); eastern Pacific (Fraser 1937a); Bermuda (Calder 1991).

Obelia dichotoma

Linnaeus, 1758 (Plate III g-i)

Sertularia dichotoma Linnaeus, 1758; *Sertularia longissima* Pallas, 1766; *Laomedea* (*Sertularia*) *dichotoma* Lamouroux, 1812; *Sertularia geniculata* Sprengel, 1813; *Campanularia dichotoma* Lamarck, 1816; *Laomedea dichotoma* Lamouroux, 1816; *Campanularia maior* Meyen, 1834; *Campanularia brasiliensis* Meyen, 1834; *Campanularia cavolinii* Deshayes and Milne-Edwards, 1836; *Sertularia cavolini* Kölliker, 1843; *Laomedea dichotoma* var. a Johnston, 1847; *Campanularia* (*Laomedea*) *dichotoma* Maitland, 1851; *Obelia dichotoma* Allman, 1864; Cornelius, 1982, 1995; Calder, 1991; Migotto, 1993; *Eucope parasitica* A. Agassiz, 1865; *Eucope pyriformis* A. Agassiz, 1865; *Obelia hyalina* Clarke, 1879; *Obelaria dichotoma* Haeckel, 1879; *Obelaria* (*Campanularia*) *pyriformis* Haeckel, 1879; *Campanularia cheloniae* Allman, 1888; *Obelia angulosa* Bale, 1888; *Laomedea* (*Obelia*) *dichotoma* Levinsen, 1893; *Obelia gracilis* Calkins, 1899; *Obelia surcularis* Calkins, 1899; *Obelia fragilis* Calkins, 1899; *Obelia griffini* Calkins, 1899; *Obelia rhunicola* Billard, 1901; *Obelia dubia* Nutting, 1901; *Campanularia obtusidens* Jäderholm, 1904b; *Obelia brasiliensis* Hartlaub, 1905; *Obelia congdoni* Hargitt, 1909; *Laomedea sargassi* Broch, 1913; *Obelia obtusidentata* Bedot, 1925; *Obelia everta* Hargitt, 1927; *Obelia alternata* Fraser, 1938; *Obelia equilateralis* Fraser, 1938; *Obelia microtheca* Fraser, 1938; *Obelia obtusidens* Fraser, 1938; *Obelia tenuis* Fraser, 1938; *Gonothyrea integra* Fraser, 1940; *Obelia biserialis* Fraser, 1948; *Laomedea* (*Obelia*) *congdoni* Vervoort, 1968; *Laomedea* (*Obelia*) *equilateralis* Vervoort, 1968; *Obelia* (*Laomedea*) *dichotoma* Gili, 1982.

Material studied: Todos os Santos Bay, Fontes Island, on *Eudendrium carneum*, 1-2 m depth, 3.vi.1995, four colonies, 4-5 mm high, without gonophores [N 1827]; Northern Coast, Arembepe region, 50 m depth, 20.ix.1995, eight colonies, 6 mm high, gonophores observed [N

1828]; 25 m depth, 20.xii.1992, eighteen colonies, 5-6 mm high, gonophores observed [N 1829]; 42 m depth, 24.ix.1996, twenty colonies, 5-6 mm high, gonophores observed [N 1830]; Northern Coast, Itacimirim Beach, on shallow bank reef, 15 m depth, 20.iv.1996, fifteen colonies, 10-12 mm high, without gonophores [N 1831]; Praia do Forte Beach, on coastal emergent reef wall, 5-6 m depth, 25.iv.1997, twenty three colonies, up to 12 mm high, without gonophores [N 1832].

Description: Soft orange, brown, pale or slightly pinkish erect or bushy colonies, up to 12 mm high, sympodial, arising from a creeping hydrorhiza. Hydrocaulus usually branched, monosiphonic, divided into internodes at regular intervals. Internodes varied in length, slightly curved, slender, annulated basally, about 5-8 annuli, supporting a hydrothecal pedicel from distal apophysis. Hydrothecal pedicels with 4, 5 or 8 annulations. Hydrothecae, wide, bell-shaped, 250-280 μm long, 200-245 μm wide at margin, 95-110 μm wide at diaphragm; margin slightly crenulate, 14-16 soft cusps, and 13-15 fine longitudinal folds, or sometimes entire; diaphragm thin, transverse or slightly oblique; basal chamber usually small. Hydranth short, cylindrical, about 150 μm long, with 25-38 tentacles, each 220-240 μm long. Gonothecae, whitish or yellowish, conical, long, 820-912 μm long, 240-300 μm in maximum diameter at distal end, tapering basally, 112-154 μm wide. Terminal aperture on a tubular neck. Pedicels short, 30-42 μm long, sometimes with 4-5 annulations, and usually arising directly from hydrothecal pedicel. Nematocyst complement represented by microbasic b-mastigophores of small size, 4.8-7.5 x 1.9-2.5 μm on tentacles and hypostome. Isorhizas of two different sizes: (i) 8.0-9.1 x 1.6-2.0 μm , not recorded from tentacles and, (ii) 5.1-8.0 x 1.0-1.6 μm less numerous throughout the colony.

