

SPECIES ACCOUNT

Order *SCLERACTINIA*

Suborder **ASTROCOENIINA**

Family **POCILLOPORIDAE** Gray, 1840

Genus **Madracis** Milne Edwards & Haime, 1849

Diagnosis: Colonies formed by extratentacular budding resulting in massive or ramose coralla. Coenosteum costate or spinose. Septa arranged in groups of 6, 8, or 10, but in rarely more than 2 cycles. Paliform lobes often present on first cycle of septa. Columella styliform.

Type Species: *Madracis asperula* Milne Edwards & Haime, 1849, by monotypy.

Madracis asperula Milne Edwards & Haime, 1849

(Figs. 12, 24-26)

Madracis asperula Milne Edwards & Haime, v*1849a: 70; 1850a: xxii; 1850b: 101, pl. 4, figs. 2a-b. –Milne Edwards, 1857: 139. –Pourtalès, v.1871: 27-28, pl. 7, fig. 4; v.1874: 41; Studer, 1878: 636. –Pourtalès, 1878: 204; v.1880a: 96, 108. –Moseley, v.1881: 182 (in part: specimens from Cape Verde). –Duncan, 1882: 219. –Not Fowler, 1888: 4-6, pl. 32, fig. 1 (= *M. brueggemannii*). –Goreau, 1959: 70 (listed). –Zans, 1959: 28 (listed). –Not Lewis, 1960: 1133, 1138-1140, figs. 9-11 (= *M. mirabilis*). –Not Allen & Wells, v.1962: 389 (= ? *M. myriaster*). –Not Roos, 1964: 7, pls. 4b, 5b, 6b (= *M. mirabilis*). –Pfaff, 1969: 21 (listed). –Geyer, 1969: 26 (listed). –Laborel, 1970: 150, 153, 155 (listed). –Tommasi, 1970: 55. –Not Roos, 1971: 53, pls. 9b, 10 (= *M. decactis*). –Porter, 1972: 111 (listed). –Wells, 1973: 19 (key to W. Atlantic species). –Bright et al., 1974: 34 (listed). –Zibrowius & Saldanha, 1976: 103, figs. 6-12. –Cairns, 1978a: 10 (listed). –Zibrowius, v.1980: 16-18, pl. 1, figs. A-J, pl. 2, figs. A-J (description and synonymy). –Castañares & Soto, 1982: Table 1 (listed). –Prahll & Erhardt, 1985: 11. –Rezak et al., 1985: 225 (listed: stn 113, Coffee Lump; stn 115, 127, 128, Geyer Bank; stn 118, Diaphus Bank; stn 125, Rezak Bank). –Prahll & Erhardt, 1989: 541. –Swedberg, 1994: 75-81, fig. 23a-d. –Ogawa, Tanase & Takahashi, 1997: 139.

Axohelia schrammi. –Lindström, v.1877: 14. [Not *Axohelia schrammi* Pourtalès, 1874]

Axhelia asperula. –Vaughan, v.1901: 294, pl. 1, fig. 4, pl. 17, fig. 2.

Madracis mirabilis. —Ludwick & Walton, 1957: 2081, fig. 13C3. [Not *Stylophora mirabilis* Duchassaing & Michelotti, 1860].

Description: Colonies small, sparsely branched in three dimensions, and delicate; branch anastomosis rare. Largest colony examined (BLM, SOFLA-17, USNM 72489) only 4 cm in height, with a pedicel diameter of 3.5 mm. Specimens still attached to substrate are extremely rare in collection, virtually all material reported below consisting of distal branch fragments. Coralla appear to attach to a soft (*e.g.*, sponge) or hard, but small substrate (*e.g.*, a small bryozoan colony), which is easily overgrown or from which the coral detaches during early ontogeny or during collection. Distal branches usually quite slender (1.4-1.7 mm in diameter), not much more than width of a corallite; attenuate; and often flattened or polygonal in cross section. Distal branches in process of bifurcation slightly thicker. Corallites circular on proximal branches, but elongate on branch tips, as though longitudinally stretched, up to 2.2 mm in GCD and 1.3-1.5 mm in LCD. Corallites at branch tip relatively closely spaced, usually less than 1 CD apart. Coenosteum covered with a fine spination, the spines about 0.18 mm in height and 50-80 μ m in diameter. Spines often arranged linearly on low ridges that cover the entire coenosteum. Corallum white.

Each corallite contains 10 relatively exsert (0.5 mm), but narrow septa, the axial edge extending only about half distance to columella. Axial edges of S1 vertical, straight, and entire, usually bordered by a small paliform lobe. S2 absent or rudimentary, the latter state represented by an alignment of small spines. Occasionally coralla having corallites with only 8 septa are found at the same station as those having 10 septa, all other characters being the same (see Discussion). Central part of fossa contains a solid, massive columella, elliptical in cross section and with a horizontal top, from which a compressed, styliform rod projects.

Discussion: Three branching azooxanthellate species of *Madracis* are known from the western Atlantic. *M. asperula* is distinguished from *M. myriaster* by having: a smaller corallum; smaller basal branch diameter and smaller, more attenuate distal branches; 3-dimensional branching with little or no branch anastomosis; spinose, instead of tuberculate-striate, coenosteum; and small paliform lobes (P1). And, although their bathymetric ranges overlap, *M. asperula* is usually found in shallower water than

M. myriaster. *M. asperula* differs from the other branching species, *M. brueggemanni*, in having larger and more closely spaced corallites; a more delicate corallum; a larger columellar base; and more slender, attenuate/flattened branch tips. Furthermore, corallites of *M. brueggemanni* have predominantly 8 septa, whereas those of *M. asperula* usually have 10.

Although ZIBROWIUS (1980) was hesitant to identify the western Atlantic populations of this species as *M. asperula* (type locality, Madeira), I can find no skeletal morphological differences between the amphi-Atlantic populations. Likewise, I can find no differences between the Atlantic populations and the specimen reported by DURHAM & BARNARD (1952) and CAIRNS (1991a) from the Galápagos Islands. A similar species, reported as *Madracis* sp. A by CAIRNS (1994), CAIRNS & KELLER (1993), and CAIRNS & ZIBROWIUS (1997), and as *M. asperula* by GARDINER & WAUGH (1939), has been reported from throughout the Indo-West Pacific.

Coralla from six stations (BLM, SOFLA-9, BLM, SOFLA-10, P-736, P-749, P-759, and Cedar Key, FL) are otherwise similar to *M. asperula* but have only 8 septa per corallite. They are not considered to be *M. brueggemanni*, which customarily has 8 septa per corallite, because these specimens have slender, attenuate branch tips, large corallites, and large columella, characters consistent with *M. asperula*. They are included herein as variants or polymorphs of *M. asperula*. At three of these stations (i.e., BLM, SOFLA-9 and 10, and P-736) typical coralla of *M. asperula* and *M. brueggemanni* were also collected, which raises the possibility that the 'octamerous *M. asperula*' may be a hybrid of the two species, a general phenomenon strongly suggested by VERON (1995) to occur among the reef building Scleractinia. Electrophoretic work on fresh material could probably easily solve this taxonomic problem and shed light on the value of using septal number as a species-level character in this genus.

Nomenclatural note: According to the ICZN (1985: Article 13c), the combined description of a new genus and new species confers availability to the both genus and species names, the species named being fixed as the type of the genus by monotypy. This is precisely what happened in the case with *Madracis asperula*, the genus and species being described in a brief three lines by MILNE EDWARDS & HAIME (1849a: 70), the more complete description and figure published the following year (MILNE EDWARDS & HAIME 1850a).

New Records: P-365, 1 branch, USNM 99087; P-366, 1 branch, USNM 99048; P-372, 1 colony and 1 branch, USNM 99062; P-392, 4 branches, USNM 99086; P-399, 4 branches, USNM 99089; P-419, 1 colony and 2 branches, USNM 99088; P-444, 2 branches, USNM 99076; P-592, 6 branches, USNM 99080; P-658, 2 branches, USNM 99079; P-684, 10+ branches, USNM 99075; P-707, 50+ branches, USNM 99085 and UMML 8.333; P-708, 10 branches, UMML 8.222; P-709, 10 branches, USNM 99082; P-710, 1 branch, USNM 99078; P-712, 1 branch, USNM 99077; P-734, 9 branches, USNM 99083; P-736, 20 branches, USNM 99047, 99060 and UMML 8.334; P-737, 20 branches, USNM 99065; P-745, 10 branches, USNM 99084; P-749, 2 branches, USNM 99046; P-759, 1 branch, USNM 99050; P-775, 10 branches, USNM 99068; P-835, 1 branch, USNM 99071; P-840, 100+ branches, USNM 99064; P-841, 5 branches, USNM 99070; P-857, 9 branches, USNM 99067; P-913, 100+ branches, USNM 99063; P-1362, 4 branches, USNM 99049; G-899, 1 branch, USNM 99066; G-956, 4 branches, USNM 99074; G-985, 2 branches, USNM 99073; G-1246, 2 branches, USNM 99081; O-4904, 1 branch, USNM 99057; Alb-2142, 10 branches, USNM 7211; Alb-2161, 2 branches, USNM 16150; Alb-2319, 1 colony, USNM 16141; BLM, SOFLA-9, many branches, USNM 72471-77, 72507; BLM, SOFLA-10, many branches, USNM 72480, 72778-79, 75512, 78219; BLM, SOFLA-11, many branches, USNM 72481-85, 72516; BLM, SOFLA-17, many branches, USNM 72486-89; BLM, SOFLA-23, many branches, USNM 72490-91, 72493, 72495-6, 72521, 72535; BLM, SOFLA-27, many branches, USNM 72497-8; BLM, SOFLA-29, many branches, USNM 72499; BLM, SOFLA-30, 1 branch, USNM 72523; BLM, SOFLA-36, 3 branches, USNM 99331; BL-247, 3 branches, USNM 6409; B-A DS59, 100+ branches, USNM 99056; Chain 35-43, 6 branches, USNM 99055; JS-16, 2 branches, USNM 99058; JS-104, 50+ branches, USNM 99072; USGS IX-1, 4 branches, USNM 75593; Hidalgo-334, 10 branches, USNM 85742; Cedar Key, FL, 55 m, 2 branches, USNM 99051.

Types: Eight syntype branches of *M. asperula* are deposited at the BM (1975.10.16.1) (see ZIBROWIUS 1980). Type Locality: Madeira.

Distribution: Western Atlantic: widely distributed throughout Caribbean, northern and eastern Gulf of Mexico, and eastern coast of South America to Abrolhos Islands, but absent from Bahamas and eastern coast of Florida (Fig. 12); 24-311 m, although most records from shallower than 100 m. Eastern Atlantic: Madeira, Canary Islands, Cape Verde Is-

lands; 2-95 m (ZIBROWIUS 1980). Elsewhere: ?Galápagos Islands; 46-64 m (CAIRNS 1991a).

***Madracis brueggemanni* (Ridley, 1881)**

(Figs. 13, 27-32)

Axohelia brueggemanni Ridley, v*1881: 102-102, pl. 6, fig. 7a-b.

Madracis asperula. –Moseley, 1881: 182 (in part: specimens from Fernando de Noronha). –Fowler, 1888: 418-420, pl. 32, fig. 1 (histology). [Not *M. asperula* Milne Edwards & Haime, 1849]

Madracis scotiae Gardiner, v*1913: 687-688, text figs. 1-2. –Laborel, 1970: 150, 151, 153, 154, 155.

Madracis brueggemanni (sic). –Porter, 1972: 111 (listed).

Madracis brueggemanni. –Wells, 1973: 20, 21-22. –Cairns, 1979: 207 (listed). –Castañares & Soto, 1982: Table 1 (listed). –Rezak et al., v.1985: 225 (listed).

Description: Like *M. asperula*, colonies are small, sparsely branched in three dimensions, and delicate, one of the largest colonies examined (BLM, SOFLA-23, USNM 72576) only 4 cm in height, and up to 6 mm in basal branch diameter. Attached coralla rarely collected; branch anastomosis rare. Branch tips blunt and evenly rounded (1.8-2.6 mm in diameter), several times the width of a corallite; circular in cross section. Distal branches in process of bifurcation slightly clavate, up to 4 mm in diameter. Corallites on proximal branches circular, whereas those on branch tips slightly elliptical, corallites ranging from 0.85-1.4 mm in GCD, often both extremes in size occurring adjacent to one another. Corallites well spaced, even at branch tips, each separated by a distance of 1-3 CD. Coenosteal spination similar in arrangement to that of *M. asperula*, but spines are larger – up to 0.18 mm in height. Corallum white.

Most (95%) corallites contain 8 relatively exsert (0.3 mm), narrow septa. Occasionally corallites contain 6, 7, 9, 10, or even 11 septa, those with less than 8 septa being more common than those with more. Axial edges of S1 vertical, straight, and entire, usually bordered by a small paliform lobe, which form a crown encircling the columella. S2 absent or rudimentary, the latter state represented by a series of elongate spines similar in size and shape to S1 face spines (Fig. 29). Columella base restricted to centre quarter of fossa, supporting a compressed (about 0.17 mm in diameter) styliform rod.

