68. **Gardineria minor** Wells, 1973

Plate XXXI, figures 7–9

Colangia simplex Pourtalès, 1878: 206–207 (in part: Blake station off Havana, 146 m).
Gardineria sp. cf. *barbadensis*: Goreau & Wells, 1967: 449.
Gardineria minor Wells, 1973: 49–53, figs. 36a–g. – Wells & Lang, 1973: 58. – Zibrowius, 1974c: 24. – Scatterday, 1974: 86. – Land, Lang & Barnes, 1977: 170.

Description. – The shape of the corallum is variable, ranging from short and cylindrical, with a base equal in diameter to the calice, to a long, irregularly tapered cylinder, attached by a narrow base. Young coralla are often attached by their sides. Dimensions of the largest corallum examined are 8.3 × 7.9 mm in calicular diameter. The calice is round. The thin epitheca usually displays irregular, concentric banding and extends above the level of the upper septal margins.

Septa are arranged in six distinct systems and four cycles. Small coralla measuring 0.5–1.0 mm in calicular diameter have only one cycle of septa. The second cycle of septa is usually complete at a calicular diameter of 1–2 mm; the third cycle at 2–7 mm; and the fourth cycle between 5–8 mm. S_1 are exsert and by far the largest septa. They are also the only ones having an entire margin. S_2 are much smaller, not exsert, and have very irregular inner edges consisting of two–three wide, blunt paliform teeth projecting perpendicular to the septal edge. S_3 are smaller and bear four–five paliform teeth on their inner margins. S_4 are rudimentary, composed of five–eight linearly arranged, low spines. The septal granules are large, blunt, and sparsely distributed.

A small, narrow paliform lobe sometimes is present on the inner edge of each S_1. A more distinct, larger, and wider lobe usually is present on the inner edge of each S_2, separated from the septum by a narrow notch. The columella is composed of 1–20 slender, irregularly shaped rods, which fuse proximally into a solid mass. The rods are sometimes indistinguishable from the paliform lobes.

Discussion. – *G. minor* is distinguished from *G. barbadensis* by its

hexameral symmetry, smaller size, and different habitat, found only in a cave environment or in heavily shaded sites. It is distinguished from *G. simplex* by its smaller size and greater number of septa at the same calicular diameter.

Material. – P-439 (3) USNM 46622; P-630 (1) USNM 46623; P-1311 (2) USNM 46624; P-1387 (3) USNM 46625; G-889 (1) USNM 46626; G-899 (1) USNM 46627; G-983 (1) USNM 46619; G-984 (2) USNM 46620; G-986 (2) USNM 46621; SB-3494 (4); BL station, off Havana, 146 m (2) MCZ; BL-156 (1) MCZ; Alb-2324 (2) USNM 10135; off Santa Marta, Colombia, 17–50 m (1) Cornell; off Cayman Island, 37 m (1); Daaibooi baai, Curaçao, 24 m (1) USNM 46629; off Andros, Bahamas, deep reef, 25 April 1970 (2) USNM 46632; 26°33'N, 78°34'W, 42.7 m (1) FDNR; Theodore Tissier (1), 15°15'N, 60°57'W, 90 m. – Types of *G. minor* and *C. simplex*.

Types. – The holotype and paratypes of *G. minor* are deposited at the USNM (53503-53506).

Three syntypes of *Colangia* (= *Gardineria*) *simplex* Pourtalès, 1878 are deposited at the MCZ; two collected at a Blake station off Havana, 80 fm (146 m); and one from BL-22 (5566). The two specimens from the Havana station are *Gardineria minor* but because the original description primarily concerned the BL-22 specimen (Pl. XXXI 1–3), which is different (both figures are of this specimen), it is designated lectotype for *G. simplex*, thus preserving WELLS's (1973) name *G. minor* for the other two specimens.

Type-Locality. – Yallahs, Jamaica; 15 m.

Distribution. – Widespread in the Caribbean and Bahamas (Map 47). 2–241 m, most common between 10–100 m.

Family **GUYNIIDAE** Hickson, 1910

Genus **Guynia** Duncan, 1872

Diagnosis. – Solitary, ceratoid to scolecoid, free or fixed laterally; sometimes producing chains of individuals by extratentacular budding. Wall epithecal; a row of mural "pores" (spots) present in every interseptal space. Pali absent. Columella composed of one twisted ribbon. Type-species: *Guynia annulata* Duncan, 1872, by monotypy.

69. **Guynia annulata** Duncan, 1872

Plate XXXII, figures 1–3

Guynia annulata Duncan, 1872: 32, pl. 1, figs. 1–8; 1873: 335–336, pl. 47, figs. 9–16. – Pourtalès, 1874: 44, pl. 9, figs. 3–4; 1878: 209; 1880: 97, 112. – Gardiner & Waugh, 1938: 172. – Rossi, 1961: 34. – Zibrowius, 1969: 327–328. – Wells, 1972: 6, figs. 11–14. – Wells & Lang, 1973: 58. – Wells, 1973a: 59–63, figs. 1–3. – Bourcier & Zibrowius, 1973: 827. – Zibrowius, 1976: 230–232, pl. 57, figs. A–Q. – Zibrowius & Saldanha, 1976: 101–102. – Zibrowius & Grieshaber, 1976: 381. – Cairns, 1977b: 5; 1978: 11.
Guynia n. sp. Goreau & Wells, 1967: 449.

Description. – The extremely small corallum is cylindrical and scolecoid in shape, rarely exceeding 10 mm in length and 1 mm in calicular diameter. It is usually attached by its side, sometimes growing free distally. Wells (1973a) reported that sometimes a new corallum buds extratentacularly from just below the calicular edge; successive budding forms a chain of individuals. Specimens from the northern Gulf of Mexico attach sand grains both basally and randomly along their coralla.

The epitheca is thin and particularly fragile at the calicular end. The theca is variable; it may be smooth for the entire length or interrupted by a series of annuli (*e.g.*, 21 over a distance of 3.6 mm) or even may bear six-eight ridged costae corresponding to the S_1. In addition, there are small white spots on the theca arranged in six or eight pairs of longitudinal rows. The rows are in the interseptal spaces directly adjacent to the smaller septa. The spots are also arranged in rings around the corallum; when annuli are present, one ring of 12 or 16 spots occurs between each growth segment. I hesitate to call these spots mural pores, which are typical for the family, because no surface relief was seen with a scanning electron microscope. Rows of shallow, round depressions were seen, however, on the interior of the theca corresponding to the externally visible white spots (Pl. XXXII 2), but complete perforations of the theca probably do not occur.

There are 12 or 16 septa arranged in two groups, hexamerally or octamerally respectively. The six or eight primaries are thick, with very sinuous inner edges, and extend almost to the columella. The

six or eight secondaries are much smaller and thinner but also have sinuous inner edges. The septa are not exsert; the epitheca rises well above the level of the larger septa, and the smaller septa are so deep in the calice that they are sometimes hidden from view. The septal faces are smooth; there are no septal granules. The columella is a single massive, twisted or flanged ribbon, sometimes visibly attached to one or more of the larger septa deep in the fossa.

Discussion. – *G. inflata* (Hickson, 1910), from the Persian Gulf, is the only other Recent species belonging to this genus. It is differentiated by its possession of endotheca, a slightly bulbous proximal end, and by always being free, not laterally attached as *G. annulata* often is.

Material. – P-629 (4); P-630 (5) USNM 46637; P-1303 (1) USNM 46635; P-1354 (1) USNM 46636, (1) UMML 8: 265; G-725 (1) USNM 46634; SB-1125 (11); BL-22 (1) MCZ; BL-143 (1) MCZ; BL-154 (1) MCZ; BL–213 (1) MCZ; Hassler, Barbados, 183 m (9) MCZ; MAFLA 1974–18 (2) RSMAS; MAFLA 1974–33 (12) RSMAS; MAFLA-2645 (2) FDNR; 27°55'N, 93°27'W, 100 m (4) BLM, Texas; Hummelinck-1443 (1). – Syntypes of *G. annulata*.

Types. – Eighteen syntypes, collected at a Porcupine station made in 1870, are deposited at the BM (1883.12.10.110–120).
Type-Locality. – Adventure Bank, Mediterranean; 168 m.

Distribution. – Western Atlantic: Antillean distribution; Gulf of Mexico; western Caribbean; off Bermuda (Map 48). 37–653 m. – Eastern Atlantic: Mediterranean; Madeira; Azores. 28–200 m.

Genus **Schizocyathus** Pourtalès, 1874

Diagnosis. – Solitary, ceratoid, fixed. Longitudinal parricidal budding common. Wall epithecal; a row of mural spots flanks each S_2. Paliform lobes on S_3. Columella absent. Type-species: *Schizocyathus fissilis* Pourtalès, 1874, by monotypy.

70. **Schizocyathus fissilis** Pourtalès, 1874

Plate XXXII, figures 4–7

Schizocyathus fissilis Pourtalès, 1874: 36–37, pl. 6, figs. 12–13. – Lindström, 1877: 15–19, pl. 2, fig. 26, pl. 3, figs. 27–34, text-figs. 1–7 – Pourtalès, 1878: 203; 1880: 96, 104. – Duncan, 1883: 366–367. – Marenzeller, 1904: 300. – Gravier, 1915: 2, 17–22, figs. 6–11; 1920: 81–86, pl. 9, figs. 144–152, pl. 14, fig. 208, pl. 15, figs. 213–214, pl. 16, figs. 216–221. – Gardiner & Waugh, 1938: 171. – Lewis, 1965: 1063. – Zibrowius, 1976: 234–236, pl. 59, figs. A–O. – Cairns, 1977b: 5; 1978: 11.

Description. – The corallum is ceratoid to subcylindrical, straight, and invariably attached to a fragment (usually one-sixth or one-third) of a parent corallum. The longest corallum known measures 25.0 mm, but more typically they are 7–8 mm in length, with a calicular diameter rarely exceeding 3.5 mm. The epitheca varies: it is usually thin, smooth, and glossy but sometimes bears rough, hispid spines (*e.g.*, Lindström's variety from Salt Island), or is marked with rugose thecal annuli. Six, thin, opaque, white lines, corresponding to the S_2 occur on the theca extending from the base to the calice. Toward the calice, these lines bifurcate, closely paralleling the S_2 to the calice. These are the future lines of fracture in asexual reproduction; the theca between the double lines and the enclosed S_2 break away from the corallum, which leads to the eventual division of the corallum into sixths or thirds. In each of the three–six sectors defined by these lines are two rows of white spots. They correspond to the interseptal spaces adjacent to every S_1. Successive spots are located about 0.5 mm apart. Neither lines nor spots are seen in surface relief with the SEM, which implies that they are not surface features. The calice is round and the epitheca extends slightly higher than the upper septal edges.

Septa are arranged in six systems and three complete cycles. S_1 are the thickest and widest septa, slightly exsert, and extend halfway to the center of the calice. They have sinuous inner edges and sometimes bear small paliform lobes. S_2 are extremely small and rudimentary, expressed only as small, ragged ridges in the upper corallum. S_3 are half as thick as the S_1, slightly exsert, and extend only one–fourth of the distance to the center of the calice. Lower in

the fossa the S_3 bear paliform lobes that reach almost to the center of the calice, where the pair in each system unite in a V before the S_1. Deep in the fossa these inner extensions of the S_3 form a platform, which is dissected by six narrow channels corresponding to the S_2. The lateral faces of the S_1 and S_3 bear large blunt granules arranged in lines or short carinae parallel to the trabeculae. One atypical specimen has a poorly-defined palar platform and a rudimentary columella. Ordinarily there is no columella.

Discussion. – There has been continuing disagreement as to whether the rudimentary septa are the S_1 and the large, thick septa the S_2 (POURTALÈS, 1871; VAUGHAN & WELLS, 1943) or the converse (MARENZELLER, 1904; GRAVIER, 1920; ZIBROWIUS, 1976). Among the 180 specimens examined, only one (from Oregon-2772) was independently attached, i.e., not the result of asexual fragmentation. Its base clearly showed the original six septa, which, when traced to the calice, corresponded to the larger septa. For this reason I agree with ZIBROWIUS, *et al.* in calling the six larger septa the S_1 and the six smaller septa the S_2.