Known range: Brazil: Rio de Janeiro (Stechow 1919 as *O. angulosa*); São Sebastião (São Paulo) (Migotto 1993). Circumglobal distribution: western Atlantic (Fraser 1944); eastern Atlantic (Cornelius 1975a, 1982, 1995); Indian Ocean (Millard 1975); western Pacific

(Yamada 1959); eastern Pacific (Fraser 1937); Bermuda (Congdon 1907, Bennett 1922, Calder 1986, 1991).

DISCUSSION

Three distinct groups of hydroids were separated based upon species composition and geographical location along the coast of Bahia. The first group, represented by sandy shores, was characterised solely by three species of *Clytia*, of which two (*C. macrotheca* and *C. noliformis*) are recorded for the first time from Brazil. The second cluster comprised mangroves and rocky shores, and was characterised by five species, including *C. gracilis* and *C. noliformis*. The third group (beach rocks, coral-algal buildup and coral reefs) was located at the northern coast of Bahia, and had higher species numbers than the other two groups, including the presence of *Campanularia hincksii* (recorded for the first time in Brazil).

Phenotypically plastic species such as *Clytia gracilis* and *C. noliformis* colonised all six ecosystems assessed, including sandy shores where only three hydroid species were recorded. This wide distribution a wide tolerance to various levels of physical stress as long as there is a hard substratum for attachment. In contrast, *C. hummelincki*, a remarkably rare species (Cornelius 1982, Calder 1991, Migotto 1993), occurred in smaller numbers and was recorded only from two ecosystems, each with oligotrophic waters. This indicates that this species requires very specific environmental conditions and may be lost if the ecosystem becomes further degraded.

Based on these distribution, it appears that hydroid species may be suitable candidates for biomonitors of Brazilian waters.

The campanulariids recorded from northern Bahia, and those from the south coast of Brazil (Migotto 1993), are usually smaller than those reported from Europe (Cornelius 1982,

1995). Morphological variations (i.e. margin of the hydrotheca, number of annulations throughout the colony, and abundance of certain types of nematocyst) can be taxonomically frustrating and make identifications difficult. However, these variations appear to be phenotypic responses to environmental conditions recorded in different ecosystems (Gili and Hughes 1995). Biochemical systematical studies are helpful in defining species, but to address the reasons behind such phenotypic variation requires detailed and intensive studies of hydroid communities, including quantitative and behavioural ecology.

ACKNOWLEDGEMENTS

The authors wish to thank the Environmental Protection Corporation (CETREL S/A), Petroleum of Brazil (PETROBRÁS) and Centro de Apoio ao Desenvolvimento Científico e Tecnológico (CNPq-Brazil) for financial support. The constructive criticism of the manuscript by two external referees P. Cornelius (Natural History Museum, London) and W. Vervoort (Nationaal Natuurhistorisch Museum, Leiden) are gratefully acknowledged. Sincere thanks are due to Malcolm B. Jones (Department of Biological Sciences, University of Plymouth) who kindly served as manuscript editor. Gratitude is extended to José María Landín Domínguez - Laboratory of Coastal Studies, and to Marlene Campos Peso Aguiar - Laboratory of Malacology and Benthic Ecology, both from Universidade Federal da Bahia, Brazil, for the technical facilities provided during the period of this research. Gratitude is expanded to Arilma Farias de Souza, Carlos Neves, Dirlene Cairo Aguiar, Larissa de Siqueira, Rita de Cássia Farani Assis, Rilza da Costa Tourinho Gomes, Simone Souza de Moraes, Tania Kobler Brazil and Yonara Souza Braga for all encouragement and assistance. Thanks to Tendai Mutyasera for the illustrations.

RESUMEN

La familia Campanulariidae es relativamente bien conocida, sin embargo varios aspectos de su biología y ecología no han sido aclarados. Este estudio presenta el primer enfoque semicuantitativo sobre los hidroides campanularidos del noreste del Brasil, distribuidos hasta los 60 metros de profundidad y se basa en colecciones obtenidas desde 1992. Las colonias fueron colectadas de seis hábitats a lo largo de la costa de Ciudad de Salvador, Bahía de Todos os Santos, Isla de Itaparica hasta la región norte de la costa del estado de Bahía. Se registraron nueve especies de las 982 colonias examinadas: *Campanularia hincksii*, *Clytia gracilis*, *C. hemisphaerica*, *C. hummelincki*, *C. linearis*, *C. macrotheca*, *C. noliformis*, *Obelia bidentata* y *O. Dichotoma*. En la escala de abundancia *Clytia gracilis* y *C. noliformis* fueron las especies más abundantes, mientras que *Campanularia hincksii* y *Clytia hummelincki* fueron las especies raras. El análisis de clasificación con datos de abundancia relativa mostró que las costas arenosas poseen una comunidad de hidroides muy diferente a la de los otros hábitats. Se proporciona una clave simplificada de identificación, redescriptiones, ilustraciones y un estudio del cnidoma para cada especie. *Campanularia hincksii*, *Clytia macrotheca* y *C. noliformis* se informan por primera vez para Brasil.

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