Discussion: In a footnote to his key to the species of western Atlantic *Madracis*, WELLS (1973) implied that *M. brueggemanni* might be a synonym of *M. asperula* because some coralla of the former were known to have corallites with 9 or 10 septa. Indeed, some coralla reported herein occasionally have corallites with 6-11 septa (see Discussion), but other characters (such as its smaller corallite diameter, blunt branch tips, more robust corallum, and smaller columellar base) distinguish *M. brueggemanni* from *M. asperula*. It should also be noted that some coralla of *M. asperula* have 8 septa, and that those specimens may be hybrids of *M. brueggemanni* and *M. asperula* (see Discussion of *M. asperula*).

The other octamerous species of *Madracis*, *M. formosa* Wells, 1973, is distinguished by having a much larger corallum, much thicker branches, and is purportedly zooxanthellate, although it is interesting to note that in one case both species are known from the same station (BLM, SOFLA-29) at 63 m.

New Records: P-392, 1 branch, USNM 99105; P-417, 3 branches, USNM 99109; P-419, 1 branch, USNM 99104; P-736, 8 branches, USNM 99103; O-4227, 8 branches, USNM 99107 and UMML 8.332; O-4231, 1 branch, USNM 99106; BLM, SOFLA-9, 7 branches, USNM 72527; BLM, SOFLA-10, 1 branch, USNM 97326; BLM, SOFLA-11, 15 branches, USNM 71528; BLM, SOFLA-23, many branches, USNM 72492, 72529, 72532, 72533, 72569, 72576, 87208; BLM, SOFLA-29, many branches, USNM 72500, 72501, 72534, 72577, 72578; BLM, SOFLA-30, 4 branches, USNM 72574; BLM, SOFLA-36, 7 branches, USNM 72535; JSL-II-1736, 15 branches, USNM 86010; Circé IX-1, 3 branches, USNM 99102.

Types: The lectotype (BM 79.12.27.78) of *M. brueggemanni* was fixed by WELLS (1973:21) as the 'holotype' from a two specimen syntype series, the other syntype (=paralectotype) being identified by him as *M. formosa* Wells, 1973. **Type Locality:** Victoria (sic) Bank (=Vitoria Seamount), Brazil (20°42'S, 37°27'W), 60 m.

The two syntypes of *M. scotiae* are also deposited at the BM (1939.7.20.14). **Type Locality:** Scotia station 81: 18°24'S, 37°58'W (Abrolhos Bank), 66 m.

Distribution: Currently known from a disjunct distribution (Fig. 13), including northern and southeastern Gulf of Mexico; southern Caribbean;

Maranhão State, Brazil; Abrolhos Islands; and Vitoria Seamount (type locality); 51-130 m.

***Madracis myriaster* (Milne Edwards & Haime, 1849)**

(Figs. 33-35)

Axohelia myriaster Milne Edwards & Haime, *1849a: 69. —Kenny *et al.*, 1975: 75, fig. 12.

Stylophora mirabilis Duchassaing & Michelotti, v*1860: 62, pl. 9, fig. 6.

Axohelia schrammii Pourtalès, v*1874: 41, pl. 8, fig. 2.

Madracis myriaster. —Werding & Erhardt, 1977: 105-107, fig. 1. —Cairns, 1979: 26-29, pl. 1, figs. 1-2, 4-5, Map 1 (description and synonymy). —Castañares & Soto, 1985: Table 1 (listed). —Fricke & Meischner, 1985: 183, 184, figs. 11c, 12a. —Prah & Erhardt, 1985: 70, figs. 25a-b. —Rezak, *et al.*, 1985: 225 (listed: stn 115, Geyer Bank). —Hubbard & Wells, v.1986: 125, fig. 3. —Bouchon & Laborel, 1986: 205 (listed). —Messing, 1987: 12, fig. —Prah & Erhardt, 1989: 540. —Cairns *et al.*, 1991: 45 (listed). —Cairns *et al.*, 1994: 4 (listed).

Diagnosis: Colonies large and robust, usually irregularly branched in one plane, resulting in frequent branch anastomosis. Large colonies up to 40 cm in height and 4 cm in basal branch diameter. Coralla firmly attached, the basal branch encircled with a broad but thin basal encrustation that also bears corallites, common substrates for attachment being gorgonian and antipatharian axes and sometimes cable. Distal branches slender (2-3 mm in diameter) and circular in cross section. Corallites on distal branches slightly elliptical, ranging from 1.7-2.1 mm in GCD and 1.3-1.6 mm in LCD. Corallites close set but not crowded. Coenosteum of distal branches covered with convex, rounded or bluntly pointed tubercles 0.25-0.35 mm in diameter, which are covered with a very fine granulation (25 μ m). Toward the proximal part of each branch these tubercles maintain the same width (about 0.3 mm), but elongate in the axis of the branch, fusing with other adjacent tubercles until they form longitudinal bands, which give larger diameter branches a striate or ridged aspect. In large diameter basal branches, several adjacent parallel bands often unite to form a continuous slightly convex fascicle or cord of bands that weave sinuously between successive corallites. This 'tuberculate-striate' coenosteal architecture produces a relatively smooth coenosteal texture, contrasted with the hispid coenosteal texture of *M. asperula* and *M. brueggemanni*. Corallum white. Ten highly exsert septa occur in each corallite; paliform lobes ab-

sent. Secondary septa absent. Columella consists of a massive platform from which a compressed styliform rod emerges.

Discussion: The additional records reported herein reinforce the previously known range of the species (CAIRNS 1979: map 1), but also extend the northern range of the species to 33°48'N, 76°34'W (off Onslow Bay, NC) and confirm a greater bathymetric range of 1220 m. This depth range was previously mentioned by WERDING & ERHARDT (1977) as a personal communication from J. WELLS, but was not documented. This depth record is herein reported as taken from the cable ship *Electra* (USNM 81355) off Cape Gravois, Haiti at a depth of 1220 m and a temperature of 5°C.

The overall colour of the living coral is an intense pinkish-orange, and the polyps are yellowish or white. The common name is the 'striate finger coral' (CAIRNS *et al.* 1991). FRICKE & MEISCHNER (1985) observed the living coral from a submersible at 196 m off Bermuda, reporting that its flabellate corallum is oriented perpendicular to the prevailing current. *M. myriaster* is compared to *M. asperula* in the account of that species.

New Records: P-595, 1 branch, USNM 99044; P-684, 1 branch, USNM 99035; P-734, 1 branch, USNM 99036; P-874, 6 branches, USNM 99031; P-887, 1 branch, USNM 99043; O-3568, 3 branches, USNM 90322; O-3494, 1 branch, USNM 99045; O-24237, 1, IRCZM 12:129; Alb-2160, 5 branches, USNM 16149; JSL-I-1037, 1, IRCZM 12:128; JSL-I-1277, 1 live colony, IRCZM; JSL-I-1355, 3 colonies, USNM 73192, 79737; JSL-I-1357, 3 branches, USNM 80363; JSL-I-1360, 50+ branches, USNM 79722; JSL-I-1504, 1 branch, USNM 75208; JSL-I-2317, 1 colony, USNM 84333; JSL-I-2585, 2 colonies, USNM 87788; JSL-I-2591, 5 branches, USNM 89350; JSL-I-3659, 20+ branches, USNM 94396; BLM, SOFLA-35, 2 branches, USNM 72524-25; BLM, SOFLA-36, 10+ branches, USNM 72579-80, 72526; BLM, SOFLA-38, 10+ branches, USNM 72503-04, 72567, 72581-83; BLM, LMRS OS-05, 50+ branches, USNM 71665; B-A DS3, 1 colony, USNM 80188; B-A DS4, 2 branches, USNM 99033; B-A DS9, 100+ branches, USNM 99025; B-A DS10, 1 branch, USNM 99040; B-A DS45, 5 branches, USNM 99032; Pelican 116-5, 10 branches, USNM 99038; Eastward-19483, 1 branch, USNM 80898; Eastward-19497, 2 branches, USNM 83712; Eastward-30174, 1 branch, USNM 84877; JS-99, 1 branch, USNM 99034; Circé 28-3, 7 branches, USNM 73660; CSA Pinnacle site 2, 1, CSA; CSA Pinnacle site 7, 1, CSA; Alvin-846, 1 branch, USNM 62060; Endeavor 1, 3 branches, USNM 77432; Hummelinck-1334, 1

branch, USNM 99030; USGS-AE-9701-42, 3 colonies, USNM 99366; Jamaica, 200 m, 1 large colony, USNM 77167; Cable Ship "Electra", 17°57'N, 73°51'W, 1220 m, 2 basal fragments previously attached to a cable, USNM 81355; 25°16'N, 84°15'W, 159-166 m, 11 branches, USNM 83450 .

Types: See CAIRNS (1979).

Distribution: Common throughout the Caribbean, Bahamas, and Gulf of Mexico (but not southwestern region), ranging from Onslow Bay, NC (33°48'N, 76°34'W) to off Suriname; Bermuda (CAIRNS 1979: map 1); 20-1220 m, but most commonly collected between 150-300 m.

***Madracis pharensis* forma *pharensis* (Heller, 1868)**

(Figs. 14, 36-41)

Astrocoenia pharensis Heller, *1868: 27, pl. 1, figs. 1-2.

Madracis pharensis. –Goreau & Wells, 1967: 446 (listed). –Laborel, 1967: 5; 1970: 154. –Porter, 1972: 111 (listed). –Colin, 1978: 213 (colour fig.), 214. –Zibrowius, v.1980: 18-20, pl. 3, figs. A-M (synonymy of eastern Atlantic records). –Castañares & Soto, 1982: Table 1 (listed). –Zlatarski, 1982: 39 (discussed). –Prahl & Erhardt, 1989: 540-541.

Madracis pharensis forma *pharensis* Wells, v.1973: 19 (key). –Wells & Lang, 1973: 56 (listed). –Land, Lang & Barnes, 1977: 170 (isotopic composition). –Cairns, 1982b: 276, fig. 121a. –Humann, 1993: 108-109, 3 colour figs. –Fenner, 1993a: 13. –Cairns et al., 1994: 6 (listed). *Madracis decactis* forma *pharensis*. –Fenner, v.1993b: 1111-1112. [Not *M. decactis* (Lyman, 1859)]

Description: Colonies consist of stoloniferous chains ('ribbons') of encrusting corallites (Fig. 38), which may periodically give rise to vertical, nodular proliferations of corallites (Figs. 36-37, 39). Stoloniferous chains rarely more than one corallite wide, bordered laterally by smooth epitheca that is often slightly upturned at the periphery, the corallites composing the chain usually poorly developed and separated from one another by a distance of approximately 2 CD. Nodular growths cylindrical to clavate in shape, 2.5-3.5 mm in diameter, and up to 12 mm in height, consisting of successive layers of corallites, one on top of the other – not a true branch. Base of nodules often expose several layers of dead corallites or a smooth, horizontally striate epithecate pedicel (Fig. 36). Corallites on nodules closely packed (cerioid), circular to polygonal in cross section, separated

only by a narrow border of sharp, slender coenosteal spines. Corallites 1.5-2.3 mm in diameter. Corallum white.

Septa hexamerally arranged in 2 cycles. S1 slender but highly exsert (up to 0.2 mm), peripherally separated from the theca by a deep notch and axially separated from its paliform lobe by another deep notch. Paliform lobes (P1) well developed, $\frac{1}{4}$ - $\frac{1}{2}$ width of the S1, forming a circular palar crown low in fossa encircling columella. Faces of S1 and P1 finely spinose to coarsely granular. S2 always present, although not exsert, but often up to half the width of S1. Columella a massive, pointed style, circular in cross section, and very finely granular.

Discussion: *M. pharensis* forma *pharensis* is most commonly found on the ceilings of caves and the undersides of live or dead platy corals, such as *Agaricia*, and coral rubble. According to HUMANN (1993), the polyps may be cream, yellow, pale green, dull red, pink, or lavender. COLIN (1978) and FENNER (1993b) cite rose and pink for polyp colour.

WELLS (1973) and WELLS & LANG (1973) established a second form of *Madracis pharensis* named forma '*luciphila*' (literally, 'light loving'), characterised by having a more robust growth form (sheet-like, encrusting) and by living in lighted areas and thus having zooxanthellae. Although basically an encrusting morph, like the typical form, it usually produces a much larger corallum (several mm² in surface area, consisting of hundreds of contiguous corallites), and having corallites that are more widely spaced (0.3-0.6 mm apart). Each corallite is bordered by a polygonal wall of small spines, all the walls forming a continuous geometric network of coenosteal spines. Calicular features are otherwise identical to the typical form, except that the columella of the zooxanthellate form is usually smaller and laterally compressed, not circular in cross section. FENNER (1993b) reported this form to occur in sunlit areas but usually in the shade, often on vertically oriented substrates, and that the polyp colours were brown or bright green. He also cited specimens that were both zooxanthellate and azooxanthellate, with a graded transition between, which supports the thesis that these are indeed two forms of the same species.