Material. – P-585 (1) USNM 46640; G-929 (1) USNM 46638; G-1011 (1) USNM 46639; O-1251 (2); O-1867 (8); O-2772 (31); O-3203 (1); SB-3483 (1); BL-51 (1) MCZ; BL-206 (slides) MCZ; BL-220 (2) MCZ; BL-259 (1) MCZ; BL-272 (1) MCZ; BL-290 (1) MCZ; BL-292 (1) MCZ; Gos-1632 (1); Caroline-13 (2); Caroline-84 (1); Caroline-93 (3); MAFLA-2106 (1) FDNR; MAFLA-2645 (2); MAFLA-2746 (1); Atl-2987D (22) MCZ; Atl-2989 (1) MCZ; Explorer-1a (10); Explorer-1b (1); Explorer-1c (25); Hummelinck-1443 (14). – Syntypes of *S. fissilis*; Lewis's (1965) specimen (Cornell).

Types. – Forty-one syntypes, divided into three lots, are deposited at the MCZ (5470, 2791). All were collected at a Hassler station off Barbados.
Type-Locality. – Off Barbados; 183 m.

Distribution. – Western Atlantic: Antillean distribution; eastern Gulf of Mexico; off Honduras (Map 49). 88–640 m. – Eastern Atlantic: the area bounded by Portugal, the Azores, and Morocco. 410–1300 m.

Genus **Stenocyathus** Pourtalès, 1871

Diagnosis. – Solitary, ceratoid to cylindrical, free or attached. Wall epithecal; rows of thecal spots flank each S_3. Pali, when present, opposite S_2. Columella formed of one–two twisted, crispate ribbons. Type-species: *Coenocyathus vermiformis* Pourtalès, 1868, by monotypy.

71. **Stenocyathus vermiformis** (Pourtalès, 1868)

Plate XXXII, figures 8–10; Plate XXXIII, figures 1–2

Coenocyathus vermiformis Pourtalès, 1868: 133–134.

Stenocyathus vermiformis: Pourtalès, 1871: 10, pl. 1, figs. 1–2, pl. 3, figs. 11–13. – Lindström, 1877: 19–21, pl. 3, figs. 35–36. – Pourtalès, 1878: 202; 1880: 96, 101 (in part: not BL-210), pl. 1, figs. 15–16. – Duncan, 1883: 368. – Agassiz, 1888: 148, fig. 483. – Marenzeller, 1904: 298–300, pl. 18, fig. 16. – Gravier, 1915: 2; 1920: 30–32, pl. 3, figs. 35–37, pl. 13, 193–197. – Gardiner & Waugh, 1938: 172. – Wells, 1947: 167, pl. 10, figs. 1–5; 1958: 262. – Rossi, 1958: 6, 11–12. – Squires, 1959: 23. – Rossi, 1961: 39–40. – Zibrowius, 1969: 328. – Laborel, 1970: 153. – Zibrowius, 1971: 244; 1974a: 769–770; 1976: 232–234, pl. 58, figs. A–Q. – Cairns, 1977b: 5; 1978: 11.

Not *Caryophyllia vermiformis* Duncan, 1873: 316, pl. 40, figs. 13–16 (= *Caryophyllia abyssorum*).

Caryophyllia simplex Duncan, 1878: 237, pl. 43, figs. 32–34.

Caryophyllia carpenteri Duncan, 1878: 237, pl. 43, figs. 28–31.

Stenocyathus washingtoni Cecchini, 1914: 151–152; 1917: 143–145, pl. 13, figs. 4–5.

Stenocyathus decamera Ralph & Squires, 1962: 11–12, pl. 4, figs. 2–6. – Squires & Keyes, 1967: 28, pl. 6, figs. 3–5.

Description. – The corallum is cylindrical, elongate, and vermiform, reaching lengths of over 50 mm but rarely exceeding 3 mm in calicular diameter. It is usually free, lying horizontally on the substrate; it is rarely basally attached. The epitheca is usually smooth and glossy, particularly delicate at the calicular end, but may also be rough as a result of the presence of numerous annuli corresponding to periodic stages of growth. Opaque, white spots are arranged in 24 longitudinal rows, which occur in all interseptal spaces but most closely adjacent to either side of the S_3. The centers of the spots are longitudinally spaced 0.35–0.45 mm apart. The spots are

not visible as a surface structure with the SEM. The calice is round and one often occurs on each end of a recumbent specimen.

Septa are arranged in six systems and three cycles, but often the third cycle is not fully developed. The six S_1 are not exsert, extend only halfway to the columella, and have sinuous inner edges. S_2 are half as large and have even more sinuous inner edges. S_3 are almost as large as the S_2 but have reduced upper margins and virtually straight inner edges. Large, pointed septal granules are arranged either randomly or in short carinae oriented perpendicular to the trabeculae.

Six P_2 are often present, forming a distinct palar ring in the fossa. They are tall and narrow, with sinuous inner edges and granules that are larger than those on the septa. S_3 and P_2 are often missing from a system, producing an asymmetrical palar ring. The columella is composed of one, rarely two or three, twisted ribbons. Sometimes the columella is absent.

Discussion. – RALPH & SQUIRES's (1962) original description of *S. decamera*, the only other Recent species described in this genus, was poor and did not include a comparison to the type-species. Examination of 14 New Zealand specimens identified by SQUIRES as *S. decamera* (USNM) reveals that they differ only by having slightly larger calicular diameters than *S. vermiformis* (up to 6 mm) and are more often solidly attached to the substrate. All 14 specimens have a hexameral septal arrangement. I do not consider these differences of specific value. *S. alabamiensis* Wells, 1947 (Paleocene, Alabama) and *S. hoffmeisteri* Wells, 1976 (Eocene, Tonga) are the only other species described in the genus.

Material. – P-596 (1) USNM 46650; P-861 (3) USNM 46649; G-663 (4) USNM 46641; G-664 (5) USNM 46642; G-703 (1) USNM 46643; G-1102 (14) USNM 46644, (1) UMML 8: 266; GS(G)-14 (3) USNM 46645; GS(G)-13 (1) USNM 46646; GS(G)-43 (1) USNM 46647; O-4226 (44); BL-5 (2) MCZ; BL-51 (2) MCZ; BL-100 (2) MCZ; Alb-2672 (1); Gos-1607 (1); Gos-1650 (2); Gos-1653 (4) USNM 46648; Gos-1766 (1); Gos-1767 (1); E-26023 (1); E-26031 (1); Akaroa-5c (30) SME; Chain-15 (3); off Anna Maria Key, Florida, 366–487 m (1) USNM 46651; 21°48'S, 40°03'W, 128 m (4) USNM 10923. – Syntypes of *Coenocyathus vermiformis*; holotypes of *C. simplex*, *C. carpenteri*, and *Caryophyllia vermiformis*; Squires's (1959) specimen (AMNH 3441).

Types. – At the MCZ there are 38 coralla or fragments of *C. vermiformis* Pourtalès, distributed in four lots, bearing the numbers 2790, 5587, and 5605 (one lot is unnumbered). Although not clearly stated in the text or with the specimens, these syntypes were probably collected from Bibb-10, 11, and 21. The holotypes of *C. simplex* and *C. carpenteri* are both deposited at the BM (1883.12.10.24 and 1883.12.10.23). It is unknown if types of *S. washingtoni* exist. The holotype of *S. decamera* is deposited at the New Zealand Geological Survey, Wellington.
Type-Locality. – Off Florida Keys; 274–329 m.

Distribution. – Western Atlantic: off Georgia and Florida; off Havana, Cuba; Arrowsmith Bank, Yucatan; Windward Group, Lesser Antilles; off Brazil (Map 50). 128–835 m. – Elsewhere: Mediterranean; area bounded by Celtic Sea, Azores, and Madeira; Indian Ocean; off New Zealand. 110–1229 m.

Genus **Pourtalocyathus,** new genus

Diagnosis. – Solitary, ceratoid, free. Wall epithecal, often bearing hispid spines. One row of mural spots present in every interseptal space. Paliform lobes sometimes present before S_2. Columella papillose. Type-species: *Ceratotrochus hispidus* Pourtalès, 1878, here designated.

Discussion. – It is necessary to establish a new genus for *Ceratotrochus hispidus* because it possesses thecal spots identical to those found in the Guyniidae, but it does not belong to any of the described guyniid genera. Pourtalès either overlooked this character (it is not mentioned in his description but is found on the holotype) or did not realize its significance. Often the mural spots are not visible; only one-third of the specimens examined showed them clearly.

This genus is clearly different from all other genera in the Guyniidae. It differs from *Guynia* by its septal arrangement, numerous columellar elements, and larger size; from *Stenocyathus* by its differently shaped paliform lobes, columella, and corallum; and from *Schizocyathus* by the presence of a columella and its septal arrangement.

Etymology. – This genus is named in honor of L. F. POURTALÈS. Gender: masculine.

72. **Pourtalocyathus hispidus** (Pourtalès, 1878), new comb.

Plate XXXIII, figures 3–8

Ceratotrochus hispidus POURTALÈS, 1878: 202, pl. 1, figs. 19–20. – ZIBROWIUS, 1974c: 25. – KELLER, 1975: 179.
Conotrochus typus: POURTALÈS, 1878: 202 (in part: BL-16).
Ceratotrochus typus: POURTALÈS, 1880: 96, 105.
Stenocyathus vermiformis: POURTALÈS, 1880: 101 (in part: BL-210).

Description. – The corallum is ceratoid and usually straight, if attached, or curved up to 90°, if free. It is originally attached by a thin, encrusting base but rarely remains attached in an upright position. The longest corallum examined measures 19.0 mm; the calicular diameter rarely exceeds 5.5 mm. The theca is quite variable in appearance. Often there are flat, broad costae corresponding to all septa and separated from each other by narrow, intercostal furrows. Sometimes the costae bear prominent, projecting granules arranged uniserially, which unite to form short ridges. Other specimens have smaller costal granules arranged three–four across the width of a costa. Still other coralla have no costae or spines; instead they have rough, imbricated, epithecal bands. Some coralla have a perfectly smooth epitheca with no ornamentation. Rows of white mural spots corresponding to each interseptal space are obvious on one-third of the specimens examined. These spots are visible in specimens with prominent costal spines as well as in the completely smooth specimens. The spots are not visible as a surface structure with the SEM. The calice is round and the epitheca usually continues for a short distance above the upper septal margins.

Septa are arranged in six systems and three complete cycles. S_1 have exsert, rounded upper edges, are sometimes quite thick, and extend to the columella. S_2 are half as large, less exsert, and also meet the columella. Small papillose P_2, similar in shape to the columellar elements, sometimes occur. S_3 are small, have slightly dentate inner edges, and do not reach the columella. The septal granules are large and arranged in lines parallel to the trabeculae. The lower, inner edges of the S_1 and S_2 are thickened where they join the columella. The columella is composed of 5–25 close-set,

thin, tapered rods, which are usually swirled in a clockwise direction. The rods may remain individualized or fuse into a solid mass. There are no dissepiments or internal stereome.

Material. – P-889 (1) USNM 46662; P-984 (3) USNM 46663; P-1225 (2) USNM 46664; 18 specimens from 10 Gerda stations from the Straits of Florida (USNM 46652–46661); SB-3494 (5); BL-16 (1) MCZ; BL-100 (3) MCZ; BL-145 (3) MCZ; BL-195 (1) MCZ; BL-210 (1) MCZ; Gos-1729 (1); Caroline-1 (1); Caroline-25 (3); Caroline-67 (42); Atl-2999 (2) MCZ; Atl-3313 (1) MCZ; Atl-3332 (28) MCZ; Atl-3336 (7) MCZ. – Holotype of *C. hispidus*.

Types. – The holotype, collected at BL-19, is deposited at the MCZ (5583).
Type-Locality. – 23°02'N, 83°10'W (western Straits of Florida); 567 m.

Distribution. – Antillean distribution; off northeastern Florida (Map 51). 349–1200 m.

Suborder DENDROPHYLLIINA Vaughan & Wells, 1943

Family **DENDROPHYLLIIDAE** Gray, 1847

Genus **Balanophyllia** Wood, 1844

Diagnosis. – Solitary, turbinate to trochoid, fixed or free. Costae well developed. Synapticulotheca porous, especially near calicular edge. Septa follow Pourtalès Plan. Pali present or absent. Columella spongy. Type-species: *Balanophyllia calyculus* Wood, 1844, by monotypy.

73. **Balanophyllia cyathoides** (Pourtalès, 1871)

Plate XXXIII, figures 9–10; Plate XXXIV, figures 1–2

Dendrophyllia cyathoides POURTALÈS, 1871: 45–46, pl. 1, figs. 8–9; 1878: 208; 1880: 97.
Balanophyllia palifera: POURTALÈS, 1880: 110 (in part: BL-300).
Balanophyllia cyathoides: CAIRNS, 1977a: 136–138, pl. 1, figs. 5–8.

Description. – The corallum is ceratoid and straight, narrowing to a thick pedicel of about one-half the calicular diameter and re-

expanding into a solid base of attachment. The holotype measures 27.1 mm tall and 9.6 mm in lesser calicular diameter. Costae are narrow, equal, rounded, and separated by deep, narrow furrows. Sometimes the C_1 and C_2 are raised slightly above the others. Every costa bears a row of tall, blunt granules.

Septa are arranged in six systems and four cycles, rarely with additional S_5. S_1 are highly exsert and extend to the columella. S_2 are much less exsert, extending almost to the columella. S_3 and S_4 follow the Pourtalès Plan; two S_4 join before each S_3 and extend to the columella. At the junction there is often a small, indistinct paliform lobe, compressed and aligned with the adjacent S_3. The inner edges of all septa are straight and entire. The septal faces bear numerous, large, pointed granules arranged in lines parallel to the trabeculae.

The fossa is fairly shallow. The columella is elongate and narrow, and often carinate. It varies from spongy to solidly fused. Sometimes it is swirled as in *Balanophyllia dineta*, with oblique, lateral ridges.

Discussion. – This species is described and discussed by CAIRNS (1977a).

Material. – P-919 (2); G-251 (1) USNM 46665; G-691 (9) USNM 46668; G-692 (1) 46666; G-701 (1) USNM 46667; BL-69 (4) MCZ; BL-300 (2) MCZ; Alb-2157 (4) USNM 16102; Alb-2322 (11) USNM 16101; Alb-2327 (7) USNM 16104; Alb-2354 (3) USNM 16103. – Holotype.

Types. – The holotype (MCZ-2774) has been cut in half (vertically) along its lesser calicular diameter; only one-half is present at the MCZ. It was probably collected from Corwin-2 or 4 in 1867.
Type-Locality. – Off Havana, Cuba; 494 m.

Distribution. – Antillean distribution; Arrowsmith Bank, Yucatan (Map 52). 53–494 m.

74. **Balanophyllia palifera** Pourtalès, 1878

Plate XXXIV, figures 3–7

Balanophyllia floridana: POURTALÈS, 1874: 43, pl. 6, fig. 20.
Balanophyllia palifera POURTALÈS, 1878: 207 (in part: BL-68); 1880: 97, 110 (in part: BL-273). – CAIRNS, 1977a: 140–141, pl. 1, fig. 4, pl. 2, figs. 4, 5, 7; 1978: 11.

Description. – The corallum is subcylindrical to ceratoid, usually straight but sometimes slightly curved, and firmly attached to the substrate. The lectotype measures 6.6 × 6.0 mm in calicular diameter and is 16.0 mm tall. There are usually thin epithecal bands covering all or part of the synapticulotheca, most common towards the base, where they may completely obscure the costae. The costae are equal, narrow, compact, slightly ridged, and separated by narrow, deeply incised furrows. The costal granules are large and pointed.

Septa are arranged in six systems and four complete cycles; however, one large specimen (cd = 10.5 mm) has 14 complete half-systems or 56 septa. S_1 are the largest septa, with slightly exsert, thick, porous upper margins. S_2 are slightly smaller, less exsert, and do not extend as far toward the columella as the S_1. S_3 are very small and always flanked by two much larger S_4, which unite before each S_3. At the junction there is a large palus, almost as large as the S_4, which extends to the columella. The inner edges of S_{1-3} are straight and entire, whereas those of the S_4 are sometimes laciniate, especially deeper in the fossa. Numerous randomly arranged, pointed granules, sometimes measuring higher than the septal thickness, cover the septal faces. The palar granules are even larger but more blunt. The calicular edges of two of the pali of the paralectotype are bifurcated; the split ends are directed toward the flanking S_4.

The fossa may be deep or shallow and is sometimes bridged by endothecal dissepiments. The columella is composed of numerous, slender, twisted ribbons, which sometimes fuse together in an elongate mass aligned with the principal septa.

Discussion. – *B. palifera* is easily distinguished from other

western Atlantic *Balanophyllia* by its distinct pali and long, slender corallum.

Material. – P-584 (2) USNM 46674; P-595 (1); P-596 (3); G-1275 (1) USNM 46673; BL-273 (1) MCZ; undetermined Hassler station off Barbados, 183 m (1) MCZ; Alb-2152 (10) USNM 16098; Alb-2157 (1) USNM 16105; Alb-2338 (1) USNM 10223A; Alb-2346 (2) USNM 16100. – Syntypes of *B. palifera*.

Types. – Two syntypes collected at BL-68 are deposited at the MCZ (5438). One of these (Pl. XXXIV 4–6) is designated lectotype, the other (Pl. XXXIV 3) paralectotype. The other syntype, from BL-12 (MCZ-5571), is *B. floridana*.
Type-Locality. – Off Havana; 444–838 m.

Distribution. – Off Havana, Cuba; Arrowsmith Bank, Yucatan; off Barbados (Map 53). 53–444 m.

75. **Balanophyllia wellsi** Cairns, 1977

Plate XXXIV, figures 8–9; Plate XXXV, figures 1–3

Balanophyllia wellsi Cairns, 1977a: 142–144, pl. 3, figs. 6–7, pl. 4, figs. 1–4.

Description. – The corallum has a slightly flared calice, which tapers to a thick pedicel measuring about one-half the calicular diameter. The pedicel enlarges basally to form a large, firm attachment. The calice and pedicel are elliptical in cross-section; the holotype measures 20.0 × 15.2 mm in calicular diameter, 9.3 × 8.5 mm at the narrowest pedicel diameter, and 30.0 mm tall. Costae are equal, compact, slightly ridged or rounded, and separated by very deep, narrow striae. The costae bear coarse, blunt granules on their outer surfaces and finer, more pointed granules laterally.

Septa are arranged in six systems and five cycles; however, the last cycle is never complete. The largest specimen examined (the holotype) contains 62 septa. S_1 and S_2 are equal in size, only slightly exsert, and extend to the columella. The remaining septa are arranged according to the Pourtalès Plan: septa of the last cycle (usually S_4) join in front of the S_3 where, (1) they may fuse and extend to the columella as one septum, (2) one of the septa may remain prominent whereas the other joins it but appears subsidiary, or (3)

both septa may remain separate and extend almost to the columella closely parallel to each other (as in the holotype). A wide paliform lobe, not separated by a notch from its septum, sometimes occurs on the combined septa, or at their junction, or on each individual septum. The inner edges of all septa are straight and entire. The granulation on the upper, outer septal faces of the S_1 and S_2 fuses with that of adjacent septa, filling in the interseptal space with a porous network. The granules on the lower, outer septal faces are large and pointed, whereas on the inner edges the granules are low and rounded.

The fossa is deep and elongate. The columella of the holotype consists of four linearly arranged, twisted rods, which are aligned in the plane of the greater axis. The columellas of the paratypes are composed of more numerous rods fused into a narrow, elongate mass.

Discussion. – *B. wellsi* can be distinguished from all other species of *Balanophyllia* in the western Atlantic by its massive pedicel, flared calice, and distinctive septal arrangement.

Material. – SB-3472 (1); Gos-112/27 (1) Cornell. – Types.

Types. – The holotype and two paratypes are deposited at the USNM, four paratypes at the MCZ, and one paratype at the UMML.
Type-Locality. – 26°38′N, 79°02′W (northern Straits of Florida); 505–527 m.

Distribution. – Antillean distribution (Map 53). 412–505 m.

76. **Balanophyllia hadros,** new species

Plate XXXV, figures 4–6

Description. – The corallum is turbinate and slightly compressed, producing an elliptical calice. The largest specimen measures 30.9 × 24.8 mm in calicular diameter and 31.0 mm tall. The corallum rapidly tapers to a thick pedicel measuring one-third of the calicular diameter and re-expands slightly at the substrate to form a firm attachment. The costae are broad, equal, and separated by very narrow, deep striae. They are porous only near the calicular edge; lower on the corallum very low, rounded granules occur such that two–

three can be counted across the width of each costa. Often higher cycle costae merge with lower cycle costae toward the base.

Septa are arranged in six systems and five incomplete cycles. There is a direct relationship between calicular diameter and number of septa: the largest specimen examined has 15 pairs of S_5 for a total of 78 septa, and the smallest specimen of 19.3 mm greater calicular diameter has nine pairs of S_5, or 66 septa. S_1 and S_2 are equal in size and have straight, vertical, entire inner edges, which reach the columella. S_3 are slightly smaller and do not reach the columella. The higher cycle septa are arranged in a Pourtalès Plan. It is not unusual for an incomplete half-system to have one of its S_4 flanked by two S_5 and the other S_4 standing alone. If unflanked, the S_4 is almost as large as an S_3 and bears a prominent paliform lobe, which extends to the columella. If flanked by S_5, the S_4 is small and two S_5 meet before each S_4 in a large palus, which extends to the columella. None of the septa are exsert. Both septa and pali are covered by randomly arranged, low, pointed granules.

The fossa is moderately deep and contains an elongate columella composed of a compact, discrete, clockwise-swirling mass of ribbons.

Discussion. – Among the ten Recent species of western Atlantic *Balanophyllia*, this species most closely resembles *B. wellsi*, particularly in size and shape. It is differentiated from *B. wellsi* by its distinctive columella, larger and more distinct pali, and nonexsert septa.

Etymology. – The specific name *hadros* (Greek, =stout, strong) refers to the robust nature of the corallum.

Material. – Types.

Types. – Holotype: 0–4834 (USNM 46906). – Paratypes: 0–4834 (15) USNM 46907; 0-4832 (2) USNM 46908.
Type-Locality. – 14°14.2′N, 80°28.5′W (off Serrana Bank, Nicaragua); 274–293 m.

Distribution. – Known only from off Serrana Bank, Nicaragua (Map 52). 238–274 m.

77. **Balanophyllia bayeri,** new species

Plate XXXV, figures 7–9

Description. – The corallum is ceratoid, straight to slightly bent, and firmly attached by a thick pedicel. The holotype measures 11.4 × 10.3 mm in calicular diameter, 29.9 mm tall, and has a pedicel diameter of 4.8 mm. The pedicel diameter is usually about one-half that of the calicular diameter, and the height of the corallum is typically two–three times the calicular diameter. The theca is porous near the calice, becoming solid and granular toward the base. Costae are equal, broad, flat, and separated by thin, sometimes obscure striae, which diminish toward the base. Pairs of higher cycle costae (the C_4) join halfway to the base (where septal substitution occurs) and continue as one costa toward the base. There is no evidence of epithecal deposits and the costae are always free of attached organisms, implying that the edge zone must cover the corallum almost to the base.

Septa are arranged in six systems and usually four complete cycles, sometimes with several pairs of S_5. S_1 and S_2 are equal in size, very slightly exsert, and have straight, entire, vertical inner edges, which join the columella low in the fossa. The S_3 are small and flanked by pairs of larger S_4, each of which bears a small palus; in some cases the two P_4 fuse into a single, large lobe positioned before the S_3. The lobes extend to and sometimes into the columella. S_5, if present, are arranged in a Pourtalès Plan. There are randomly arranged, prominent, pointed granules on both the septal and palar faces.

The columella is a discrete, elongated structure aligned in the greater calicular axis. Like the columella of *B. dineta* and of *B. hadros*, it is composed of a clockwise-swirling mass of ribbons.

Discussion. – *B. bayeri* is most similar to *B. dineta* and *B. hadros* based on their very similar columellas and arrangement of septa and pali. It is distinguished from *B. hadros* by its smaller size and narrower (ceratoid) corallum. However, it is extremely similar to some specimens of *B. dineta* and could easily be confused with it. Distinctive characters of *B. bayeri* are: (1) a consistently larger

pedicel diameter, (2) a longer, straighter corallum, (3) fewer S_5, (4) a more laterally compressed columella, and (5) absence of an epitheca.

Etymology. – This species is named in honor of FREDERICK M. BAYER, noted invertebrate zoologist and octocoral systematist.