Furthermore, ZLATARSKI (1982) implied and FENNER (1993b) later stated that *M. pharensis* and *M. decactis* (LYMAN 1859) were also conspecific, FENNER considering there to be three intergrading forms of *M. decactis*: typical, *luciphila*, and *pharensis*, each occurring at a certain light intensity, the typi-

cal form being a robust, zooxanthellate form often occurring in full sunlight as thick encrustations or bushy/branched coralla. Nonetheless, WELLS (1973) distinguished *M. pharensis* from *M. decactis* by its prominent second cycle of septa, well-developed paliform lobes, and less robust corallum. But, based on certain bimorphic colonies that were variable for these character states, FENNER (1993b) lumped the three phenotypes. Whereas I agree that forma *pharensis* and *luciphila* represent ecological variation of the same species, I am not yet convinced that *M. pharensis* is conspecific with *M. decactis*. Although some colonies of *M. decactis* have rudimentary S2, most are completely devoid of secondary septa. Furthermore, paliform lobes are much better developed in both forms of *M. pharensis*, and *M. pharensis* occurs only as single sheets of corallites, whereas the coralla of *M. decactis* may be thick, with multiple-encrusting layers of coenosteum, bushy, or even ramose.

A phenotype morphologically indistinguishable from *M. pharensis* forma *pharensis* has been reported from throughout the Indo-Pacific at 5-421 m (see CAIRNS & ZIBROWIUS 1997, as *M. sp. cf. M. pharensis*). As in the case of the putative Atlantic forms of this species, the confirmation of Pacific *M. pharensis* may hinge on the analysis of characteristics of the soft parts, perhaps including molecular analysis.

New Records: P-595, 1 colony, USNM 99097; P-629, 3 colonies, USNM 99092; P-991, 2 colonies, USNM 99094; P-1191/1273, 1 colony, USNM 99093; P-1303, 3 colonies, USNM 99091; P-1368, 2, UMML; SB-961, 1 colony, UMML; SB-3494, 1 colony, USNM 99100; Alb-2161, 1 colony, USNM 99096; Alb-2320, 1 colony, USNM 99095; Alb-2327, 1 colony, USNM 16140; Alb-2386, 1 colony, USNM 10376; JSL-I-1495, 2, IRCZM; JSL-I-3660, 3 colonies, USNM 94744; DBL-736, Discovery Bay, Jamaica, 70 m, 1 colony, USNM 84239; DBL-995, Discovery Bay, Jamaica, depth unknown, 1 colony, USNM 99099; DBL, Discovery Bay, Great Chute Cave, 37 m, 1 colony, USNM 81358; DBL, Discovery Bay, Jamaica, 1 colony, USNM 85445; off George Town, Grand Cayman Island, 243 m, 1 colony, USNM 99054; Hyatt Expedition to Brazil (Str. Norseman), 21°48'S, 40°03'W, 3 colonies, USNM 5324, 10920, 10921; Carrie Bow Cay, Belize, 18-31 m, 2 colonies, USNM 47621 and 99101; Glover's Reef, Belize, 11 m, 1 colony, USNM 81359; Bay of Pigs, Cuba, 31-46 m, 1 colony, USNM 99098; Imelda, Gigante Point, Baru I., Colombia, 20 m, 1 colony, USNM 94758.

Types: The syntypes of *M. pharensis* appear to be lost (see ZIBROWIUS 1980). Type Locality: Hvarski Kanal (=Chanel de Lesina), Adriatic Sea, 36 m.

Distribution: Western Atlantic: common throughout Caribbean and Bahamas; northeastern and southwestern Gulf of Mexico and Gulf of Campeche; off Brazil to 21°48'S (Fig. 14); 11-333 m. Eastern Atlantic: Mediterranean, Madeira, Canary Islands, Cape Verde Islands, Azores; 6-40 m (ZIBROWIUS 1980). ?Indo-Pacific: Maldives Islands; Philippines; Indonesia; Fiji; Palau (reported herein, USNM 98951); Gulf of California; 5-421 m (CAIRNS & ZIBROWIUS 1997).

Suborder FAVIINA

Superfamily FAVIOIDEA Gregory, 1900

Family RHIZANGIIDAE d'Orbigny, 1851

Genus *Astrangia* Milne Edwards & Haime, 1848

Diagnosis: Colonies formed by extratentacular budding, resulting in encrusting coralla that are united by a sheet of coenosteum (cerioid) or by stolons (reptoid). Distal and axial septal edges dentate. Paliform lobes sometimes present on all but last cycle; columella papillose.

Type Species: *Astrangia michelinii* MILNE EDWARDS & HAIME, 1848c [= *A. poculata* (ELLIS & SOLANDER 1786)], by subsequent designation (MILNE EDWARDS & HAIME 1850a: xlv).

Astrangia solitaria (Lesueur, 1817)

(Figs. 15, 42-49)

Caryophyllia solitaria Lesueur, *1817: 179, pl. 8, figs. 10 a-b; 1821: 273-275, pl. 15, figs. 1 a-c. -Dana, 1846: 383-384.

Astrangia neglecta Duchassaing & Michelotti, v*1860: 79, pl. 10, figs. 3-4.

Astrangia granulata Duchassaing & Michelotti, v*1860: 79, pl. 9, figs. 13-14.

Astrangia solitaria. -Verrill, 1864: 47. -Pourtalès, 1871: 31, 79-80. -Pourtalès in Agassiz,

1880b: pl. 12, figs. 8-12. –Duncan, 1890: 569. –Vaughan, 1901: 299. –Duerden, 1902: 553-555, pl. 5, figs. 43-45, pl. 6, fig. 47, text-figs. 8 a-b (histology). –Branner, 1904: 266 (list). –Vaughan, 1911: 135. –van der Horst, 1927: 159. –Smith, 1948: 91. –Goreau, 1959: 70 (listed). –Zans, 1959: 29, 35 (listed). –Almy & Carrión-Torres, 1963: 155-156, fig. 15a. –Keith & Weber, v.1965: 499 (isotopic composition). –Laborel, 1966: 282 (list). –Goreau & Wells, 1967: 448 (listed). –Pfaff, 1969: 23 (listed). –Keith & Weber, v.1970: 270 (isotopic composition). –Roos, 1971: 74, pl. 36. –Smith, 1971: 87. –Wells, 1972: 2-4, figs. 1-5 (synonymy). –Antonius, 1972: 93 (listed). –Porter, v.1972: 111. –Erhardt, 1974: 406. –Weisbord, 1974: 399-403, pl. 46, fig. 3 (synonymy). –Werding & Erhardt, 1976: 48. –Land, Lang & Barnes, 1977: 170 (isotopic composition). –Cairns, 1978a: 10 (listed). –Chassaing et al., 1978: 74, figs. 47-48. –Colin, 1978: 257 (colour fig.), 262. –Zlatarski, 1982: 130-132, pl. 44, figs. 1-6, pl. 45, figs. 1-8 (synonymy and complete description). –Cairns, 1982b: 290, pl. 128, figs. b-d. –Castañares & Soto, 1982: table 1 (listed). –Wood, 1983: 105 (colour fig.). –Cortés et al., 1984: 58 (listed). –Cortés & Guzman, 1985: 75, fig. 28a. –Hubbard & Wells, v.1986: 128, figs. 6-7. –Bouchon & Laborel, 1986: 204 (listed). –Cairns et al., 1986: 184, pl. 6, fig. 7 (colour). –Estalella, 1986: 20. –Prahl & Erhardt, 1989: 543. –Tunnel, 1989: 307 (listed). –Humann, v.1993: 172-173, 3 colour figs. –Cairns et al. 1994: 9. –Cortés, 1996: 330.

Astrangia solitaria portoricensis Vaughan, v*1901: 298-299, pl. 1, figs. 6a-b.

Astrangia brasiliensis Vaughan, v*1906: 848-849, pl. 77, figs. 3-6. –Moore, 1958: 154. –Smith, 1971: 87.

Astrangia braziliensis. –Laborel, 1971: 200. –Leão, 1986: 33, figs. (p. 34). –Hertzel & Castro, 1994: 60, 2 colour figs.

Astrangia sp. cf. *A. rathbuni*. –Hubbard & Wells, 1986: 128, figs. 8-9. [Not *A. rathbuni* Vaughan, 1906]

Description: Small reptoid colonies are composed of relatively few (usually less than 20) cylindrical corallites budded extratentacularly from narrow, thin stolons. A continuous coenosteum between or among corallites is rarely present, and the stoloniferous connection is usually encrusted or abraded, resulting in the apparent or actual isolation of individual corallites. Most corallites 4-6 mm in GCD and 4-8 mm in height; however, atypically large corallites from Trinidad (e.g., USNM 68466, figured by HUBBARD & WELLS 1986 as *A. cf. rathbuni*) measure up to 9.3 mm in GCD, whereas some populations from Brazil (type series of *A. brasiliensis* Vaughan, 1906) rarely exceed 3.5 mm in GCD. Also, on rare occasions, corallites may be quite tall, some from Jamaica (USNM 80920) up to 22 mm in height (Fig. 42). Corallites bear broad, flat, granular costae, separated from one another by thin, shallow intercostal striae; costae often extend to stolons, but are often covered by epifauna, and, in some cases, concentric bands of thin epitheca encrust the corallites (Fig. 42). Costal granules low and rounded, occurring 3-4 across width of a costa. Corallites usually uniformly light brown or light brown in distal half, grading to white on lower half. Occasionally corallites are entirely white. However, even in uniformly

brown corallites there is usually a lack of pigmentation and thus a white streaking of the septal faces associated with the axial margin of each septal tooth, altogether producing a mottled pattern on well-preserved specimens.

Septa hexamerally arranged in 4 cycles (S1>S2>S3>S4), a full complement of 48 septa rarely achieved, 36 septa (a pair of S4 in each system) being the most common number. S1 exert (up to 1.1 mm), extending about half distance to centre of corallite. Distal and disto-axial margin of S1 bear 3 or 4 coarse, sharp to rounded teeth, which are only observable in well-preserved specimens. Lower axial edge of S1 vertical and smooth (non-dentate), bearing 1-5 slender (cylindrical), vertically-oriented paliform lobes low in fossa. S2 are slightly smaller versions of S1, bearing 2-4 slender paliform lobes, the uppermost P2 rising slightly higher in the fossa than the P1. If flanked by S4, S3 also bear 2-3 slender paliform lobes, the uppermost P3 rising higher in the fossa than the P2 and fusing to its adjacent P2. Axial edges of S4 and unflanked S3 finely dentate. All paliform lobes coarsely granular and vertically oriented, usually easily distinguished from the columellar elements. Fossa deep and steep-sided, containing a papillose columella.

Discussion: *Astrangia solitaria* is one of the most frequently collected and reported azooxanthellate coral in the western Atlantic. An excellent description of the species was given by ZLATARSKI (1982), and a good account of its histology and live observations were given by DUERDEN (1902). Most of the other references reported in the synonymy are simple distributional records. Many, but not all, of the new records of this species are presented below.

Astrangia solitaria is commonly attached to dead coral rubble and the undersides of platy corals. The polyps of this species may be clear, green, or brown. HUMANN (1993) calls it the 'dwarf cup coral'.

New Records: P-435, 10 colonies, USNM 80239; P-712, 1 colony, USNM 80243; P-750, 1 colony, USNM 80244; P-761, 2 colonies, USNM 80245; P-857, 1 colony, USNM 80324; P-1242, 2 colonies, USNM 80330; P-1294, 1 colony, USNM 80332; P-1302, 3 colonies, UMML 8.291; O-4215, 1 colony, USNM 80216; O-4228, 3 colonies, USNM 80217; Chain 35-36, 1 colony, USNM 99110; DBL-1303, Salt Gut Reef, Jamaica, 11 m, 1 colony, USNM 80920; DBL-2516, Rio

Bueno, Jamaica, 20 m, 1 colony, USNM 80877; Saltrou, Haiti, many colonies, USNM 80421-22; Carrie Bow Cay, Belize, many colonies, USNM 47791-99, and 99112; Margarita Island, Venezuela, 1 m, 1 colony, USNM 73922; St. John, Virgin Islands, 1 colony, USNM 96222; Old Providence Island, Nicaragua, 2 colonies, USNM 95519 and 96221; Biscayne Bay, Miami, FL, 1 colony, USNM 80196; Negril Point, Jamaica, 1 colony, USNM 80875; Llandoverly Reef, Jamaica, 2 colonies, USNM 80879-80; Marbella Beach, Cartagena, Colombia, 1 colony, USNM 94761; Jobos Bay, Puerto Rico, 5 m, 1 colony, USNM 80876; Nonsuch Bay, Bermuda, 6 m, 1 colony, USNM 80210; Limón Bay, Panama, 0.3 m, 2 colonies, USNM 80878; Chinchorro, Yucatan, Mexico, 3 colonies, USNM 74224; Chankanaab caves, Cozumel, Mexico, 1 colony, USNM 80366; Tierrabomba Island, Colombia, 5 m, 1 colony, USNM 94760; Cocconut Point, Andros, Bahamas, 10 colonies, USNM 80423; Middle Bight, Andros Island, Bahamas, 1 colony, USNM 80344; Islas Mujeres, Yucatan, Mexico, 9 m, 1 colony, USNM 74227; Pernambuco, Brazil, 1 colony, USNM 10894.

Types: *Caryophyllia solitaria*: deposition unknown. Type Locality: 'Guadeloupe.'

Astrangia neglecta: holotype deposited at the Turin Museum (Coel. 81). Type Locality: St. Thomas, Virgin Islands.

Astrangia granulata: holotype deposited at the Turin Museum (Coel. 83). Type Locality: St. Thomas, Virgin Islands.

Astrangia solitaria portoricensis: holotype and paratype deposited at USNM (36485, 22091, respectively). Type Locality: Fish Hawk stn 134, 'Porto Rico'.

Astrangia brasiliensis: holotype (USNM 10940) and paratypes (USNM 5325, 5326, 10897, 10916 (Fig. 45), 10917, 10918). Type Locality: Periperi, Bahia, Brazil.

Distribution: Widespread from Miami, Florida to southern Bahia, Brazil, including Fernanda de Noronha, all of Caribbean, Bermuda, and southwestern Gulf of Mexico (Fig. 15); 0-51 m.

***Astrangia rathbuni* Vaughan, 1906**

(Figs. 16, 50-54)

Astrangia rathbuni Vaughan, v*1906: 849-850, pl. 78, figs. 1-3. -Squires, v.1963: 10-11, figs. 1-3. -Laborel, 1970: 156; 1971: 200-201, pl. 6, fig. 1, map 7. -Not Avent, King & Gore, 1977: 200 (listed). -Aramayo & Farinati, 1981: 16, pl. 11, fig. 3. -Cairns, 1982a: 10-12, pl. 2, figs. 4-6 (synonymy). -Leão, 1986: 35, 2 figs. (p. 37). -Hertzel & Castro, 1994: 60. -Pires, 1997: 182.

Not *Astrangia* sp. cf. *A. rathbuni*. -Hubbard & Wells, v.1986: 128, figs. 8-9 (= *A. solitaria* Lesueur, 1817).

Description: Small, relatively spherical colonies up to 5 cm in diameter often encrust dead barnacle valves or bivalve shells. Cylindrical corallites bud from a common, continuous basal coenosteum as well as from theca of parent corallites. Corallites closely spaced, the theca of adjacent corallites often fused, resulting in a bushy corallum. Corallites up to 9 mm in height and 6.5 mm in GCD. Costae and costal granulation as in *A. solitaria*. Most corallites examined reddish-brown in colour.

Septa hexamerally arranged in 4 cycles (S1>S2>S3>S4), but only larger corallites have a full fourth cycle. S1 only slightly exsert and quite narrow at calicular edge (about 0.3 mm), the axial edge bearing 5-7 thin, elongate paliform teeth. S1 only independent septa, their lower axial edges merging imperceptibly with columellar elements. S2 similar to S1 but slightly less wide, bearing 8 or 9 thin paliform teeth that also indistinguishably merge with columella. S3 a slightly narrower version of S2, also bearing 8 or 9 paliform teeth, the lower axial edges of each pair of S3 fusing to the lower axial edge of the flanked S2 near the columella. S4 less wide than S3, bear 6-8 thin paliform lobes, the lower axial edges of each pair of S4 merging to its flanked S3 about half distance to columella. Orientation of paliform teeth oblique, slanted into fossa, not vertical, and the diameter of teeth is 0.10-0.15 mm, the same as the columellar elements. Thus there is no demarcation between the lowermost paliform teeth and the columellar papillae. Fossa relatively deep but open, the axial edges of all septa forming a bowl-shaped, rather than a steep-sided, fossa. Columella consists of 10-15 elements.

Discussion: In distinguishing *A. rathbuni* from *A. solitaria* most previous authors have stressed that the former has a thick, continuous basal coenos-

teum, whereas the latter is stoloniferous, often with secondary loss of corallite connection. Whereas this is true, there are many other characters that separate the species. The shape of the septa is quite different between the two species: those of *A. rathbuni* are very slender near the calicular edge, and bear numerous obliquely oriented, slender paliform teeth along the entire axial edge, which are indistinguishable from the columellar elements. The distal septal edges of *A. solitaria* are much wider (up to 1.0 mm) and coarsely dentate, the medial axial edge smooth, and the lower axial edges bearing several vertically oriented paliform lobes that are easily distinguished from the columellar elements. Also, the colony form of *A. rathbuni* is bushy, with more closely spaced corallites, and its colour reddish-brown instead of light brown. Finally, the fossa of *A. rathbuni* is bowl-shaped, whereas that of *A. solitaria* is steep-sided and narrow. Also, although the range of the two species overlaps off the coast of Brazil, *A. rathbuni* occurs much farther south than *A. solitaria* and is not yet known from the Caribbean.

Although LABOREL (1971: 201) reported *A. rathbuni* 'en grande abondance' from 10 stations off Brazil, the species is otherwise rarely collected and nothing is known of its biology. Furthermore, specimens are often collected dead or even fossilized and thus little is known about its depth range; however, LABOREL (1971) reported the species from several to 90 m.

New Records: Beach at Bigisanti, Suriname, (Holocene fossil?), 3 colonies, USNM 80868; 'Brazil', 1 live colony, ex Museu Nacional no. 17, USNM 80484.

Types: The holotypic colony of *Astrangia rathbuni* is deposited at the USNM (10974). Seven more paratypic colonies are also deposited there: USNM 10910, 10971-75, and 5322. The USNM catalog numbers for paratypes listed by LABOREL (1971) are incorrect. **Type Locality:** Paqueta, Rio de Janeiro, Brazil (depth unknown).

Distribution: Suriname (reported herein); coast of South America from southern Bahia, Brazil (HERTZEL & CASTRO 1994) to Mar del Plata, Argentina (SQUIRES 1963) (Fig. 16); several to 90 m.

***Astrangia poculata* (Ellis & Solander, 1786)**

(Figs. 3, 55-56)

Madrepora poculata Ellis & Solander, v*1786: 165.*Astrangia Michelinii* Milne Edwards & Haime, v*1848b: 320, pl. 7, figs. 5, 5a.*Astrangia Danae* Milne Edwards & Haime, *1849b: 180. —Miller, 1995: 91-94, figs. 2-3.*Astrangia astreiformis* Milne Edwards & Haime, *1849b: 181. —Vaughan, v.1901: 300. —, Thiel, v.1941: 15, pl. 1, figs. 5-6.*Astrangia danae* Agassiz, *1850: 68-77, pl. 1, fig. 7.*Astrangia edwardsii* Verrill, *1866: 324.*Astrangia poculata*. —Peters et al., 1988: 234-250, figs. 1-6 (synonymy, description, neotype selection).

Description: Corallum shape quite variable, depending on environment, ranging from low, encrusting, cerioid coralla to plocoid encrusting coralla, to plocoid branching colonies. Low, cerioid coralla usually found in high energy environments, the corallites often being polygonal with common walls, and having very little to no intercorallite coenosteum, and a very shallow fossa (Fig. 55). Plocoid coralla (Fig. 56) bear corallites circular in shape that are raised slightly above the common coenosteum, each corallite separated by 0.5-2.0 mm of intervening coenosteum. Branching coralla are relatively rare and may be the result of living at greater depth (calmer waters), or a response to high sedimentation, algal lesions, or simply the result of a particular substrate type, e.g., encrusting a dead, branching gorgonian axis (see Discussion in PETERS *et al.* 1988). Coralla rarely more than 7 cm in diameter, all corallites connected by a solid, continuous, often thick, common coenosteum. Regardless of colony morphology, corallites range in size from 2 to 7 mm, smaller corallites usually interspersed among larger corallites as well as flanking the edge of the colony, both types the result of extratentacular budding. Corallites that bud in centre of corallum often elevated above others, producing an irregular surface to the colony. Because of crowded nature of corallites and their often cerioid arrangement, costae usually not present; however, in some plocoid coralla faint, granular costae present near calicular edge and sometimes also cover intercorallite coenosteum. Coralla always white.

Septa hexamerally arranged in 4 cycles, the fourth cycle rarely complete, 30-36 being the most common number of septa. All septa strongly dentate, bearing tall, slender, obliquely oriented teeth from distal to lower axial edge. S1 independent; lower axial edges of S2 and S3 fuse to one another

at columella; lower, axial edges of S4 fuse to common S3 about $\frac{2}{3}$ distance to columella. Depth of fossa variable, ranging from shallow to moderately deep. Columella papillose, composed of 10-20 irregular elements that are slightly smaller in diameter than lower septal teeth.

Discussion: Although not discussed in my revision of the deep-water azooxanthellates (CAIRNS 1979), *A. poculata* was thoroughly monographed by PETERS *et al.* (1988), which included an exhaustive synonymy, description, illustrations, and discussions of nomenclatural history, distribution, and the ecology of the species. Neotypes were also designated for *A. poculata* and *A. michelinii*. Therefore, only a short description of the species is given above and the present discussion is brief; however, the records on which the PETERS *et al.* (1988) paper was based are documented for the first time below. The common name of this species is the 'northern star coral' (CAIRNS *et al.* 1991).

Three species of *Astrangia* occur in the western Atlantic, each with a discrete, but slightly overlapping geographic range. *A. poculata* is characteristic of the northern temperate region and is found from Maine to Texas. It is replaced in the tropical western Atlantic by *A. solitaria*, which overlaps the range of *A. poculata* only off southern Florida, and continues to the Abrolhos Islands, Brazil. *A. rathbuni* is the southern temperate species, found as far south as Mar del Plata, but co-exists with *A. solitaria* in the tropics as far north as Suriname. *A. poculata* is morphologically most similar to the allopatric *A. rathbuni*, not the partially sympatric *A. solitaria*, particularly in septal morphology. Nonetheless, *A. poculata* can be distinguished by its colony shape (closely adjacent corallites often arranged in a cerioid or plocoid manner), sometimes even forming branching colonies, its white corallum, and its fewer number of septa at a corresponding GCD.

Astrangia poculata is an extremely hardy coral, capable of living in salinities ranging from 10-40 ppt and at temperatures of -1.5° to 22°C (CUMMINGS 1976) as well as being able to survive under low oxygen conditions. It is also one of the few coral species that can exist with or without zooxanthellae, the preference for one mode over the other being caused by genetics or environmental factors, such as temperature, light intensity, and/or sedimentation rate (see PETERS *et al.* 1988 for review).

New Records: G-304, 1, USNM 80517; G-849, 1, USNM 80520; G-1002, 1, USNM 78507; G-1003, 2, USNM 80343; SB-1634, 1, USNM 95517; SB-3266, 1,

USNM 80232; SB-3278, 1, USNM 95520; SB-4428, 1, USNM 95518; Alb-2280, 1, USNM 80169; Alb-2285, 1, USNM 19082; Pelican 177-10, 1, USNM 79714; Pelican 180-5, 1, USNM 78509; Pelican 209-5, 2, USNM 96224; FH-770, 10, USNM 19189; FH-775, 2, USNM 3793; FH-842, 3, USNM 81928; FH-957, 4, USNM 13227; FH-958, 6, USNM 13226; FH-1237, 2, USNM 16242; FH-1686, 2, USNM 9286; FH-8339, 10, USNM 80486; FH-8371, 3, USNM 80177; FH-8499, 5, USNM 80178; FH-8592, 50, USNM 80179 and 80487; FH-8595, over 100, USNM 80180 and 80488 and 99173; FH-8596, 1, USNM 80181; FH-8602, 3, USNM 80182; FH-8826, 2, USNM 80183; FH-8827, 2, USNM 80184; Gos-1456, 1, USNM 79705; Gos-1483, 1, USNM 79702; Gos-1494, 2, USNM 79715; Gos-1503, 1, USNM 99115; Gos-1504, 1, USNM 79698; Gos-1507, 2, USNM 79711; Gos-1508, 1, USNM 79712; Gos-1509, 5, USNM 99116; Gos-1510, 1, USNM 79699; Gos-1514, 4, USNM 79710; Gos-1521, 2, USNM 79708; Gos-1535, 1, USNM 79716; Gos-1539, 1, USNM 79696; Gos-1541, 1, USNM 00117; Gos-1620, 1, USNM 79707; Gos-1624, 2, USNM 79709; Gos-1647, 4, USNM 79713; Gos-1686, 1, USNM 80414; Gos-1688, 1, USNM 99113; Gos-1689, 1, USNM 79703; Gos-1769, 1, USNM 79701; Gos-2027, 1, USNM 99114; Vineyard Sound, MA, 20, USNM 24889, 29527, and 80425; Buzzard's Bay, MA, 3, USNM 4127, 7052, and 80482; Woods Hole, MA, 25, USNM 6856, 31643, and 81094; Newport, RI, 6, USNM 80186; Fort Adams, RI, 2, USNM 36521; Narragansett Bay, RI, 5, USNM 3784; Newport Harbor, RI, 1, USNM 4039; Stonington, CT, 17-20 m, 7, USNM 19179 and 24823; Noank, CT, 10, USNM 25167; Fisher's Island, NY, 1, USNM 36510; Atlantic City, NJ, 1, USNM 82185; Cape May, NJ, 1, USNM 80424; Cape Henlopen, DE, 2, USNM 95516; Plum Point, MD, 1, USNM 80418; Smith's Island, VA, 1, USNM 36483; Beaufort, NC, 11, USNM 80806 and 80864; Myrtle Beach, SC, 1, USNM 80195; St. Augustine, FL, 1, USNM 79695; Western Dry Rocks, Dry Tortugas, FL, 1, USNM 78508; Loggerhead Key, Dry Tortugas, FL, 1, USNM 99381; Carrabelle, St. George Sound, FL, 1, USNM 80201; St. James Cut, FL, 1, USNM 80481; Punta Rasa, Charlotte Harbor, FL, 10, USNM 6944, 7410, and 7411; Marco, FL, 1, USNM 7403; Pass-a-Grille, FL, 1, USNM 36541; Pensacola, FL, 1, USNM 19194; Cape Romano, FL, 2, USNM 16152; Talbot Island, FL, 16 m, 1, USNM 80365; Dixon Bay, Panacea, FL, 3 m, 3, USNM 45680; Beach Ile Derniere, LA, 1, USNM 80419; Charland Pass, LA, 1, USNM 80187; Aransas Pass, TX, 3, USNM M547381; Port Aransas, TX, 1, USNM 80862; Rockport, TX, 1, USNM 36520; Galveston, TX, 1, USNM 36519.