Material. – Types.

Types. – Holotype: O-4940 (USNM 46909). – Paratypes: O-4940 (17) USNM 46910; O-4939 (5) USNM 46911; P-596 (16) USNM 46912.
Type-Locality. – 20°30'N, 86°14'W (off Isla Cozumel, Mexico); 311–329 m.

Distribution. – Known only from off Isla Cozumel, Mexico (Map 54). 274–311 m.

Genus **Dendrophyllia** Blainville, 1830

Diagnosis. – Colonial, dendroid or bushy colonies formed by extratentacular budding. Costae well-defined. Septa arranged according to Pourtalès Plan. Columella spongy. Tabular endothecal dissepiments may be present. Type-species: *Madrepora ramea* Linnaeus, 1758, by subsequent designation (MILNE EDWARDS & HAIME, 1850).

78. **Dendrophyllia cornucopia** Pourtalès, 1871

Plate XXXVI, figures 1–4

Dendrophyllia cornucopia POURTALÈS, 1871: 45, pl. 5, figs. 7–8; 1880: 97, 111. – MARENZELLER, 1907a: 14. – ZIBROWIUS, SOUTHWARD & DAY, 1975: 97, pl. 5, fig. F. – ZIBROWIUS, 1976: 245–246, pl. 93, figs. A–L. – CAIRNS, 1978: 11.
Not *Balanophyllia cornucopia*: HORST, 1922: 59, pl. 8, fig. 13.

Description. – The corallum is cylindrical and elongate (up to 15 cm), tapering gradually to a narrow base, which is invariably broken at the tip. The recumbent corallum may be straight, curved, or greatly contorted. Numerous buds project at right angles to the parent corallum. The buds are rarely large and break off at a young

stage, which accounts for the numerous scars on the theca. The calice is elliptical; POURTALÈS's figured syntype measures 17.4 × 15.0 mm in calicular diameter. The corallum wall is thick and porous. Costae are flat, equal, porous, and set apart by narrow, poorly-defined striae. The costal granules are small and sharp. Epithecal bands are often present over most of the corallum.

Septa are arranged in six systems and five cycles, the fifth always incomplete. The figured syntype has 64 septa, including 16 S_5. S_1 and S_2 are equal in size, not exsert, and extend to the columella. Higher cycle septa follow the Pourtalès Plan, sometimes joining before the S_3 and extending to the columella. S_4 margins are irregular to laciniate. The septal granules vary from inconspicuous to large and pointed, twice the septal thickness in height.

The fossa is moderately deep, enclosing a massive, convex columella, oval to elliptical in outline. The fused columellar elements often form a clockwise-swirling vortex with obliquely ridged sides. Tabular endothecal dissepiments are abundant, occurring every 1.5–4.0 mm.

Discussion. – *D. cornucopia* does not fall within the definition of *Dendrophyllia sensu* Vaughan & Wells, 1943, nor does it resemble the type-species, *D. ramea*. Instead of a dendroid colony, it produces solitary coralla with randomly arranged buds, which usually detach long before a third generation bud can form from the second. The genus *Dendrophyllia* is in need of a revision in which a subgeneric category might usefully be employed to distinguish the diverse growth forms now included in the genus.

D. cornucopia is most similar to an undescribed species designated as *Dendrophyllia* A by CAIRNS (1976). The growth forms are identical, but *Dendrophyllia* A has much thinner thecae and septa and more widely spaced dissepiments, producing a much lighter corallum. Furthermore, *Dendrophyllia* A is known from shallower water (46–60 m).

Material. – P-861 (65) USNM 46684,, (10) UMML 8: 269; P-1171 (2) USNM 46683; G-386 (1) USNM 46678; G-663 (3) USNM 46679; G-664 (1) USNM 46680; G-1012 (3) USNM 46682; G-1029 (30) USNM 46681, (1) UMML 8: 368; GS(G)-19 (1) USNM 46685; GS(G)–23 (4) USNM 46686; SB-2427 (8); BL-100 (1) MCZ; BL-

253 (1) MCZ; BL-254 (1) MCZ; BL-281 (2) MCZ; BL-290 (2) MCZ; FH-7283 (6) USNM 22024; FH-7286 (19) USNM 22023; TAMU 65A9–20 (2) TAMU. – Syntypes of *D. cornucopia*.

Types. – Three lots of syntypes are deposited at the MCZ: (1) two worn fragments (5442, 2752) from Bibb-135 and Bibb-173, (2) the illustrated specimen (1871: pl. 5, figs. 7–8) (2752) from Bibb-173, and (3) six pieces with soft parts in alcohol from Bibb-173. There is also a specimen from Bibb-173 at the BM.
Type-Locality. – Off Key West, Florida; 220–229 m.

Distribution. – Western Atlantic: Straits of Florida; off northern Cuba; Windward Group, Lesser Antilles (Map 54). 132–604 m. – Eastern Atlantic: Celtic Sea; Gulf of Gascony. 330–960 m.

79. **Dendrophyllia gaditana** (Duncan, 1873)

Plate XXXVI, figures 5–10

Balanophyllia gaditana Duncan, 1873: 333.
Balanophyllia fistula: Horst, 1922: 59 (in part: Siboga-310).
Balanophyllia praecipua Gardiner & Waugh, 1939: 240, pl. 1, fig. 2.
Dendrophyllia praecipua: Wells, 1964: 116, pl. 2, figs. 6–7. – Zibrowius, 1973: 52; 1974a: 758.
Dendrophyllia gaditana: Zibrowius, 1976: 246–248, pl. 94, figs A–N.

Description. – This species forms small, sparsely branched, delicate colonies. The largest known branch measures less than 75 mm in length. Few colonies, if any, have been collected that show a basal attachment. Branching occurs both intra- and extratentacularly; the latter predominates and is responsible for the colonial form. In extratentacular division, the bud originates from the edge zone not far from the calice. The bud usually grows perpendicular to the parent branch but sometimes curves upward, paralleling it. In intratentacular division the calice elongates and adds septa; often the branch increases in length several centimeters before the bud becomes separate. Frequently, however, the bud aborts and the elongated calice resumes its original shape. The branch, however, always retains the flattened shape caused by the aborted bud.

The calice is round to slightly elliptical; an average calice measures 5.5 × 4.2 mm in diameter, whereas a flattened calice in the

process of intratentacular division may measure 8.8 × 3.5 mm. The branches are about the same diameter as the terminal calices. Usually the C_1 and C_2 are distinctly ridged and bear a single row of low, rounded granules. The higher cycle costae are low, equal, and also bear a single row of granules. The costae are covered by a thin, glistening epitheca, which usually extends to within 1–2 mm of the calice.

A mature corallite typically contains 48 septa arranged in six systems and four cycles; however, a calice in the process of intratentacular division may contain up to 17 or more half-systems, including S_5, for a total of 70–80 septa. Septa are arranged in a Pourtalès Plan. The S_1 are slightly larger and more exsert than the S_2; both have vertical, slightly serrate, lower inner edges as a result of perpendicularly projecting paliform teeth. Each S_3 is small and flanked by a pair of larger S_4, which join in front of the S_3 as a large paliform lobe. The septal and palar granulation is prominent and pointed, sometimes higher than the septal thickness. The large, spongy columella is bordered by the paliform teeth of the S_{1-2} and the P_4.

Discussion. – *D. gaditana* is easily distinguished from the other three western Atlantic *Dendrophyllia* by its much smaller branch diameter and peculiar intratentacular budding.

Material. – P-596 (1); O-4954 (1); Alb-2354 (11); Alb-2416 (1); Chain-15 (24 fragments); Chain-16 (3 fragments).

Types. – The very worn holotype of *D. gaditana* was collected at Porcupine station 29 in 1870, and is deposited at the BM (1883.12.10-97). Also deposited at the BM (1939.7.13.28) are the three types of *D. praecipua* collected at John Murray station 111 (5°04′18″S, 39°14′12″E, 73–165 m).
Type-Locality. – Iberian-Morocco Gulf (36°20′N, 6°47′W); 417 m.

Distribution. – Western Atlantic: off North Carolina and Georgia; Arrowsmith Bank, Yucatan; St. Peter and Paul Rocks (first records for the western Atlantic) (Map 55). 146–505 m. – Elsewhere: Iberian-Morocco Gulf; Madeira; Great Meteor Bank; Gulf of Guinea. 73–417 m. Off Queensland, Australia; off Indonesia; off Pemba, Tanzania.

80. **Dendrophyllia alternata** Pourtalès, 1880

Plate XXXVII, figures 1, 4, 8

Dendrophyllia alternata Pourtalès, 1880: 97, 111, pl. 2, figs. 3–4. – Zibrowius, 1974: 572; 1976: 248–249, pl. 95, figs. A–J. – Cairns, 1978: 11.

Description. – The colony is dendroid with uniplanar, dichotomous branching. The size of a mature colony is probably about 1 m. The diameter of the widest syntype branch is 13.0 mm, whereas the terminal branches measure 4–5 mm in diameter. Calices occur laterally in the plane of branching in an alternating fashion. Intercalicular distances range between 9–14 mm. Calices project 2–3 mm above the branch and are directed perpendicular to a large, basal branch but obliquely on a small, terminal branch. Coenosteal costae are prominent and rounded, separated by deep, narrow furrows. Costal granulation is fine, consisting of distinct, pointed spines particularly well developed on terminal branches. Calices are round and measure 4.5–5.5 mm in diameter.

Septa are arranged in six systems and four cycles; however, S_3 and S_4 are incompletely and irregularly developed, making the systems difficult to distinguish. There are usually 32, 34, or 36 septa in a poorly-defined Pourtalès Plan. S_1 and S_2 are equal, not exsert, and extend to the columella. Each pair of S_4 joins before a smaller S_3 and extends to the columella as one septum. There is usually a prominent paliform lobe (P_3) at the junction of the two S_4. The inner edges of S_4 are laciniate, particularly deep within the fossa. Sharp granules, equal to the septal thickness in height, are scattered over the septal faces.

The elongate columella is aligned in the direction of the branch and is composed of several granulated, individualized rods or a fused mass of rods.

Material. – P-901 (USNM 46690); G-169 (USNM 46688); G-386 (USNM 46689); G-661 (UMML 8: 369); G-663 (UMML 8: 270); G-664 (UMML 8: 370); O-1408; O-1991; O-4605; Gos-112/26 (Cornell); E-26017; E-30175; Atl-2980 B. (MCZ). – Syntypes.

Types – Eight branches (syntypes) are deposited at the MCZ: one from BL-209, one from BL-164, and six from BL-218. All bear the number 5440. Another branch from BL-209 is at the BM (1939.7.20.422).
Type-Locality. – Lesser Antilles; 274–346 m.

Distribution. – Western Atlantic: Antillean distribution; northern Gulf of Mexico (Map 55). 276–900 m. – Eastern Atlantic: northwest of Spain; Azores. 450–688 m.

Genus **Enallopsammia** Michelotti, 1871

Diagnosis. – Colonial, dendroid (often uniplanar) colonies formed by extratentacular budding. Coenosteum compact, synapticulothecate, porous only near calices. Septa arranged normally. Columella small. Type-species: *Coenopsammia scillae* Seguenza, 1864, by monotypy.

81. **Enallopsammia profunda** (Pourtalès, 1867)

Plate XXXVII, figures 5, 7

Diplohelia profunda Pourtalès, 1867: 114; 1868: 135; 1871: 25, pl. 6, figs. 6–7.
Dendrophyllia profunda: Pourtalès, 1878: 208, pl. 1, figs. 6–8. – Squires, 1959: 28–30, figs. 13–14. – Stetson, Squires & Pratt, 1962: 21, figs. 8–10, 12–13. – Squires, 1963: 22, fig.
Stereopsammia profunda: Pourtalès, 1880: 97, 111.
Not *Dendrophyllia profunda*: Alcock, 1902: 43 (= *E. marenzelleri*).
Not *Coenopsammia profunda*: Marenzeller, 1904: 313 (= *E. marenzelleri*).
Enallopsammia profunda: Zibrowius, 1973: 43–44, pl. 3, figs. 21–23. – Cairns, 1977b: 5; 1978:11.

Description. – The corallum is dendroid, forming massive colonies over 1 m high and equally broad. Subterminal branches are about 1 cm in diameter and bear prominent corallites shaped like truncated cones and projecting up to 1 cm perpendicularly from the main branch. Toward the branch tips the corallites are oriented obliquely. The calices are round to slightly elliptical (measuring 3–4 mm in diameter), and arranged alternately on opposite sides of a branch, sometimes producing a spiral along the branch. Their

centers are between 9–14 mm apart. The coenosteum is very compact, almost solid, even on fresh specimens; it is noticeably porous only around the calicular edges.

Septa are arranged in six systems and three cycles, the last cycle rarely complete. S_1 are not exsert, narrow, and reach the columella deep in the fossa; S_2 and S_3 are progressively smaller. In a small calice, each pair of S_3 joins in front of an S_2; with greater size the Pourtalès Plan is lost and all septa are arranged in normal fashion. Scattered septal granules are tall and blunt, two–three times the septal thickness in height.

The fossa is very deep in young corallites on thin branches but shorter in older corallites on thickened branches as a result of infilling of stereome. The columella is usually small, consisting of a spongy mass of trabeculae.

Discussion. – The five Recent species of *Enallopsammia* have been reviewed by ZIBROWIUS (1973), who provides a generic discussion and detailed synonymies.

Remarks. – Ahermatypic deep-water banks have known since 1865 (SARS) from the eastern Atlantic. They were reported for the first time in the western Atlantic by MOORE & BULLIS (1960) from off the Mississippi Delta and later by STETSON, *et al.* (1962) and SQUIRES (1963) from the Blake Plateau. *E. profunda* and *L. prolifera* are the primary constituents of the deep-water coral banks in the western Atlantic, whereas *L. prolifera* and *M. oculata* are the framework species of the eastern Atlantic banks (STETSON, *et al.*, 1962). In the western Atlantic, *E. profunda* therefore seems to fill the role of *M. oculata*. Great quantities of *E. profunda* and *L. prolifera* were dredged from CI-140 and CI-246 (26°22′–24′N, 79°35′–37′W, 738–761 m), which strongly indicates another such bank in the Straits of Florida. *Solenosmilia variabilis*, a similar branching form, also was reported from these stations. Associated solitary species often found attached to these branching forms are: *Bathypsammia fallosocialis*, *Tethocyathus variabilis*, *Cyathoceras squiresi*, and *Desmophyllum cristagalli*.

Material. – P-105 (USNM 46596); P-120 (USNM 46595); colonies from 17 Gerda stations from the Straits of Florida (USNM 46598–46610); CI-140 (USNM 46591, UMML 8: 361); CI-246 (USNM 46590); GS(G)-13 (USNM 46592); O-6690; O-11705; O-11716; O-11718; O-11725; SB-453; SB-2484; BL-44 (MCZ); Bibb-22 (MCZ); Alb-2415 (USNM 10497); Alb-2416 (USNM 10529); Alb-2529 (USNM 11974, YPM 8381); Alb-2530 (USNM 11975); Alb-2661 (USNM 15914); Alb-2662 (USNM 36526); Alb-2663 (USNM 16162); Alb-2668 (USNM 36925); Alb-2671 (USNM 36927); Alb-2678 (USNM 19089); colonies from 22 Gosnold stations from the eastern slopes of Florida and Georgia; E-26004 (USNM 46593); E-26019; E-26028; E-26037; E-26052; TAMU 65A9–4 (TAMU). – Syntypes of *D. profunda*; Squires's (1959) specimens (AMNH 3343).

Types. – At the MCZ there are two lots of syntypes of *E. profunda*: one contains two worn fragments (MCZ 2782) and the second contains nine fragments (no number). Both were collected from Bibb-3. Another syntype from this Bibb station is at the YPM (4773). The syntype from 28°24'N, 79°15'W was not found.
Type-Locality. – Straits of Florida; 640 m.

Distribution. – Northern temperate distribution from off Massachusetts through the Straits of Florida; one record off St. Lucia, Lesser Antilles (Map 56). 403–1748 m, records below 1000 m rare. 3°–12°C, based on 15 records.

82. **Enallopsammia rostrata** (Pourtalès, 1878)

Plate XXXVII, figures 2-3, 6

Amphihelia rostrata POURTALÈS, 1878: 204, pl. 1, figs. 4–5. – AGASSIZ, 1888: 152, fig. 473. – GOURRET, 1906: 122, pl. 12, figs. 11, 11A–B.
Stereopsammia rostrata: POURTALÈS, 1880: 97, 110–111.
Not *Anisopsammia rostrata*: MARENZELLER, 1904: 314 (= *E. amphelioides*).
Anisopsammia rostrata: GRAVIER, 1915: 3; 1920: 102–104, pl. 12, figs. 181–185.
Enallopsammia rostrata: SQUIRES, 1959: 40. – ZIBROWIUS, 1973: 44–45, pl. 2, figs. 14–15; 1976: 253–254, pl. 87, figs. A–K, pl. 88, figs. A–C.
Not *Enallopsammia rostrata*: LABOREL, 1970: 156 (= *E. amphelioides*).

Description. – The corallum is massive, forming dendroid, flabellate colonies with a base up to 3 cm in diameter. The colony is densely branched, especially near the smaller end branches where extratentacular budding occurs at the level of every, or every other, calice. Calices occur on only one side of the colony and are elliptical to teardrop-shaped, measuring 3–5 mm in diameter. The average distance between calicular centers is 6–8 mm. The calices project

upward and are bordered beneath by a prominent, costoseptal rostrum. The rostrum is usually aligned with the branch axis but is occasionally perpendicular to it. It is sometimes so produced as to almost enclose the calice. The coenosteum on the calicular side of the branches is usually porous, whereas, on rhe reverse side, it is solid and striate. A faint to well marked spiny costa corresponds to each septum; some costae are continuous with the striae on the reverse side of the branch.

Septa are arranged in six systems and three complete cycles. Five of the six S_1 are small, not exsert, and extend to the columella. The enlarged S_1 is very exsert and, along with the three–four adjacent septa on either side, form the rostrum, which gives the calice its elongated or teardrop shape. The S_2 and S_3 are progressively smaller. The S_2 extend to the columella whereas the S_3 are sometimes loosely connected by trabeculae to the S_2 halfway to the columella. The septal granules are spiny, like those of the costae, and randomly arranged. The lower, inner edges of the S_1 and S_2 bear small lobes intimately connected with the rudimentary, trabecular columella.

Discussion. – A third species of *Enallopsammia*, *E. amphelioides* (Alcock, 1902), (Pl. XL 4–5) also occurs in the tropical western Atlantic. Previously known only from the Indo-Pacific, it was recently collected from the Azores and off Brazil (24°49'S, 44°31'W, 535 m). The Brazilian record was reported incorrectly as *E. rostrata* by LABOREL (1969). A large colony of this species was found in a display case at the BM labelled "Barbadoes" [sic]; no additional data could be ascertained. It is not unlikely that this species also exists in the Caribbean. It is distinguished from the two other western Atlantic species in this genus by the combination of having calices on only one side of the branch and a very weakly developed calicular rostrum, if present at all.

Material. – P-881 (USNM 46695); P-1187 (USNM 46694); P-1262 (USNM 46693, UMML 8: 272); G-190 (USNM 46692); O-11225; O-11226; O-11722; BL-124 (MCZ); BL-218 (MCZ, USNM); BL-266 (MCZ, USNM); BL-271 (MCZ); Gos-112/78 (Cornell); E-30176; Atl-2980 B (MCZ); Atl-3469 (MCZ); Atl-3472 (MCZ); Atl-3474 (MCZ); Atl-280-3; Atl-280-16. – Syntypes of *A. rostrata*; Squires's (1959) specimen (AMNH 3444).

Types. – Two lots of syntypes are deposited at the MCZ: one contains two branches including the illustrated type and the other lot contains one large branch and 28 fragments. Both lots are from BL-2.
Type-Locality. – 23°14'N, 82°25'W (western Straits of Florida); 1472 m.

Distribution. – Western Atlantic: Kelvin and San Pablo Seamounts; off Georgia; Antillean distribution; off Nicaragua; off São Paulo, Brazil (Map 57). 300–1646 m. SQUIRES's (1959) record of 3383 m is questioned. 5°–13°C, based on three records. – Eastern Atlantic: the area bounded by the Celtic Sea, Azores, and the Gulf of Guinea. 732–2165 m.

Genus **Thecopsammia** Pourtalès, 1868

Diagnosis. – Solitary, turbinate to trochoid, fixed. Costae absent, epitheca sometimes covers basal synapticulotheca. Septa follow Pourtalès Plan. No pali. Columella small, spongy. Type-species: *Thecopsammia socialis* Pourtalès, 1868, by subsequent designation (MARENZELLER, 1907).

83. **Thecopsammia socialis** Pourtalès, 1868

Plate XXXVIII, figures 7–9

Thecopsammia socialis POURTALÈS, 1868: 138; 1871: 44, pl. 2, figs. 9–10; 1880: 97. – VERRILL, 1883: 63. – AGASSIZ, 1888: 152, fig. 475. – MARENZELLER, 1907: 8; 1907a: 16. – SQUIRES, 1959: 38, figs. 21, 24. – ZIBROWIUS, 1976: 269.
Not *Balanophyllia* (*Thecopsammia*) *socialis*: DUNCAN, 1870: 295 (= *L. britannica*).
Not *Balanophyllia socialis*: DUNCAN, 1873: 333–334, pl. 43, figs. 14–19 (=*Leptopsammia britannica*).

Description. – The corallum is trochoid to turbinate, straight, and attached by an expanded base. The pedicel measures one-fourth to one-half the calicular diameter. The calice is round to elliptical; the largest specimen examined measures 20.4 × 17.9 mm in calicular diameter and 20.0 mm tall. A smooth epitheca, which overlays a thick, non-costate synapticulotheca, is usually present around the base but sometimes extends almost to the calice.

Septa are arranged in six systems and five cycles, the last cycle never complete even in the largest specimen. Coralla measuring 6–11 mm in calicular diameter have four complete cycles. Above 11 mm, S_5 begin to appear by septal substitution. Pourtalès's illustrated syntype, measuring 15.5 mm in calicular diameter, has 64 septa. S_1 are larger than the S_2, slightly exsert, and extend to the columella. Each pair of S_4 joins in front of an S_3 and extends to the columella (Pourtalès Plan). The first 24 S_5 are equally distributed in all twelve half-systems before any one half-system is completed with four S_5. The upper edges of all septa are rounded and their inner edges descend almost vertically into a deep fossa. Smaller specimens have more open (turbinate) calices with sloping septal edges. The septa bear low, close-set, blunt granules arranged in poorly-defined lines parallel to the trabeculae.

The columella is small and spongy, composed of individualized elements or a solid fusion of several elements into a compact mass.

Discussion. – *T. socialis* is most similar to, and often found with, *Bathypsammia fallosocialis* and *B. tintinnabulum*, but can easily be distinguished by its arrangement of septa according to the Pourtalès Plan. SQUIRES (1959) gives a detailed comparison.

Material. – G-298 (1) USNM 46696; G-672 (2) USNM 46697, (1) UMML 8: 367; G-849 (10) USNM 46698, (1) UMML 8: 273; G-1029 (6) USNM 46699; GS(G)-13 (2) USNM 46701; GS(G)-40 (7) USNM 46700; O-5755 (2); O-11716 (1); SB-450 (14); SB-453 (4); BL-316 (1) MCZ; Bibb-203 (1) MCZ; Alb-2662 (1) USNM 14611; Alb-2663 (9) USNM 16111; Alb-2669 (4); 29 specimens from 11 Gosnold stations from the eastern slopes of Florida and Georgia; E-26017 (2) USNM 46702; E-26019 (1) USNM 46703; E-26028 (1) USNM 46704; Atl-266-4 (2); Atl-266-6 (1); Atl-266-7 (8). – Syntypes of *T. socialis*.

Types. – Thirty-nine syntypes in four lots are deposited at the MCZ: (1) 20 specimens (5601), including the figured type, (2) 14 specimens (5601), (3) three specimens (2773) labelled "Florida, 100–300 fms.", and (4) two specimens (2773). Another syntype is at the YPM (4764). Five more specimens at the BM labelled "100–300 fms." are probably also syntypes. POURTALÈS did not specify localities in his original description or with the type-material, therefore all that is certain is that the syntypes were collected by the Bibb in 1868 off the Florida Keys.
Type-Locality. – Florida Keys; 183–549 m (by implication).