Types: See PETERS *et al.* (1988).

Distribution: Entire eastern and southern coasts of U. S. from Maine to Texas, but not southern tip of Florida; ?Puerto Rico (VAUGHAN 1901); ?Martinique (THIEL 1941) (Fig. 3); 0-263 m (see PETERS *et al.* 1988). The specimen from Culebra, Puerto Rico reported by VAUGHAN (1901) was re-examined (USNM 45598) and found to be a typical plocoid specimen of *A. poculata*; however, it is difficult to understand this apparent disjunct distribution given the relatively well-known range of *Astrangia* in the western Atlantic. Likewise, the specimen from Martinique reported by THIEL (1941) was also examined (Institut Royal des Sciences Naturelles de Belgique, Coel. 10910) and also appears to be typical *A. poculata*. Elsewhere: ?Gulf of Guinea (CHEVALIER 1966).

A. poculata is the only coral likely to be encountered by swimming, snorkeling, or beach combing north of Onslow Bay, North Carolina.

Family OCULINIDAE Gray, 1900

Genus *Madrepora* Linnaeus, 1758

Diagnosis: Colonies formed by extratentacular, sympodial branching. Coenosteum dense; theca faintly costate, striate, or porcellaneous. Usually only 3 cycles of septa; paliform lobes may be present on first septal cycle. Columella rudimentary or absent.

Type Species: *Madrepora oculata* Linnaeus, 1758, by subsequent designation (Verrill, 1901).

Madrepora carolina (Pourtalès, 1871)

Lophohelia carolina Pourtalès, v*1871: 24, 26, pl. 1, figs. 6-7.

Oculina disticha.—Ludwick & Walton, 1957: 2081, fig. 13C2. [Not *O. disticha* Pourtalès, 1868]

Madrepora carolina.—Cairns, 1979: 42-43, pl. 4, figs. 1-4, Map 5 (synonymy and description).

—Fricke & Meischner, 1985: 183, 184, figs. 11d, 12b. —Rezak *et al.*, v.1985: 225 (listed: sm 118, Diaphus Bank). —Messing, 1987: 12, fig. —Cairns *et al.*, 1991: 46 (listed). —Cairns *et al.*, 1994: 4 (listed).

Diagnosis: Large (up to 36 cm in height and 3 cm in basal branch diameter), bushy or flabellate coralla formed from sympodially budded

corallites; branch anastomosis extremely rare. Corallites 3.5-5.5 mm in diameter, flared distally, projecting well above branch coenosteum. In large uniplanar coralla, corallites tend to occur on only one side of flabellum. Coenosteum white, finely granular, and faintly striate; ridged C1-2 present near calicular edge. Septa hexamerally arranged in 3 cycles (S1>S2>S3), the S1 highly exsert and dimorphic in size, *i.e.*, two opposing pairs of S1 are wider than the remaining two S1, their lower axial edges almost touching across the fossa. S3 rudimentary. Fossa deep; no columella.

Discussion: In addition to augmenting many of the localities mapped by CAIRNS (1979: map 5) for this species, the records reported below also include range extensions for southwestern Louisiana, Roatán, Tobago and Bermuda, although specimens from the last locality had been previously reported by FRICKE & MEISCHNER (1985). Despite numerous collections, *M. carolina* is not known from the Lesser Antilles or the northern coast of South America, except for Tobago. According to a museum label written by R. H. HUBBARD (USNM 80977), the colour of the polyps of a specimen collected from Tobago is pink.

Another species of *Madrepora*, *M. oculata* L., 1758, was reported from the western Atlantic from 144-1391 m (CAIRNS 1979). The shallow end of that bathymetric range was based on a specimen from Gosnold-1750 (USNM 62046), consisting of a small, very worn branch fragment of three corallites. This record is herein reidentified as *Enallopsammia profunda*, which changes the known western Atlantic depth range of *M. oculata* to 300-1391 m, and therefore it is not further discussed in this paper. It does, however, produce an unusually shallow range for *Enallopsammia profunda*, otherwise known from 403-1748 m (CAIRNS 1979). It is suggested that this anomaly is due to a station error, the specimen probably being a remnant from Gosnold-1748, a station made at 524 m earlier on the same day, and from which a large amount of *E. profunda* was collected.

This species has been given the common name of 'Pourtales' fan coral' by MESSING (1987).

New Records: BLM, SOFLA-29, 1 branch, USNM 72595; BLM, SOFLA-35, 12 coralla, USNM 72586, 72596-98; BLM, SOFLA-36, 10 coralla, USNM 72589, 72599, 75034, 75685, 76445; BLM, SOFLA-38, 72593, 72600, 84675; JSL-I-1354, 2 branches, USNM 93232; JSL-I-1355, 1 branch, USNM 73193; JSL-I-1360, 1

branch, USNM 73194; JSL-I-2582, 7 coralla, USNM 87783; JSL-I-2585, 4 colonies, USNM 87787; JSL-I-2586, 10+ branches, USNM 87791; JSL-I-2591, 4 branches, USNM 89354; Gos-33, Happy Grove, Portland Point, Jamaica, 100-240 m, 10+ branches, USNM 80976; Alvin-764, F17-F18, 1 large colony and many branches, USNM 49114, 49122; Circé 27-2, 1 branch, USNM 75655, Circé 28-1, 4 fragments, USNM 75657; Circé 29, 1 fragment, USNM 75662; Circé 31-2, 1 branch, USNM 75665; CSA Pinnacle site 9, 1 colony, CSA; BLM, LMRS, OS-05, several branches, USNM 72390; EJ81-21, 1, FSBC I; EJ81-22, 1, FSBC I; off George Town, Grand Cayman, 243 m, 2 coralla, USNM 75187; USGS VIII-A-1B, 2 fragments, USNM 62072; USGS VIII-A-2, 4 fragments, USNM 62073; Ocho Rios, Jamaica, depth unknown, 1 corallum, USNM 80974; Charlottesville, Tobago, 91-152 m, 1 colony, USNM 80977; off Varadero Beach, Cuba, 335 m, 1 colony, USNM 62079; 33°51'N, 76°31'W, 86-106 m, 2 colonies, USNM 80975; Castle Rocks, Bermuda, 250 m, 10 branches, USNM 48033; north side of Roatán, Honduras, 84 m, 1 branch, USNM 99118.

Types: See CAIRNS (1979).

Distribution: Bermuda; east coast of US from North Carolina (33°56'N, 76°27'W) through western Gulf of Mexico; Bahamas; Greater Antilles; northern Caribbean; Tobago; St. Peter and St. Paul Rocks; 53-801 m, although most commonly collected at depths of 100-300 m (CAIRNS 1979: map 5).

Genus *Oculina* Lamarck, 1816

Diagnosis: Colonies formed by extratentacular, sympodial branching; axial corallites absent. Coenosteum dense, costate. Usually 3 cycles of septa, with paliform lobes before first 2 cycles. Columella papillose.

Type Species: *Madrepora virginea* Lamarck, 1816 (= *Oculina diffusa* Lamarck, 1816), by subsequent designation (MILNE EDWARDS & HAIME 1850a: xix).

***Oculina tenella* Pourtalès, 1871**

(Figs. 4, 57-60)

Oculina tenella Pourtalès, v*1871: 23, pl. 5, figs. 11-12; v.1878: 204. –Cairns, 1977b: 5, 18 (listed); 1978a: 10 (listed); 1979: 207 (listed). –Cairns et al., 1991: 46 (common name). –Hummann, v.1993: 100-101, colour fig.

Lophohelia tenuis. –Thiel, 1941: 13-14, pl. 1, fig. 4. [Not *L. tenuis* Moseley, 1881]

Description: Corallum small and delicate; irregularly branched in three dimensions, rarely with branch anastomosis. One of largest colonies (USNM 93926) only 5 cm in height and 3 mm in basal branch diameter. Branch diameter ranges from 2-3 mm and does not significantly increase with proximity to base; branches usually equal or less than diameter of corallites they support. Most specimens reported below are broken, detached branches; attached colonies rarely collected. Coralla appear to attach to loose, unconsolidated sediment from which they easily detach. Corallites bud in alternate, opposite fashion (sympodially) and are well spaced, such that the distance between adjacent calicular centres is 3.5-5.5 mm, or approximately 1.0-1.5 CD apart. Distalmost 5-7 corallites directed anterolaterally, but older, more proximal corallites oriented perpendicular to branch and usually protuberant, projecting as much as 3.1 mm above branch surface, a height that is often greater than the diameter of the supporting branch. Corallites 1.8-2.7 mm in GCD, only slightly elliptical. C1-3 slightly ridged near calicular edge; otherwise theca uniformly granular, the small, conical, blunt-tipped coenosteal spines up to 70µm in height and 75µm in basal diameter. Corallum white.

Septa hexamerally arranged in 3 cycles (S1>S2>S3). S1 moderately exsert (about 0.4 mm), having a smooth, vertical axial edge and a small paliform lobe. S2 only slightly less wide and less exsert than S1, also having an axial paliform lobe that rises slightly higher in the fossa than the P1 and having a broader peripheral edge. S3 slightly less exsert and less wide than the S2, their lower axial edges sometimes fusing to their adjacent S2. P1-2 form an elliptical paliform crown; faces of paliform lobes bear tall spines. Fossa of moderate depth, containing a rudimentary papillose columella.

Discussion: *Oculina tenella* differs from *O. diffusa* Lamarck, 1816, in having a smaller, more delicate corallum and more sparsely budded corallites. Coralla of *O. diffusa* form robust colonies up to 35 cm in diameter, with in-

creasingly large basal branches toward the attachment site, and their coralites bud from all 4 edges of a distal branch, producing a more crowded arrangement. Furthermore, *O. tenella* is assumed to be azooxanthellate, whereas *O. diffusa* is primarily zooxanthellate; however, it is quite possible that *O. tenella* may occur in the zooxanthellate form as well, specimens from the shallower depth range of 25-159 m being well within the range of a zooxanthellate species. *O. diffusa* is rarely known from deeper than 15 m (GOREAU & WELLS 1967; HUMANN 1993); however, HUMANN (1993: 100, 101) reported an anomalously azooxanthellate specimen (Fig. 61) from 25 m.

Another species, *O. varicosa* Leseuer, 1821, is known from the east coast of Florida (5-128 m), and, like *O. diffusa*, is a facultative zooxanthellate species, *i.e.*, shallow water coralla have zooxanthellae, whereas deep-water coralla do not (REED 1980). In deep water this species forms colonies several meters in height, which often coalesce to form extensive banks or thickets. REED (1982) found that the growth rate of the larger, azooxanthellate, deep-water form was higher than that of the shallow-water, zooxanthellate form. The highly variable *O. varicosa* is described, illustrated, and discussed by REED (1980, 1982) and HUMANN (1993), but not further discussed in this report. Four western Atlantic Scleractinia are thus known to be facultative zooxanthellates: *Astrangia poculata*, *Madracis pharensis*, *Oculina varicosa*, and *O. diffusa*.

Another species similar to *O. varicosa*, *O. valenciennesi* Milne Edwards & Haime, 1850b, known primarily from Bermuda but also reported from Jamaica (GOREAU & WELLS 1967) and Curaçao (ROOS 1971), was listed as an azooxanthellate species by WELLS & LANG (1973). But, because the taxonomy and ecological status of this species are so poorly known it is not considered as being azooxanthellate and thus is not treated in this account. Indeed, the taxonomy, nomenclature, and range of variation of the western Atlantic *Oculina* are complex and beyond the scope of this study.

According to HUMANN (1993:100), *O. tenella* occurs in areas of "rocky rubble, shell hash under ledge overhangs and shipwrecks" and is cream to white in colour. Its common name is the 'delicate ivory bush coral' (CAIRNS *et al.* 1991). Little more is known about the biology of this Florida species.

New Records: Alb-2374, 1 branch, USNM 10343; Alb-2405, 4 branches, USNM 16070; Alb-2406, 100+ branches, USNM 61999; Alb-2407, 7 branches,

USNM 10466; Alb-2412, 2 branches, USNM 10482; Alb-2414, 6 branches, USNM 6191; SB-48, 10 fragments, USNM 62001; SB-2412, 1 branch, USNM 62000; G-1086, 1 branch, USNM 61998; BLM, SOFLA-3, 7 branches, USNM 72057, 72078, 72080; BLM, SOFLA-9, 25 branches, USNM 72058-61, 72079-81, 72594; BLM, SOFLA-17, 15 branches, USNM 72062-65, 72072-74; BLM, SOFLA-27, 16 branches, USNM 72066-69, 72076-77; Eastward, 27°51'N, 80°00'W, 83-93 m, 1 branch, USNM 85453; Hernan Cortez stn D, 1, FSBC I 33149; Hernan Cortez stn L, 12 branches: 2 (FSBC I 33150, 33151), 10 (USNM 84359-61); EJ81-8, 1, FSBC I; 29°56'N, 86°06'W, 37-38 m, 2 branches, USNM 84298; 29°57'N, 87°14'W, 37 m, 4 branches, USNM 93926; 25°16'N, 84°15'W, 159-166 m, 1 branch, USNM 83455; Dry Tortugas, FL, 2 branches, USNM 99172; 26°05'N, 83°46.1'W, 64 m, 3 branches, USNM 45356; off Sombrero Light, FL, 74-210 m, 1 branch, USNM 99171; off Alligator Reef, FL, 42 m, 2 branches, USNM 99119; Cedar Keys, FL, 55 m, 1 branch, USNM 62002.