Distribution. – Northern temperate distribution from off

Georgia to the Florida Keys (Map 57). 214–878 m. 6°–11°C, based on four records.

Genus **Bathypsammia** Marenzeller, 1907

Diagnosis. – Like *Thecopsammia* but septa arranged normally and columella usually larger. Type-species: *Thecopsammia tintinnabulum* Pourtalès, 1868, by original designation.

84. **Bathypsammia tintinnabulum** (Pourtalès, 1868)

Plate XXXVIII, figures 1–3; Plate XXXIX, figure 1

Thecopsammia tintinnabulum Pourtalès, 1868: 138; 1871: 43, pl. 1, figs. 10–11; 1878: 207; 1880: 97. – Agassiz, 1888: 152.
Bathypsammia tintinnabulum: Marenzeller, 1907; 8; 1907a: 16. – Squires, 1959: 32–37, figs. 15–16, 20, 22–24. – Cairns, 1977b: 5; 1978: 11.

Description. – The corallum is bell-shaped, straight or slightly curved, and attached by a narrow, nipple-shaped pedicel usually measuring less than one-fourth the calicular diameter. The calice is elliptical; the largest specimen examined measures 17.5 × 15.6 mm in calicular diameter and 25.0 mm tall. An epitheca is usually present and can cover up to 95% of the thick synapticulotheca. No costae are present.

Septa are arranged in six systems and four cycles; the fourth cycle is complete only in the largest coralla. Squires (1959) reported a specimen with 52 septa, including septa of the fifth cycle, but S_5 are uncommon. S_1 are slightly larger than S_2, not exsert, and extend into the columella, sometimes constricting it into three lobes. S_2 extend to the columella, S_3 only three-fourths of the distance. S_4 are rudimentary in large coralla and absent or barely distinguishable in average-size specimens. The number of S_4 is closely related to corallum size: they develop first in the end half-systems and later in the lateral ones. The inner edges of all septa are entire, straight, and unattached to other septa. Those of the S_1 and S_2 descend vertically into a moderately deep fossa, forming almost a right angle

at their upper, inner edges. Septal granules are large and blunt, arranged in widely spaced, curved rows oriented perpendicular to the trabeculae.

The spongy columella is large, elongate, and, as noted by POURTALÈS (1871), sometimes constricted by the inner edges of the S_1.

Material. – 691 specimens from 36 Gerda stations in the Straits of Florida (USNM 46511–46546); CI-246 (1) USNM 46547; GS(G)-15 (3) USNM 46549; O-6690 (8); O-11718 (1); SB-450 (3); SB-2420 (1); SB-2427 (4); BL-5 (4) MCZ, USNM; BL-44 (3) MCZ; Bibb-135 (100) MCZ; Bibb-215 (8) MCZ; Alb-2660 (2) USNM 14622; Alb-2664 (3) USNM 14499; Alb-2676 (47) USNM 14569; Combat-452 (1); 59 specimens from 10 Gosnold stations from the eastern coast of Florida; E-26004 (1); E-26017 (1); E-26052 (1); 360 km southwest of Egmont Key, Florida, 366 m (7) AMNH. – Squires's (1959) specimens (AMNH 3437); Syntypes.

Types. – At the MCZ there are seven lots of syntypes containing 129, 50, 40, 21, 10, 7, and 3 specimens (MCZ 5604 and 2768). The illustrated specimen (1871: pl. 1, figs. 10–11) is in the lot of three and is chosen as lectotype. Eleven additional syntypes are at the BM, four of which are numbered 69.10.25.15, 91.9.28.16, and 1939.7.20.426–427. Another syntype is at the YPM (4763). POURTALÈS did not specify where the syntypes were collected, but they undoubtedly resulted from the 1868 cruise of the Bibb. Only two of the seven lots had definite station data: Bibb-18 and Bibb-66.
Type-Locality. – Off Florida reefs; 183–549 m.

Distribution. – Northern temperate distribution from off South Carolina through Florida Keys; off southwestern Florida (Map 58). 210–1079 m. 6°–10°C, based on seven records.

85. **Bathypsammia fallosocialis** Squires, 1959

Plate XXXVIII, figures 4–6

Bathypsammia fallosocialis SQUIRES, 1959: 37–39, figs. 17–19, 21, 24.

Description. – The corallum is trochoid, usually straight, and attached by a thick pedicel measuring 25–55% of the calicular diameter. It is often found attached to branches of *Enallopsammia profunda*. The calice is elliptical; the largest corallum examined measures 19.7 × 17.5 mm in calicular diameter and 33.0 mm tall. An epitheca is almost always present, usually covering half of the corallum but varying from 10–90%. Costae are not present; instead

there is a uniform, highly porous synapticulotheca, which is very thick in large specimens, especially at the calicular edge.

Septa are arranged in six systems and usually four cycles, but SQUIRES (1959) reported a specimen with eight S_5. S_1 are slightly larger than the S_2; both are exsert and extend to the columella. S_3 are half as large as the S_1 and very narrow deeper in the fossa. S_4 are rudimentary and often have laciniate lower inner edges. Septal granulation consists of crowded, prominent, blunt spines, which are most highly developed near the inner edges of the S_1 and S_2 adjacent to the columella. The granules are arranged in rows oriented perpendicular to the trabeculae.

The fossa is moderately deep. The columella is very small and sometimes absent. When present it is elongate or elliptical, composed of a fused mass of twisted, spongy trabeculae.

Discussion. – *B. fallosocialis* closely resembles *B. tintinnabulum* but can be differentiated by the following: (1) its basal attachment is larger and not nipple-shaped, (2) its columella is smaller, (3) its theca is often much thicker, and (4) its septa are more crowded. No one character will always distinguish the two species since the range of variation overlaps in all parameters, but, taken together, these four characters will serve to differentiate the two.

Material. – P-105 (3) USNM 46705; P-901 (2) USNM 46717; 53 specimens from 8 Gerda stations in the northern Straits of Florida (USNM 46706–46713); CI-140 (2) USNM 46714; CI-246 (5) USNM 46715, (1) UMML 8: 275; O-11725 (2); SB-450 (6); BL-21 (2) MCZ; Alb-2416 (9) USNM 10544; Alb-2663 (7); Alb-2668 (6) USNM 14495; Gos-1749 (1); Gos-1766 (5); Gos-1767 (2); Gos-1784 (1); E-26004 (7) USNM 46716; Atl-266-4 (3) USNM 53411; Atl-266-6 (4) USNM 53412. – Paratypes.

Types. – Holotype: AMNH 3344. – Paratypes: sixty specimens (AMNH 3438). All specimens were collected at Vema-3-23.
Type-Locality. - 27°10'N, 79°34.9'W (northern Straits of Florida); 686 m.

Distribution. – Primarily a northern temperate distribution from off Georgia to off Havana, Cuba; one record off St. Lucia, Lesser Antilles (Map 59). 244–805 m. 6°–12°C, based on five records.

Genus **Rhizopsammia** Verrill, 1869

Diagnosis. – Reptoid colonies formed by extratentacular, stoloniferous budding, the corallites sometimes losing their interconnection. Corallites trochoid to cylindrical. Costae present. Pali present. Columella prominent, spongy. Type-species: *Rhizopsammia pulchra* Verrill, 1869, by monotypy.

86. **"Rhizopsammia" manuelensis** Chevalier, 1966

Plate XXXIX, figures 2–6

Rhizopsammia manuelensis Chevalier, 1966: 1382, pl. 6, figs. 1–3, pl. 7, fig. 5. – Zibrowius, 1976: 251–252, pl. 89, figs. A–M. – Cairns, 1977b: 5; 1978: 11.
Dendrophyllia n. sp. Allen & Wells, 1962: 390, pl. 4, figs. 2–4.

Description. – The colony forms phaceloid clumps composed of corallites of varying lengths and diameters, originating from an encrusting base. Small colonies are sometimes reptoid, as in the holotypic colony. Larger, phaceloid colonies from the western Atlantic commonly encrust the base of *Madrepora carolina*. Cylindrical to ceratoid corallites project up to 40 mm above the base, but rarely exceed 10 mm in height. An epitheca (holotheca) covers all of the basal encrustation and the lower coralla. The calices are elliptical, averaging 9.5 × 8.5 mm in diameter; however, the largest calice examined measures 18 mm in diameter. Costae are well-defined, equal, and bear one row of coarse, pointed granules.

Septa are arranged in six systems and five cycles; the last cycle is very irregularly developed. In a calice of 9.6 mm in diameter there are 56 septa. S_1 and S_2 are equal in size, slightly exsert, and extend to the columella. S_4 meet before the S_3 and extend to the columella. At their junction there is usually a distinct, high paliform lobe, separated from the S_3 by a notch. The inner edges of the S_1 and S_2 are entire; those of the S_3 are dentate or irregular. S_{4-5} are very porous, with laciniate paliform teeth. Septal granulation is variable, ranging from low and rounded to tall and pointed granules, and may be arranged randomly or in lines parallel to the trabeculae.

The fossa is deep. The columella of larger calices is massive, rounded, and elliptical, composed of individualized ribbons arranged in a clockwise-swirling mass.

Discussion. – CHEVALIER (1966) placed this species in *Rhizopsammia* Verrill, because the small, holotypic colony shows reptoid budding. However, larger colonies show a distinctly phaceloid growth form with corallites growing from a basal coenosteum as in *Cladopsammia* Lacaze-Duthiers, 1897. The type-species of *Rhizopsammia* produces corallites of uniformly low height and stolons, with subsequent loss of connection of individual corallites. The corallites of *R. manuelensis*, however, never form stolons, never lose their interconnection, and may be 40 mm tall. Although similar in growth form, *R. manuelensis* also does not appear to belong to *Cladopsammia* because of its prominent paliform lobes, which are not present in *C. rolandi* (type-species of *Cladopsammia*). In a general revision of the dendrophylliids, *R. manuelensis* could form the basis of a new generic or subgeneric category of *Cladopsammia* or *Rhizopsammia*.

Material. – P-595 (USNM 46720, UMML 8: 276); G-134; G-135 (USNM 46719); GS(G)-44 (USNM 46718); O-3953; SB-332; Alb-2354 (USNM 16103A); E-26538; WH-44/68 (SME); off Cat Cay, Bahamas, 366 m. – Types of *R. manuelensis* at MNHNP.

Types. – Holotype: a small colony of three corallites collected by the Gerard-Treca (23-3-1954) is deposited at the MNHNP, Institute of Paleontology. – Paratypes: one other colony at the MNHNP and others at IFAN, Dakar.
Type-Locality. – Off Cape Manuel, Dakar; 135 m.

Distribution. – Western Atlantic: Straits of Florida; northern Gulf of Mexico; Arrowsmith Bank, Yucatan; off Uruguay (Map 59). 78–366 m. – Eastern Atlantic; off Senegal; Cape Verde Islands; Gulf of Guinea. 55–135 m.

Genus **Trochopsammia** Pourtalès, 1878

Diagnosis. – Solitary, turbinate, fixed. Costae thick and porous. Septa arranged normally, showing no trace of the Pourtalès Plan.

Columella rudimentary or absent. Type-species: *Trochopsammia infundibulum* Pourtalès, 1878, by monotypy.

87. **Trochopsammia infundibulum** Pourtalès, 1878

Plate XL, figures 1–3

Trochopsammia infundibulum Pourtalès, 1878: 208, pl. 1, figs. 16–17; 1880: 97, 110. – Vaughan & Wells, 1943: 239, pl. 50, figs. 7–7a. – Cairns, 1978: 11.

Description. – The corallum is trochoid, tapering to a thick pedicel, and attached by an expanded base. The calice is round. An average-size specimen measures 10 mm in calicular diameter and about 13 mm tall. A solid, smooth epitheca covers the basal 10–20% of the corallum; otherwise broad, equal, finely granulated costae extend from the calice to the epitheca. The costae are separated by narrow, deeply incised grooves. Small, blunt costal granules are arranged over the entire surface of each costa such that, on the average, five–seven occur across a costa near the calicular edge.

The thickened costae merge into thick septa, which are arranged in six systems and three cycles. Several S_4 are present in only one of the specimens examined. The lower edges of the S_1 and S_3 extend to the center of the fossa; the S_2 do not quite reach the center. All septa are slightly exsert; the upper edges of the S_1 and S_2 are slightly ridged whereas the S_3 are rounded. The inner edges of the S_1 and S_2 are entire; those of the S_3 are irregularly dentate. Blunt granules cover most of each septal face except near the lower inner edge, where the granules are higher and usually fused into short carinae oriented perpendicular to the trabeculae.

The fossa is deep and narrow. There is usually no columella or, if present, only a very small one composed of several short trabeculae attached to the lower inner edges of the septa.

Material. – G-114 (2) USNM 46722; BL-226 (1) MCZ; BL-260 (2) MCZ; Alb-2351 (3) USNM 10276; Rosaura-34 (1) BM; 72 km south of Dry Tortugas, Florida, 1065 m (2). – Syntypes.

Types. – Two syntypes from BL-25 are deposited at the MCZ (5607). Two additional syntypes from BL-2 are at the BM (1939.7.20.430–431).
Type-Locality. – Off northwestern Cuba; 1161–1472 m.

Distribution. – Off northwestern Cuba; Windward Group, Lesser Antilles (Map 60). 532–1372 m.

INCERTAE SEDIS

88. "Cylicia" inflata Pourtalès, 1878

Plate XL, figures 6–7

Cylicia inflata POURTALÈS, 1878: 207, pl. 1, figs. 10–11; 1880: 96.

Description. – The corallites form loose clusters or small phaceloid colonies by reptoid budding. The corallites are roughly cylindrical in shape but usually slightly tapered at the calice and swollen toward the base. The largest corallite measures 3.8 mm tall, 1.4 mm in calicular diameter, and 2.4 mm in basal diameter. The theca is smooth and finely granulated, with only a slight trace of costae.

Septa are arranged in six systems and three complete cycles. The S_1 are slightly exsert and much larger than the S_2, which in turn, are larger than the S_3. Before the S_2, small pali occur. Their inner edges are often bifurcated, seeming to mold themselves around the inner edge of the S_2. A small, papillose columella of one–three elements lies deep in the fossa.

Discussion. – No material of this species has been discovered subsequent to its original description. It clearly does not belong to *Culicia* Dana, 1846. Because of the presence of pali before the second group of septa, it has affinities with *Caryophyllia*. *"C." inflata* could also be a young stage of a larger adult, but more material is needed to resolve its taxonomic position.

Material. – Types.

Types. – Two lots of syntypes are deposited at the MCZ. One lot (5573) from a Blake station off Havana at 242 fm (443 m), contains several attached specimens in very poor condition. The lot from BL-69 (5577) contains 21 small specimens, 13 of which are the species described and/or illustrated by POURTALÈS. The eight other specimens are young dendrophylliids. One of the 13 (Pl. XL 7) is designated lectotype; the remaining 12 are designated paralectotypes.
Type-Locality. – Off Havana, Cuba; 183 m.

Distribution. – Known only from off Havana, Cuba (Map 60). 183–443 m.

ZOOGEOGRAPHY

The rich, deep-water Scleractinian fauna of the Caribbean Sea has a strong influence on the tropical and temperate areas to the north and south. Consequently, the following zoogeographic analysis deals not only with the Caribbean but with the deep-water Scleractinian fauna of both the tropical and warm temperate regions of the western Atlantic.

Although corals have been examined from over 1150 deep-water stations, a thorough sampling of the Caribbean and adjacent waters is far from complete. There are still large, poorly sampled areas, notably off the southern coasts of Cuba and Hispaniola, off Costa Rica, the western Gulf of Mexico, and off Brazil between 5°N–20°S. Other areas have been intensively collected and are well known: the Straits of Florida, the northeastern Gulf of Mexico, the Lesser Antilles, and off the northwestern coast of Cuba. Some species are still known from only one or two records, others from over 150. Because of these limitations, the following analysis is considered preliminary.

Patterns of Distribution

Among the 88 deep-water species considered in this review, four patterns of distribution (Table 1, column 21) occur in the Caribbean and adjacent waters.

Firstly, an entirely insular distribution, extending from Grenada

to western Cuba, including the Bahamas and sometimes the Florida Keys, is shared by 15 species. This pattern is similar to EKMAN's (1953: 53) and BAYER's (1961: 343) Antillean region and BRIGGS's (1974: 63) West Indian province, based on shelf organisms. This distribution will subsequently be referred to as Antillean.

Secondly, another 20 species are found throughout the Antillean distribution but also with at least one record in the western Caribbean. The western Caribbean component may be a unique record or occur along the entire coast, but the avoidance of the northern coast of South America is absolute. This pattern does not have a shallow-water analog.

Thirdly, seven species are endemic to the temperate region off the eastern coast of the United States, with a southern boundary often extending to the Florida Keys, the northern Bahamas, or sometimes as far south as Cuba. Five of these species have a primarily warm temperate distribution (*Concentrotheca laevigata*, *Cyathoceras squiresi*, *Thecopsammia socialis*, *Bathypsammia tintinnabulum*, and *B. fallosocialis*), whereas the other two (*Enallopsammia profunda* and *Dasmosmilia lymani*) are found well into the cold temperate region.

Finally, three species (*Deltocyathus pourtalesi*, *Rhizosmilia gerdae*, and *Flabellum pavoninum atlanticum*) are endemic to the insular side of the Straits of Florida and Old Bahama Channel.

Of the remaining species, 26 do not fall into a pattern of distribution within the Caribbean, either because of a paucity of records or because of an atypical distribution.

Another 17 species are widely distributed throughout the Caribbean off virtually every sector of the coast. These species are also usually common in the Gulf of Mexico, Bahamas, off the eastern coast of the United States, and off tropical Brazil. Of these 17 species, nine are endemic to the western Atlantic, six are amphi-Atlantic, and two are cosmopolitan.

FAUNISTIC RELATIONSHIPS IN THE WESTERN ATLANTIC

TABLE 1 indicates the generalized distribution of the 88 species treated in this review. Seventy-six of the 88 species occur in the

Caribbean. Reference to TABLE 1 indicates that the area of highest species diversity is off Cuba (61 species), followed by the Windward Group of the Lesser Antilles (60 species). However, other areas of the Caribbean, such as Hispaniola, Puerto Rico, and off the northern coast of South America have low species diversities, on the order of 20–25.

Areas adjacent to the Caribbean have many fewer species. For instance, there are only 40 species of deep-water corals known from the Gulf of Mexico: 19 in the western Gulf and 36 in the eastern Gulf (15 occur throughout the Gulf). Of these 40, four are cosmopolitan species, four are primarily temperate region species (Distributional pattern 4 of TABLE 1), one (*Flabellum fragile*) is endemic to the Gulf except for records in the upper Florida Keys, and the remaining 31 species are tropical or eurythermal tropical (Caribbean) species (BRIGGS, 1974: 366). None of the four temperate species shows a disjunct distribution around Florida. The deep-water ahermatypes of the Gulf of Mexico, therefore, are a depauperate extension of the Caribbean fauna with a minor temperate component.

The deep-water coral faunas of the Bahamas and the eastern coast of Florida have 54 and 55 species respectively, reflecting, in part, their proximity to the Caribbean fauna, especially Cuba.

To the north of Florida the influence of the Caribbean fauna decreases. There are 28 species of deep-water Scleractinia in the warm temperate northwest Atlantic. Half of these species are eurythermal tropical species, extending into the warm temperate region but not north of Cape Hatteras. Seven species are primarily endemic to the temperate region with southern ranges extending to Florida or Cuba (TABLE 1, column 21, pattern 4). The remaining seven species are cosmopolitan or widely distributed. North of Cape Hatteras, twelve deep-water species have been reported: six species characteristic of cold temperate waters that do not occur in the Caribbean (TABLE 2), two species common to the temperate region (*Enallopsammia profunda* and *Dasmosmilia lymani*), and four cosmopolitan or widely distributed species. No Caribbean tropical species extends into this cold temperate region. Therefore the fauna off the eastern coast of the United States can be divided into a

TABLE 1

GEOGRAPHIC DISTRIBUTION OF THE DEEP-WATER SCLERACTINIA OF THE CARIBBEAN AND ADJACENT WATERS

Species List	Bermuda	East coast of U.S.[1]	Eastern Florida & Keys	Bahamas	Western Gulf[2]	Eastern Gulf[3]	Cuba, Caymans	Hispaniola	Puerto Rico	Jamaica	Windward Group[7]	Leeward Group[7]	N. coast of S. America	Southwest Caribbean[4]	Northwest Caribbean[5]	Trinidad & Tobago, northeast Venezuela	Guianas, Surinam	Brazil	St. Peter & Paul Rocks	Eastern Atlantic	Distributional Pattern[6]	Bathymetric Range in western Atlantic (meters)	Temperature Range in western Atlantic (°C)
1 *M. myriaster*	×	.	×	×	×	×	×	×	×	×	×	×	.	×	×	.	×	.	.	.	3	37–708	9–26
2 *F. pusillus*	.	.	×	.	.	.	.	.	.	.	×	.	.	.	×	.	.	×	.	.	3	285–439	–
3 *F. symmetricus*	×	.	×	×	.	.	×	.	×	×	×	.	.	×	×	.	.	×	.	.	3	183–1664	6–12
4 *F. crispus*	.	.	×	.	.	×	.	.	.	.	×	.	.	.	×	.	.	×	.	×	3	183–640	–
5 *F. marenzelleri*	.	.	.	×	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	×	0	2450–2745	–
6 *L. discus*	.	.	.	.	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	×	0	2842–3475	–
7 *M. oculata*	.	×	×	×	×	×	×	×	×	×	×	×	×	.	×	×	×	×	.	×	1	144–1391	4–12
8 *M. carolina*	.	×	×	×	×	×	×	×	.	×	.	.	.	×	×	.	.	.	×	.	3	53–801	–
9 *A. patera*	.	.	×	×	.	.	×	.	.	.	×	.	.	.	.	.	.	.	.	.	2	500–700	–
10 *C. berteriana*	.	.	×	×	.	×	×	×	×	×	×	×	.	×	×	×	×	.	.	.	3	100–1033	7–23
11 *C. cornuformis*	.	×	×	×	.	×	×	.	.	×	×	.	.	.	×	.	.	×	.	×	3	37–931	–
12 *C. antillarum*	.	.	.	×	.	.	×	.	.	.	×	.	.	.	.	.	.	?	.	.	2	150–1000	–
13 *C. polygona*	.	.	×	.	×	.	×	.	.	×	×	.	.	.	.	.	.	.	.	.	2	700–1817	5–8
14 *C. paucipalata*	.	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	.	.	.	.	0	714–843	–
15 *C. a. caribbeana*	×	?	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	.	.	1	183–1646	5–16
16 *C. barbadensis*	.	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	.	.	.	.	0	183–249	–
17 *C. corrugata*	.	.	.	×	.	.	×	.	.	.	×	.	.	.	.	.	.	.	.	.	2	183–380	–
18 *C. parvula*	.	.	.	×	.	.	×	×	.	×	×	.	×	.	×	.	.	×	.	.	0	97–399	–
19 *C. zopyros*	.	.	.	.	.	.	×	.	.	×	×	.	.	.	.	.	.	.	.	.	2	73–618	–
20 *C. laevigata*	.	×	×	.	.	×	.	.	.	.	.	.	.	.	×	.	.	.	.	×	4	183–800	10–12
21 *C.* sp. cf. *C. cornu*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	0	220–241	–
22 *C. squiresi*	.	×	×	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	686–822	–
23 *L. langae*	.	×	×	.	.	.	×	.	.	.	×	.	.	.	×	.	.	.	.	.	3	695–810	–
24 *L. facetus*	.	×	×	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	0	385–402	–
25 *O. rotundifolia*	.	×	×	×	×	.	×	×	×	.	×	×	×	×	.	×	×	×	.	.	1	46–640	–
26 *T. rawsonii*	.	×	×	×	×	×	×	×	×	.	×	×	×	×	.	×	×	×	.	.	1	82–622	8–23