Types: Five syntype branches, two of them numbered 5209, are deposited at the MCZ. Two more syntype branches are deposited at the BM (91.9.28.2 and 91.2.4.7). Type Locality: Bibb station 85 or 86: off Dry Tortugas, FL, 66 m.

Distribution: Known only from the continental shelf of Florida, from off Sebastian on the east coast to off Pensacola on the Gulf coast (Fig. 4); 25-159 m, but most commonly collected between 40 and 60 m.

Suborder **CARYOPHYLLIINA**

Superfamily **CARYOPHYLLIOIDEA** Dana, 1846

Family **CARYOPHYLLIIDAE** Dana, 1846

Genus **Caryophyllia** Lamarck, 1801

Diagnosis: Corallum solitary; attached (subcylindrical, ceratoid, trochoid) or free (cornute). Calice circular to compressed; thecal edge spines present in one subgenus. Septotheca usually costate and granular. Septal

symmetry variable, but hexamerall symmetry with 4 cycle of septa is most common. One crown on pali present before penultimate or antepenultimate (rarely) septal cycle. Columella fascicular.

Type Species: *Madrepora cyathus* Ellis & Solander, 1786, by subsequent designation (BRODERIP in BECHE 1828).

***Caryophyllia berteriana* Duchassaing, 1850**

(Figs. 62-63)

Caryophyllia berteriana Duchassaing, *1850: 15. –Cairns, 1979: 47-49, pl. 6, figs. 4-8, pl. 7, fig. 1, Map 7 (description and synonymy; but not G-311 and G-711, =*C. polygona*). –Viada & Cairns, 1987: 132. –Cairns et al., 1991: 47 (listed); 1994: 4 (listed). –Stolarski, v.1995: 30-32, figs. 8A-H (microstructure).

Caryophyllia formosa Pourtalès, v*1867: 113.

Diagnosis: Corallum ceratoid and usually straight, narrowing to a robust pedicel (PD:GCD = 0.3-0.5), and firmly attached by a thin, encrusting base. Largest corallum (USNM 81012) 25.5 mm in GCD and 36 mm in height. C1-3 usually slightly ridged near calice or theca may be uniformly granular. Septa hexamerally arranged in 4 cycles (S1-2>S3>S4, 48 septa) or sometimes with 2-4 additional half-systems, resulting in 56 septa and 14 pali, or 64 septa and 16 pali (see Discussion). Axial edges of S1-2 and S4 moderately sinuous, whereas those of S3 highly sinuous. Pali (P3) wide and lamellar, with only slightly sinuous axial and peripheral edges, forming an elliptical palar crown surrounding a fascicular columella. Columella composed of 2-17 twisted elements arranged linearly or in an elliptical field.

Discussion: POURTALÈS (1867) described *C. formosa* but later (POURTALÈS 1880a) synonymised his species with *C. berteriana*; however, the taxon he described as *C. formosa* does differ from typical *C. berteriana* in several fairly consistent characters. *C. formosa* invariably has only 48 septa and 12 pali, whereas *C. berteriana* has 48-64 septa and 12-16 pali, most often 56 septa and 14 pali. The calicular edge of *C. formosa* is not lanced, whereas that of *C. berteriana* is prominently lanced with highly exsert S1-3. The columella of *C. formosa* is composed of discrete, slender, tightly twisted elements, compared to broader and looser, fused elements of *C. berteriana*. And finally, the theca of *C. formosa* is usually uniformly granular, that of *C.*

berteriana costate near the calice. Both forms occur in the same geographic areas, but in only one case (SB-3472) were they both collected at the same station; forma *formosa* is often found in deeper water, usually below 500 m. Despite the variation described above, *C. formosa* is considered to represent a form of *C. berteriana*. Previously reported records (CAIRNS 1979) of forma *formosa* include: G-23, G-261, G-663, G-1329, P-209, P-904, P-944, SB-3472, Combat-447, Alb-2152, Alb-2153, and (VIADA & CAIRNS 1987) are LGL WC7 and 9.

The additional records reported below slightly extend the westernmost range to '28 Fathom Bank', Texas, but otherwise do not significantly alter the known geographic or bathymetric range of the species as summarized by CAIRNS (1979) and VIADA & CAIRNS (1987).

New Records: Typical form: O-24237, 4, IRCZM 12-112; B-A DS4, 1, USNM 80819; BA-DS10, 3, USNM 80820; BLM, SOFLA-32, 4, USNM 71966-67, 72028; BLM, SOFLA-35, 3, USNM 71965, 71968; JSL-II-1720, 2, USNM 94725; CS "Electra", south of Barbados, depth unknown, 1, USNM 81012; 25°16', 84°15'W, 137-166m, 6, USNM 83433, 83447, 83453; off Boca Grande, FL, 176-179 m, 5, USNM 45317-19; off Barbados, 220-250 m, 2, USNM 81011; 27°53.2'N, 93°23.9'W, 99 m, 1, USNM 49032.- **Forma formosa:** JSL-I-2064, 1, USNM 91373; LGL WC6, 8, USNM 76831.

Types: See CAIRNS (1979).

Distribution: Common throughout Caribbean and Bahamas, south to Suriname; eastern and northern Gulf of Mexico (CAIRNS 1979: map 7). Northernmost Atlantic record 27°30'N (G-663); westernmost Gulf record off "28 Fathom Bank," TX; off southern coast of Caribbean only off Aruba; 99-1033 m.

***Caryophyllia horologium* Cairns, 1977**

(Figs. 16, 64-65)

Caryophyllia horologium Cairns, *1977b: 10-11, pl. 1, figs. 4-6, 9 (description); 1978a: 10 (listed); 1979: 207 (listed); Cairns et al., 1991: 47 (listed). -Cairns et al., 1994: 4 (listed).

Diagnosis: Corallum ceratoid and usually straight to slightly curved proximally, narrowing to a slender pedicel (PD:GCD = 0.08-0.23), which is usually not attached to substrate. Largest corallum (holotype) 14.6 mm in GCD and 18.8 mm in height. C1-3 usually sharply ridged from calice to pedicel; coarse granules cover intercostal theca. Calicular margin lancetted. Septa hexamerally arranged in 4 cycles (S1-2>S3>S4, 48 septa). Axial edges of S1-2 and S4 moderately sinuous, whereas those of S3 highly sinuous. Pali (P3) wide and lamellar, equal to or wider than S3, and separated from S3 by a broad notch, the axial palar edge vertical, but the peripheral palar edge sloping away from its adjacent septum. Fossa shallow, containing a fascicular columella composed of 2-7 strongly fused twisted elements.

Discussion: *Caryophyllia horologium* is very similar to *C. berteriana*, and may represent its sister shallow-water analog or be a subspecies of *C. berteriana*; however, there is a slight overlap in the bathymetric ranges of the two species and both have been collected together at 2 stations (i.e., BLM, SOFLA-32 and 26°16.5'N, 84°03.5'W, 137-141 m). In general, *C. horologium* is found in shallower water than *C. berteriana*, but geographically their ranges completely overlap. *C. horologium* differs from *C. berteriana* in having a smaller corallum; a smaller pedicel, which is usually unattached; more sharply ridged costae; a shallower fossa; consistently 48 septa; and a broader notch between S3 and P3. This represents the only substantive report of the species subsequent to its original description and almost doubles its known bathymetric range.

New Records: BLM, SOFLA-32, 4, USNM 71970, 80100; BLM, SOFLA-36, 12+, USNM 71971, 71969; USGS VIII-A-2, 175 m, 1, USNM 80845 (record implied by CAIRNS 1978 for area 3); 28°11.2'N, 84°52.2'W, 1, USNM 45376; 27°18.4'N, 84°17.8'W, 102 m, 1, USNM 45351; 26°16.5'N, 84°03.5'W, 137-141 m, 5, USNM 83432; 25°00'N, 84°00'W, 126 m, 5, USNM 80202.

Types: See CAIRNS (1977b).

Distribution: Off western coast of Florida and near Alderdice Bank, southwestern LA; 55-175 m (Fig. 16).

Caryophyllia crypta, new species

(Figs. 16, 66-68)

Caryophyllia sp. cf. *C. antillarum*. –Goreau & Wells, v.1967: 449 (listed). –Wells & Lang, v.1973: 58 (listed). –Wells, 1973: 60. –Land, Lang & Barnes, 1977: 170 (isotopic analysis). [Not *C. antillarum* Pourtalès, 1874]

Caryophyllia C, new species Cairns, 1976: 64-66, pl. 8, figs. 3-7.

Caryophyllia smithii. –Zlatarski, 1982: 258-259 (in part: pl. 111, figs. 1-6, text-figs. 60-61). –Estrella, 1986: 20. [Not *C. smithii* Broderip in Beche, 1828]

Caryophyllia sp. Fenner, v.1993a: 14 (listed: USNM 81283).

Description: Corallum ceratoid, straight to irregularly bent, narrowing to a slender (PD:GCD = 0.2-0.5), monocyclic base. Largest specimen 11.5 x 10.3 mm in CD and 29 mm in height (SB-3494); however, most specimens in type series considerably smaller, the holotype measuring 7.6 x 6.6 mm in CD and 12.7 mm in height. C1-2 usually slightly ridged near calice; otherwise, costae barely distinguishable, the theca lacking intercostal striae and covered with low, glisteny granules. Theca and peripheral septa usually pigmented a light brown, the axial portions of the septa, pali, and columella being white.

Septa hexamerally arranged in 4 cycles. A specimen of GCD 1.6-3.0 mm has only 3 cycles of 24 septa and 6 pali, whereas the full fourth cycle of 48 septa and 12 pali is attained at a GCD of about 5.0 mm. Large coralla sometimes have several pairs of S5 (up to 50 septa and 14 pali), and coralla between 3 and 5 mm have a variable number of septa and pali. S1 highly exsert (1.6-1.8 mm), extend about $\frac{2}{3}$ distance to columella, and have slightly sinuous axial edges. S2 less exsert (about 1.2 mm), about $\frac{1}{2}$ width of S1, and have similarly shaped axial edges. S3 least exsert septa (about 0.5 mm), $\frac{1}{3}$ width of S2, and have moderately sinuous axial edges. S4 about 1 mm exsert, each pair flanking an S1 fusing to that S1, which produces a lancetted calicular edge. S4 dimorphic in width, those adjacent to S1 usually slightly wider than S3, those adjacent to S2 being equal or slightly less wide than S3. Fossa deep, containing a well-defined, elliptical crown of broad (1.1-1.3 mm) and robust P3, the P3 being thicker than the septa and sometimes wider than their corresponding S3. Upper edges of pali terminate well below calicular edge. Columella deeply recessed in fossa, consisting of 1-6 slender (0.4-0.5 mm), tightly twisted elements that are usually linearly arranged.

Discussion: Among the approximately 56 valid Recent species of *Caryophyllia*, *C. crypta* appears to be morphologically closest to *C. crosnieri* Cairns & Zibrowius, 1997, a species known from the Indo-West Pacific at depths of 366-600 m. Among the species having an attached corallum with 4 cycles of septa these are the only 2 species to have hexamerally arranged septa in which the S1 are wider and more exsert than the S2, and S4 that are equal to or wider than the S3. They are also similar in corallum colour and size and in having a deep fossa, but *C. crypta* differs in having less exsert septa, a shallower fossa, and much wider pali.

Within the Atlantic *C. crypta* is most similar to *C. calveri* Duncan, 1873, known from the Mediterranean and northeast Atlantic at depths of 130-1050 m (ZIBROWIUS 1980). *C. crypta* differs in having a much deeper fossa (the distal edges of the pali and even the columellar elements of *C. calveri* often rise above the calicular edge), wider pali, S1 that are wider and more exsert than the S2, and fewer columellar elements.

Caryophyllia crypta is often found on the undersides of living and dead, platy reef corals, such as *Agaricia* and *Mycetophyllia*.

Etymology: The species name *crypta* (Greek *kryptos*, hidden, secret) alludes to the cryptic habit of this small species.

Types: G-703, holotype (USNM 46861) and 3 paratypes (USNM46862); P-405, 1 paratype, USNM 62526; P-439, 1 paratype, USNM 46054; SB-3494, 3 paratypes, USNM 99177; Eastward-30176, 1 paratype, USNM 99175; Eastward-30178, 12 paratypes, USNM 99183; DBL-993, Discovery Bay, Jamaica, 61 m, 1 paratype, USNM 99176; DBL-1198, Discovery Bay, Jamaica, 76 m, 1 paratype, USNM 46863; DBL-1199, Cardiff Hall, Jamaica, 40 m, 1 paratype, UMML 8.298; DBL-1200, Maria Buena Bay, Jamaica, 40 m, 1 paratype, USNM 81271; DBL-1311, Discovery Bay, Jamaica, 61 m, 3 paratypes, USNM 99178; DBL-1429, Discovery Bay, Jamaica, 73 m, 2 paratypes, USNM 99179; DBL-1472, Discovery Bay, Jamaica, 1 paratype, USNM 99180; DBL-1474, Discovery Bay, Jamaica, 1 paratype, USNM 99181; DBL, Discovery Bay, Jamaica, 40 m, 1 paratype, USNM 46864; Carrie Bow Cay, Belize, sand trough, 1 paratype, USNM 47809; Carrie Bow Cay, Belize, 14 m, 4 paratypes, USNM 99182; Carrie Bow Cay, Belize, 18-30 m, 2 paratypes, USNM 99184; Little Cayman, 1 paratype, USNM 81283; north of Georgetown, Grand Cayman, 12 m, 6 paratypes, USNM 99185; Church Hill Beach, Lucaya, Bahamas, 16 m, 1 paratype, USNM 46053;

Freeport, Grand Bahama, 35-60 m, 6 paratypes, USNM 99186; Santa Marta, Colombia, 17 m, 4 paratypes, USNM 99187; Salt River Canyon, St. Croix, VI, 15-21 m, 3 paratypes, USNM 99188; south of Bonaire, 24 m, 1 nontype, UMML 8.359. Type Locality: 26°29'N, 78°40'W (Northwest Providence Channel, Bahamas), 27-165 m.

Distribution: Bahamas and Caribbean (Fig. 16), but rare in Lesser Antilles; 12-183 m (the deeper records of 500-600 m from the Eastward stations are based on dead specimens).

***Caryophyllia antillarum* Pourtalès, 1874**

(Fig. 70)

Caryophyllia antillarum Pourtalès, v*1874: 34, pl. 6, figs. 3-4. -Cairns, 1979: 52-53, pl. 5, figs. 8-10, map 9 (description, synonymy, and lectotype designation).

Diagnosis: Corallum ceratoid, straight, and firmly attached through a robust pedicel about half the CD. Lectotype 9.0 x 8.6 mm in CD and 11.9 mm in height. Theca covered with porcelaneous granules; costae usually inconspicuous; corallum white. Septa decamerally arranged in 3 cycles: 10:10:20 (=40 septa), septa of each cycle progressively narrower and less exsert; however, tertiaries only slightly narrower than secondaries. Axial edges of secondaries quite sinuous, each secondary septum bearing a bluntly tipped palus that forms an elliptical crown encircling the fascicular columella. Peripheral edges of pali overlap axial edges of primary septa. Fossa shallow; columella composed of 3-10 slender, tightly twisted elements, usually arranged in 2 parallel rows.

Discussion: The lectotype of *C. antillarum* (Fig. 70) is atypical in that it bears a pair of quaternary septa and a palus before the S3 that the 2 quaternaries flank, resulting in 42 septa and 11 pali.

Caryophyllia antillarum is one of 2 western Atlantic species having decamerally arranged septa, the other being *C. zopyros*. *C. antillarum* is distinguished by having a shallower fossa, a porcelaneous-granular theca (vs a non-porcelaneous, granular costate theca), and thicker P3, the peripheral edges of which overlap with the axial edges of the primary septa. The pe-

ripheral palar edges of *C. zopyros* do not overlap with the axial edges of any septa. A key to the western Atlantic species of *Caryophyllia* is given by CAIRNS (1979).

Only one new record from near Navassa Island is known for this species since it was redescribed by CAIRNS (1979). *C. antillarum* is more characteristic of slope depths (150-730 m), but is included in this report because POURTALÈS (1874, 1880a) recorded several specimens from 3 localities at depths slightly shallower than 200 m: BL-273 (188 m), BL-300 (150 m), and the syntype series (183 m). The depth record of 1000 m given by CAIRNS (1979) was based on a specimen from SME-1776, an identification that was questioned at that time and is excluded now.

New Record: O-22084, 1, IRCZM 12:122.

Types: See CAIRNS (1979).

Distribution: Antillean distribution (CAIRNS 1979: map 9), extending from Grand Bahama Island to the Grenadine Islands; 150-730 m.

***Caryophyllia zopyros* Cairns, 1979**

Caryophyllia zopyros Cairns, *1979: 63-64, pl. 10, figs. 1-4, map 13.

Diagnosis: Corallum ceratoid to trochoid, straight, and firmly attached through a robust pedicel about half the CD in diameter. Coralla up to 10.5 mm in GCD and 15-17 mm in height. Broad, flat to slightly convex, non-porcelaneous granular costae present; upper corallum light brown, lower half white. Septa decamerally arranged in 3 cycles: 10:10:20 (=40 septa), septa of each cycle progressively narrower and less exsert. Axial edges of secondaries quite sinuous, each secondary bearing a narrow, lanceolate palus that together form an elliptical crown encircling the fascicular columella. Peripheral edges of pali usually do not overlap the axial edges of the primary septa and thus form a well-defined palar ring. Fossa of moderate depth; columella composed of 4 or 5 slender, tightly twisted elements.

Discussion: *Caryophyllia zopyros* is compared to the other decamerally

symmetrical *Caryophyllia* in the account of *C. antillarum*. *C. zopyros* is rarely collected and nothing is known of its biology. Although it does not have a previously assigned common name, the Greek root of the name would suggest 'the fireworks coral'.

No new records or literature citations are known for this species since its original description. *C. zopyros* is more characteristic of slope depths (73-618 m), but is included in this report based on two records from 73 m (DBL-1429, USNM 46056) and 188 m (BL-273, MCZ).

New Records: None.

Types: See CAIRNS (1979).

Distribution: Antillean distribution (CAIRNS 1979: map 13), extending from northwestern Cuba to the Grenadine Islands; 73-618 m.

***Caryophyllia barbadensis* Cairns, 1979**

Caryophyllia barbadensis Cairns, *1979: 60-61, pl. 8, figs. 7-9, pl. 9, fig. 1, Map 11 (description and illustrations). -Zibrowius, 1988: 135 (listed). -Cairns et al., 1994: 8.

Diagnosis: Corallum subcylindrical to ceratoid, straight to slightly bent, and firmly attached through a thick pedicel. Corallum relatively small, the holotype 6.0 x 5.5 mm in CD and 12.9 mm in height. Theca bears broad, slightly convex, granular costae; corallum white. Septa octamerally arranged in 3 cycles: 8:8:16 (=32 septa), the primary septa the largest and most exsert, but tertiaries equally as wide and only slightly less exsert than secondaries. Axial edges of all septa sinuous. Secondary septa bear pali, forming an elliptical crown of 8 pali that encircles a fascicular columella composed of 2-4 twisted elements. Septal faces bear prominent granules; axial edges of both septal and palar faces bear short menianes.

Discussion: Although there are 7 species of octamerally symmetrical *Caryophyllia* (see CAIRNS 1999a), *C. barbadensis* is the only one known from the Atlantic.

New Records: None.

Types: See CAIRNS (1979).

Distribution: Barbados; Green Canyon, southwestern Louisiana; ?off southern Brazil (ZIBROWIUS 1988); 129-249 m.

Genus **Premocyathus** Yabe & Eguchi, 1942

Diagnosis: Corallum solitary, cornute, sometimes with a costal ridge on convex thecal edge. Base open, the result of asexual budding. Theca costate. Septa arranged in 3 cycles but with very irregular symmetry, ranging from 6 to 12 primary septa and 24-48 septa. Pali in one crown before penultimate (second) septal cycle, but also very irregular in development, ranging from 0-12. Columella fascicular.

Type Species: *Premocyathus compressus* Yabe & Eguchi, 1942 (= *Platocrochides dentiformis* Alcock, 1902), by original designation. *Caryophyllia compressa* Yabe & Eguchi, 1932, the stated genotype, is a *nomen nudum*, later properly described, along with the new genus, by YABE & EGUCHI (1942) as the combination *Premocyathus compressus*.

Discussion: CAIRNS & ZIBROWIUS (1997) revised the genus *Premocyathus*, resulting in only one species in the genus: *P. dentiformis*. Although *Caryophyllia cornuformis* Pourtalès, 1868 does not have a highly compressed corallum resulting in a carinate convex thecal edge, it does have the characteristic open base and irregular septal and paler symmetry common to the type species, and is thus transferred to the genus *Premocyathus*.

Premocyathus cornuformis (Portalès, 1868), new combination

Caryophyllia cornuformis Portalès, v*1868: 133. –Cairns, 1979: 49-51, pl. 7, figs. 2-5, Map 8 (synonymy and description). –Zibrowius, v.1980: 66-67, pl. 26, figs. A-L (synonymy and description). –Zibrowius, 1988: 135 (listed). –Cairns et al., 1991: 47 (listed). –Cairns et al., 1994: 4 (listed). –v.Pires, 1997: 182. –Cairns, 1999a: 72.
Caryophyllia sp. cf. *C. cornuformis*. –Cairns & Keller, 1993: 235, pl. 3, figs. C, F.

Diagnosis: Corallum cornute (usually regularly curved about 90°), and unattached, having an open base 1.2-1.8 mm in diameter. Calice circular to only slightly elliptical (not compressed). Calicular edge uniformly serrate. Largest known corallum 10.2 mm in CD and 25 mm in height, but most specimens about half this CD. Costae slightly convex and finely granular, separated by very thin, shallow striae; costae sometimes porcelaneous; corallum white. Septa arranged in 3 cycles, septa of each cycle progressively narrower, but arranged with a very irregular symmetry, ranging from 6 to 12 primary septa, some of the more common septal complements being: 6:6:12 (24) and 7:7:14 (28 septa), the largest being 11:11:18 (38 septa). Axial edges of septa sinuous. Pali occur only before secondary septa that are flanked by a pair of tertiary septa. Because tertiary septa are often missing, there are often fewer pali than secondary septa, pali ranging in number from 0-12 and often asymmetrically placed. Occasionally an enlarged columellar element seems to substitute for a palus. Columella fascicular, composed of 2-9 slender, twisted elements.

Discussion: Although only one additional record of this species is reported herein, there have been several substantive reports of *P. cornuformis* since 1979. ZIBROWIUS (1980) summarized and discussed what is known about eastern Atlantic populations; CAIRNS & KELLER (1993) suggested that the species might also be legitimately recorded from off Mozambique; and PIRES (1997) extended the southernmost western Atlantic range to $24^\circ 35'S$, $44^\circ 12'W$ (off Couves Island, São Paulo, 600 m).

Premocyathus cornuformis is more typical of slope depths (as deep as 2200 m), but is included in this report because of one specimen cited by CAIRNS (1979) from SB-2425 at 137 m, not 37 m as previously reported.

The common name of *P. cornuformis* is the 'lesser horn coral' (CAIRNS *et al.* 1991). POURTALÈS (1871, 1880a) reported living specimens attached to *Xenophora* shells at Sand Key.

New Record: JSL-I-1910, 1, IRCZM.

Types: See CAIRNS (1979).

Distribution: Western Atlantic: Straits of Florida; Bahamas; northern

and eastern Caribbean; off Brazil from Recife to São Paulo; 137-931; north-west Atlantic from 46°-63° (Newfoundland, Labrador, Davis Strait) (CAIRNS 1979: map 8); 1065-1790 m. Elsewhere: northeastern Atlantic in area bounded by Celtic Sea, the Azores, and Morocco; 1300-2200 m (ZIBROWIUS 1980). ?off Mozambique; 91-347 m (CAIRNS & KELLER 1993).

Genus *Coenocyathus* Milne Edwards & Haime, 1848

Diagnosis: Colonial, corallites usually extratentacularly budded from a thick, common, basal coenosteum; occasionally from lateral edges of other corallites (e.g., *C. bowersi*); and rarely intratentacularly. Corallites cylindrical and usually stout, with no anastomosis. Septotheca costate and granular. Septa in 3 or 4 cycles of variable symmetry. A crown of well-formed pali occurs before penultimate septal cycle. Columella papillose or fascicular (twisted elements). Endotheca absent.

Type Species: *Coenocyathus cylindricus* Milne Edwards & Haime, 1848, by subsequent designation (MILNE EDWARDS & HAIME 1850a: xii).

Discussion: Seven species are currently assigned to this genus: *Coenocyathus cylindricus* Milne Edwards & Haime, 1848 (eastern Atlantic); *C. bowersi* Vaughan, 1906 (eastern Pacific); *C. goreau* Wells, 1972 (Bermuda); *C. parvulus* (CAIRNS 1979) (western Atlantic); *C. brooki* Cairns, 1995 (Kermadec Islands); *C. humanni*, n. sp. (off Florida); and *C. caribbeana*, n. sp. (Caribbean). *Coenocyathus sagamiensis* Eguchi, 1968 was transferred to *Rhizosmilia* by CAIRNS (1994), and *Coenocyathus anthophyllites* Milne Edwards & Haime, 1848, is herein excluded from *Coenocyathus* on the basis of its possession of abundant endothecal dissepiments, a parasmiliine character. That species also has a predominantly bushy growth form, and poorly-defined paliform lobes. Although having some resemblance to the parasmiliine genus *Pourtalosmilia*, it may ultimately form the basis of an undescribed genus.

Coenocyathus humanni, new species

(Figs. 5, 72-76)

Coenocyathus n. sp. Humann, v.1993: 174-175, colour fig. (*in situ*).

Description: Holotypic colony consists of 22 corallites united by a common basal coenosteum, which is attached to a bivalve shell that is attached to an oxidized metallic structure. Corallites cylindrical and short, the largest corallite 5.6 x 5.0 mm in CD and 5.0 mm in height. Colony increase primarily through extratentacular budding, resulting in contiguous corallites (with fused walls) or corallites basally connected by coenosteum (sometimes reptoid in extant) but at a distance of 1-2 CD from one another. In one case a corallite appears to be in the process of intratentacular budding. Costae inconspicuous, separated by very faint intercostal striae, and covered with low granules. Corallum white.

Septal symmetry variable, but most common septal plans include: 10:10:16-20 (36-40 septa) and 12:12:16-20 (40-44 septa), the last cycle rarely complete. Primary septa highly exsert (1.2-1.5 mm), sometimes flared slightly outward, having a sinuous axial edge that reaches $\frac{2}{3}$ distance to columella. Secondary septa about 0.5 mm exsert and half width of primaries. Tertiary septa slightly less exsert but almost as wide as secondaries. Each secondary septum that is flanked by a pair of tertiary septa bears a well-formed palus 0.6-0.7 mm in width, the pali bearing tall granules and/or obliquely oriented menianes across their faces. Because the third cycle of septa is rarely complete, the number of pali is also correspondingly low. Fossa of moderate depth, containing a fascicular columella of 3-7 twisted elements that are fused to one another.

Discussion: Among the 6 other species listed in the discussion of the genus, *C. humanni* is most similar to *C. brooki*, but can be distinguished by lacking transverse thecal ridges and in often having a decamerous septal symmetry. According to HUMANN (1993), it occurs on the undersides of ledge overhangs and cave ceilings, and the living coral is white with a pink tint. His common name for this species is the 'ornate cup coral'.

Etymology: This species is named in honor of PAUL HUMANN, who collected the holotypic specimen.

Types: Holotype: Humann stn 2WPB-7, 1 colony, USNM 92080. Paratype: one corallum consisting of 3 contiguous corallites on same substrate as holotype. **Type Locality:** off West Palm Beach, FL (on ceiling of a shipwreck); 21 m.

Distribution: Known only from the type locality (Fig. 5).

***Coenocyathus caribbeana*, new species**

(Figs. 5, 77-80)

Caryophyllia smithi. -Zlatarski, 1982: 258-259 (in part: specimen 2686 from stn. 128, pl. 110, figs. 1-6). [Not *C. smithi* Broderip in Beche, 1828]

Coenocyathus bartschi. -Zlatarski, 1982: 259 (in part: specimen 314 from stn. 6a, pl. 113, figs. 2-3). [Not *C. bartschii* Wells, 1947]

Caryophyllia n. sp. -Humann, v.1993: 174-175, colour fig. (USNM 91667).

Description: Colonies consist of a thick sheet of coenosteum from which stout, widely spaced (2-3 CD apart) corallites are extratentacularly budded. Corallites cylindrical to barrel-shaped, the pedicel sometimes inflated to a greater diameter than the calice, in several coralla consisting of a spongy, non-dissepimental exothecal accretion. Largest corallite (USNM 99190) 14.4 x 12.6 mm in CD and 9.9 mm in height. Costae inconspicuous, flat, granular, and separated by very thin, shallow striae. Costae may also extend to intercorallite coenosteum or this region may be uniformly granular. At calicular edge C4 are broadest costae, 2-3 times width of a C1 or C2. Upper theca and upper axial regions of septa light brown; otherwise corallum white.

Septa hexamerally arranged in 4 complete cycles: S1>S2>S4>S3, the fourth cycle complete at a GCD of about 7 mm. Larger corallites sometime have up to 2 additional pairs of S5, resulting in 52 septa and 14 pali. Otherwise the hexamerall symmetry of 48 septa and 12 pali is fairly constant. S1 highly exsert (up to 2.7 mm), having straight, vertical axial edges that extend about $\frac{1}{2}$ distance to columella. S2 less exsert (about 2.2 mm), $\frac{2}{3}$ width of S1. S3 least exsert (about 1 mm) and half width of S2, being the only septa with sinuous axial edges. S4 dimorphic in size, those adjacent to S1 about 1.3 mm exsert, forming a calicular lancet with the flanked S1, and slightly wider than the adjacent S3. S4 adjacent to S2 slightly less exsert

than the other S4, and equal to or slightly wider than their adjacent S3, although usually less wide than those S4 adjacent to the S1. An elliptical crown of 12-14 pali (P3), each 1.5-2.0 mm wide, encircles a deeply recessed fascicular columella composed of 2-15 elements: some twisted, others pillar-shaped. Small, deeply recessed paliform lobes (P1-2) occasionally present before some septa of several coralla.

Discussion: *Coenocyathus caribbeana* is distinguished from its congeners by its large size and by having S4 that are wider than the S3; however, it is remarkably similar to *Caryophyllia crypta* in many characters, including septal symmetry, relative septal size, palar and columellar morphology, and corallum pigmentation. A small, individual corallite of *C. caribbeana* might easily be confused with an adult *Caryophyllia crypta*, but a fully developed *C. caribbeana* can be distinguished by its colonial growth form, larger corallites, cylindrical (*vs* ceratoid) corallites, and unequal costal widths.

Records of *Coenocyathus* from the western Atlantic were previously reported by three authors: *Coenocyathus dohrni* Döderlein, 1913 (= *Caryophyllia inornata* Duncan, 1878, see ZIBROWIUS 1980) from off the northern Yucatan Bank at 34-55 m (KELLER 1975); *Coenocyathus* n. sp. from the outer shelf edge banks of Texas at 100 m (REZAK *et al.* 1985); and *Coenocyathus* sp. from off eastern Florida (AVENT, KING & GORE 1977). In all cases the species were only listed, not accompanied by description or illustrations, and the specimens are not available for further study. KELLER's material is purported to be at the Instituto de Oceanología, Havana, Cuba, but cannot be accessed. It is possible that they are *Coenocyathus caribbeana* or perhaps *C. humanni*, whereas REZAK's (1985) specimens appear to be *Phyllangia pequegnatae*. The specimen reported by AVENT, KING & GORE (1977) may be *Pourtalosmilia conferta*.

HUMANN (1993) refers to this species as the 'button cup coral'.

Etymology: Named for the region in which occurs, the Caribbean Sea.

Records/Types: Holotype: Wagenaar Hummelinck 1334, Caracas Baai, Curaçao, attached to submarine buoy, 10 m; holotype (USNM 99189), 2 paratype colonies (USNM 99190); Humann stn CBH-13, San Salvador, Bahamas, 23 m, 1 paratype corallite, USNM 91667; Humann stn 2RC-10B, Roatán, Honduras, 20 m, 1 paratype corallite, USNM 92092; Humann stn

IC2d, Roatán, Honduras, 12 m (cave), 2 paratypes, USNM 99191; DBL-1470, Discovery Bay, Jamaica, depth unknown, 1 paratype corallite, USNM 99192; Barbados, 100 m, 1 paratype corallite, UMML 8.279. Type Locality: Caracas Bay, Curaçao, 10 m.

Distribution: Bahamas; Caribbean (Fig. 5); 5-100 m.

***Coenocyathus parvulus* (Cairns, 1979)
new combination**

Caryophyllia parvula Cairns, *1979: 62-63, pl. 9, figs. 6-8, pl. 10, figs. 5-6, Map 12. -Rezak et al., v.1985: 225 (listed: stn. 120, Sidner Bank; stn. 118, Diaphus Bank, LA, 120 m). -Cairns et al., 1994: 6.

Diagnosis: Corallites extratentacularly budded from a thick, continuous, smooth basal coenosteum. Corallites small: largest known (JSL-I-2582) 6.8 x 5.6 mm in CD and 8.1 mm in height. Corallites ceratoid to subcylindrical, with a thick pedicel and even thicker basal region, the latter about same diameter as calice. C1-2 and usually C3 ridged. Upper theca and peripheral septa usually light brown; pali, columella, and basal coenosteum white. Septa of larger specimens hexamerally arranged in 4 cycles (S1>S2>S3>S4), but a full fourth cycle never attained; larger corallites having 42-44 septa. Smaller corallites pass through stages having 8-11 half-systems, some of these half-systems missing pairs of S4, resulting in corallites with 32-44 septa and 8-11 pali. S1-2 highly exsert; axial edges of all septa highly sinuous. Septal faces of S4 bear elongate menianes. Pali (P3) slender, quite sinuous, and usually also bear menianes. Fossa of moderate depth; columella papillose, composed of 5-12 slender, irregularly-shaped elements.

Discussion: Most previously collected specimens of *C. parvulus* were corallites broken from their bases, or founder corallites that had not yet formed colonies. However, a well-preserved corallum from JSL-I-2582 clearly shows the growth of the species to be colonial, with budding from a common basal coenosteum, which suggests a placement in *Coenocyathus*. In fact, corallites from the "Steamer Norseman", previously reported by CAIRNS (1979), also display a colonial mode. The papillose columella of

this species is also more consistent with that of *Coenocyathus*. *C. parvulus* is distinguished from other species in that genus by its small size and carinate S4. Aside from the generic reassignment, the specimens reported herein provide a size record for the species (JSL-I-2582) and a slight northeastern range extension to Grand Bahama Bank.

New Records: SB-3467, 2, USNM 80234; JSL-I-2582, 9, USNM 87786; JSL-I-2585, 4, USNM 87789, 89358; BLM, SOFLA-32, 1, USNM 97331; USGS VIII-A-2, 4, USNM 80356.

Types: See CAIRNS (1979).

Distribution: Bahamas; northeastern Gulf of Mexico (Sidner Bank, LA (REZAK *et al.* 1985)); Caribbean, but rare in southern Caribbean; Brazil from Cumuruxatiba to Ilha de Sebastião (CAIRNS 1979: map 12); 97-399 m.

***Coenocyathus goreau* Wells, 1972**

(Figs. 5, 81-84)

Coenocyathus goreau Wells, v*1972: 4-6, figs. 6-10. -Zibrowius, 1980: 73. -Cairns *et al.*, 1986: 187, fig.

"*Coenocyathus*" *goreau*. -Cairns, 1979: 207 (listed).

Description: Small (up to 5 cm diameter), densely branched colonies are composed of elongate (up to 26 mm), cylindrical corallites that bud from common basal coenosteum and edge zone of parent corallites. Corallites vermiform in shape and often anastomose laterally, producing many crevices. Calices circular to slightly elliptical in shape; largest calice (USNM 49235) 6.4 mm in CD; calicular edge finely and uniformly serrate. Costae flat and equal, separated by narrow, shallow intercostal striae; costae covered with low, rounded granules, 2 or 3 across width of a costa. Corallum white.

Septa octamerally arranged in 3 to 4 cycles, a full 3 cycles (32 septa) present in coralla 3-5 mm in CD, additional pairs of quaternary septa occurring in larger corallites, e.g., up to 42 septa in a corallite 6.4 mm in diameter. Primary septa about 1 mm exsert, having straight, vertical axial edges. Secondary septa up to 0.7 mm exsert, about $\frac{2}{3}$ width of the primaries, having

slightly sinuous axial edges. Tertiaries equal to or only slightly smaller than secondaries. A crown of 8 broad, sinuous pali occurs before secondary septa, each palus about same width as septum it borders. When pairs of quaternary septa present, the palus orients with the flanked tertiary septum within that sector. Pali highly granular and bear obliquely oriented menianes. Fossa shallow to moderate in depth, containing a fascicular columella composed of 2-5 twisted elements. Endothecal dissepiments absent.

Discussion: The classification of this species in *Coenocyathus* was questioned by WELLS (*pers. comm.* 1976, 1977), CAIRNS (1979), and ZIBROWIUS (1980); however, no one has suggested an alternative genus. It is tempting to consider a reassignment to *Pourtalesmilia*, a genus resurrected by ZIBROWIUS (1980) after *C. goreaui* was described, based on the presumption that the elongate coralla of *C. goreaui* have endothecal dissepiments. However, the paratype illustrated by WELLS (YPM 8499), which contains corallites up to 26 mm in length, do not contain any trace of endothecal dissepiments. Thus, it would seem appropriate to keep this species in the genus in which it was originally described. It differs from congenierics in having octamerally arranged septa.

New Records: Harrington Sound, Bermuda, cave near Somers Hill, 2 m, 4 corallites, USNM 49234; Harrington Sound, Bermuda, Green Bay Cave, 5 m, 6 corallites, USNM 49235; Harrington Sound, Bermuda, Green Bay Cave, depth unknown, 1 corallite, USNM 80360; between Canton Point and Sam Halls Bay, Bermuda, 4 m, 2 corallites, USNM 80470; Myrtle Bank, Bermuda, depth unknown, 5 corallites, USNM 80359; Desecheo Island, Puerto Rico, cave, 6-9 m, 9 corallites, USNM 80367.

Types: The holotype and paratype are deposited at the YPM (8498 and 8499, respectively). **Type Locality:** "cavity in reef rock North East Breakers (Haversack, East), Bermuda."

Distribution: Bermuda; Desecheo Island, Puerto Rico (Fig. 5); 2-6 m.