Species List	Bermuda	East coast of U.S.[1]	Eastern Florida & Keys	Bahamas	Western Gulf[2]	Eastern Gulf[3]	Cuba, Caymans	Hispaniola	Puerto Rico	Jamaica	Windward Group[7]	Leeward Group[7]	N. coast of S. America	Southwest Caribbean[4]	Northwest Caribbean[5]	Trinidad & Tobago, northeast Venezuela	Guianas, Surinam	Brazil	St. Peter & Paul Rocks	Eastern Atlantic	Distributional Pattern[6]	Bathymetric Range in western Atlantic (meters)	Temperature Range in western Atlantic (°C)
27 *T. fossulus*	.	.	.	×	.	.	.	.	.	.	×	.	.	.	.	.	.	.	.	.	0	205–380	–
28 *T. fasciatus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	0	238	–
29 *T. cylindraceus*	.	.	×	×	.	.	.	.	.	×	×	.	.	.	.	.	.	.	.	.	2	155–649	–
30 *T. recurvatus*	.	.	.	×	.	.	×	.	.	×	.	.	.	.	×	.	.	.	.	.	0	320–488	–
31 *T. variabilis*	.	.	×	×	.	.	×	.	×	.	×	.	.	.	×	.	.	.	.	×	3	250–576	–
32 *P. pulchellus*	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	.	×	×	.	×	1	17–838	8–24
33 *D. agassizii*	.	.	×	.	.	.	×	.	.	.	×	.	.	.	.	.	.	.	.	.	2	494–907	–
34 *D. calcar*	×	×	×	×	.	×	×	×	×	×	×	.	×	×	×	×	×	×	.	.	1	81–675	8–19
35 *D.* sp. cf. *D. italicus*	×	?	×	×	×	×	×	×	×	×	×	×	×	.	×	×	.	×	.	×	1	403–2634	3–7
36 *D. eccentricus*	×	×	×	×	×	×	×	.	×	×	×	.	×	×	×	×	.	×	.	×	1	183–907	–
37 *D. moseleyi*	×	.	×	×	.	.	×	.	.	.	×	.	.	.	×	.	.	.	.	×	3	201–777	–
38 *D. pourtalesi*	.	×	×	×	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	.	5	311–567	–
39 *S. diadema*	.	×	×	×	.	×	×	×	×	×	×	×	×	×	×	×	×	×	.	.	1	795–2133	3–8
40 *S. paliferus*	.	.	×	×	×	×	×	.	.	×	×	×	×	×	×	×	×	×	.	.	1	229–715	11–19
41 *S. laevifundus*	.	.	×	×	.	.	×	×	.	.	×	.	.	×	.	.	.	.	.	.	3	300–1158	5–7
42 *S. (O.) coronatus*	.	.	×	×	.	×	×	×	×	×	×	×	×	×	×	×	.	.	.	.	1	543–1250	3–8
43 *T. corbicula*	.	.	.	.	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	.	0	400–576	–
44 *P. folliculus*	.	?	×	.	.	.	×	.	.	.	×	.	.	.	.	.	.	.	.	×	2	284–457	–
45 *P. stimpsonii*	.	×	×	.	.	×	×	.	.	.	×	.	.	.	.	.	.	×	.	×	2	110–553	–
46 *D. cristagalli*	.	×	×	×	.	.	×	.	.	.	×	.	.	.	.	.	.	×	.	×	0	155–1939	–
47 *D. striatum*	.	.	.	×	.	.	×	×	.	×	×	.	.	.	.	.	.	.	.	.	2	130–823	–
48 *T. riisei*	.	.	.	×	.	.	×	.	.	×	×	.	.	×	×	×	×	.	.	.	3	18–1317	–
49 *T. gombergi*	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	155–220	–
50 *L. prolifera*	.	×	×	×	.	×	.	.	×	×	×	.	×	.	.	.	.	×	.	×	0	95–1000	3–12
51 *A. fecunda*	.	.	×	.	×	×	×	×	.	×	×	×	×	×	×	×	.	.	×	×	1	73–567	–
52 *C. arbuscula*	.	.	×	×	×	×	×	.	×	.	×	×	×	×	×	.	×	.	.	×	1	109–622	–

Species List	Bermuda	East coast of U.S.[1])	Eastern Florida & Keys	Bahamas	Western Gulf[2])	Eastern Gulf[3])	Cuba, Caymans	Hispaniola	Puerto Rico	Jamaica	Windward Group[7])	Leeward Group[7])	N. coast of S. America	Southwest Caribbean[4])	Northwest Caribbean[5])	Trinidad & Tobago, northeast Venezuela	Guianas, Surinam	Brazil	St. Peter & Paul Rocks	Eastern Atlantic	Distributional Pattern[6])	Bathymetric Range in western Atlantic (meters)	Temperature Range in western Atlantic (°C)
53 *D. lymani*	.	×	×	.	.	×	.	.	.	.	.	×	.	.	.	.	.	×	.	×	4	48–366	7–21
54 *D. variegata*	.	.	×	.	.	×	.	.	.	.	.	.	×	.	.	.	.	×	.	×	0	110–366	–
55 *S. variabilis*	.	×	×	.	.	×	×	.	.	×	×	×	.	.	.	×	×	×	.	×	0	220–1383	–
56 *A. prolifera*	.	.	×	×	×	×	.	.	.	.	×	×	×	.	.	×	×	.	.	×	0	32–311	–
57 *A. marchadi*	.	.	×	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	.	×	0	32–229	–
58 *R. gerdae*	.	.	.	×	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	.	5	123–355	–
59 *P. flos*	.	.	.	×	.	×	×	×	.	×	×	.	.	×	.	×	.	×	.	.	3	22–560	–
60 *F. moseleyi*	.	.	×	.	.	×	×	.	.	×	×	×	×	×	×	×	.	.	.	.	1	216–1097	6–18
61 *F. fragile*	.	.	×	.	×	×	.	.	.	.	.	.	.	.	.	.	.	?	.	.	0	80–366	–
62 *F. p. atlanticum*	.	.	.	×	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	.	5	357–618	–
63 *P. frusta*	.	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	.	×	.	×	0	497–907	–
64 *J. cailleti*	.	×	×	×	.	×	×	×	.	×	×	×	×	×	×	×	×	.	.	×	1	86–1682	6–16
65 *J. pseudoalabastra*	.	.	.	×	.	.	.	.	.	×	.	.	.	.	.	.	.	.	.	×	0	1089–1234	–
66 *P. fragilis*	.	×	×	×	.	×	×	.	.	.	×	×	.	×	×	.	.	×	.	.	1	75–796	10–18
67 *G. paradoxa*	.	.	×	.	.	.	.	.	.	×	×	.	.	.	×	.	.	.	.	.	3	91–700	–
68 *G. minor*	.	.	.	×	.	.	×	×	.	×	×	×	×	×	×	.	.	.	.	.	1	2–241	–
69 *G. annulata*	×	.	.	×	×	×	×	×	.	×	×	.	.	×	×	.	.	.	.	×	3	37–653	–
70 *S. fissilis*	.	.	×	×	.	×	×	.	×	.	×	.	.	.	×	.	.	.	.	×	3	88–640	–
71 *S. vermiformis*	.	×	×	×	.	×	×	.	.	.	×	.	.	.	.	.	.	×	×	×	3	128–835	–
72 *P. hispidus*	.	.	.	×	.	.	×	.	×	×	×	.	.	.	.	.	.	.	.	.	2	349–1200	–
73 *B. cyathoides*	.	.	.	×	.	.	×	.	.	.	×	.	.	.	×	.	.	.	.	.	3	53–494	–
74 *B. palifera*	.	.	.	.	.	.	×	.	.	.	×	.	.	.	×	.	.	.	.	.	3	53–444	–
75 *B. wellsi*	.	.	.	×	.	.	×	.	.	×	.	.	.	.	.	×	.	.	.	.	2	412–505	–
76 *B. hadros*	.	.	.	.	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	.	0	238–274	–
77 *B. bayeri*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	×	.	.	.	.	.	0	274–311	–
78 *D. cornucopia*	.	.	×	×	.	×	×	.	.	.	×	.	.	.	.	.	.	.	.	×	2	132–604	–

Species List	Bermuda	East coast of U.S.[1]	Eastern Florida & Keys	Bahamas	Western Gulf[2]	Eastern Gulf[3]	Cuba, Caymans	Hispaniola	Puerto Rico	Jamaica	Windward Group[7]	Leeward Group[7]	N. coast of S. America	Southwest Caribbean[4]	Northwest Caribbean[5]	Trinidad & Tobago, northeast Venezuela	Guianas, Surinam	Brazil	St. Peter & Paul Rocks	Eastern Atlantic	Distributional Pattern[6]	Bathymetric Range in western Atlantic (meters)	Temperature Range in western Atlantic (°C)
79 *D. gaditana*	.	×	.	.	.	.	.	.	.	.	.	.	.	.	×	.	.	.	×	×	0	146–505	–
80 *D. alternata*	.	.	.	×	×	.	×	.	.	×	×	.	.	.	.	×	.	.	.	×	2	276–900	–
81 *E. profunda*	.	×	×	×	.	×	×	.	.	.	×	.	.	.	.	.	.	.	.	.	4	403–1748	3–12
82 *E. rostrata*	.	×	.	×	.	.	×	×	.	×	×	.	.	×	.	.	.	×	.	×	3	300–1646	5–13
83 *T. socialis*	.	×	×	×	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	214–878	6–11
84 *B. tintinnabulum*	.	×	×	×	×	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	210–1079	6–10
85 *B. fallosocialis*	.	×	×	.	.	.	×	.	.	×	.	.	.	.	.	.	.	.	.	.	4	244–805	6–12
86 *"R". manuelensis*	.	.	×	×	×	×	.	.	.	.	.	.	.	.	×	.	.	×	.	×	0	78–366	–
87 *T. infundibulum*	.	.	.	.	.	×	×	.	.	.	×	.	.	.	.	.	.	.	.	.	2	532–1372	–
88 *"C". inflata*	.	.	.	.	.	.	×	.	.	.	.	.	.	.	.	.	.	.	.	.	0	183–443	–
Totals	9	28	55	54	19	36	61	21	18	36	60	20	21	25	39	20	15	25	4	33			

[1]) North of Florida.

[2]) Boundary between eastern and western Gulf of Mexico considered as the line from the Mississippi Delta to the northeast tip of the Yucatán Peninsula.

[3]) Southeastern border of eastern Gulf of Mexico considered as the line of longitude 83°30′ W between Cuba and the Florida Keys.

[4]) Southwestern Caribbean includes coasts of Panama, Costa Rica, Nicaragua, and all offshore islands.

[5]) Northwestern Caribbean includes coasts from Honduras to the shortest line connecting the Yucatán Peninsula to Cuba and all offshore islands.

[6]) Distributional patterns: 0. No distributional pattern; 1. Widespread throughout Caribbean; 2. Antillean distribution; 3. Antillean distribution plus western Caribbean; 4. Northern temperate distribution; 5. Insular side of Straits of Florida and Old Bahama Channel.

[7]) The geographic subdivisions of the Antilles proposed by WAGENAAR HUMMELINCK (1953, 1977) are used throughout this paper.

warm temperate component of 28 species, which is strongly influenced by the Caribbean tropical fauna, and a cold temperate component of 12 species north of Cape Hatteras, strongly influenced by temperate species common to the North Atlantic. There is an overlap of six species between the warm and cold temperate regions.

The nine species of deep-water ahermatypes known from Bermuda are all species that also occur in the Caribbean. No cosmopolitan, temperate, or endemic species have been reported, although two species of endemic shallow-water ahermatypes have been described. Five of the nine species have amphi-Atlantic distributions.

Thirty-four species of deep-water Scleractinia (including *Enallopsammia amphelioides* and *Stephanocyathus* (*Odontocyathus*) sp. cf. *S.* (*O.*) *nobilis*) are known from the Guianas to Cabo Frio, Brazil. Thirty-two are common in the Caribbean including six cosmopolitan species. *Stephanocyathus* sp. cf. *S.* (*O.*) *nobilis* is known from off Brazil and the eastern Atlantic and *Enallopsammia amphelioides* is known from off Brazil, the Azores, and the Indo-Pacific; neither has been reported from the Caribbean. No deep-water species are endemic to this region (southwestern and west equatorial tropical Atlantic), and 94% of the known species also occur in the Caribbean, implying that this region is simply a depauperate extension of the Caribbean fauna.

The Scleractinian fauna of the poorly known southwestern temperate Atlantic has been reviewed by SQUIRES (1961). Of the 17 ahermatypic species known from this region, six are cosmopolitan and the remaining 11 (TABLE 3) are characteristic of the South Atlantic temperate region, with no overlap with the Caribbean.

For reference, a list of the shallow-water tropical western Atlantic ahermatypes is provided (TABLE 4). Combining the tropical and temperate areas, both shallow and deep water (TABLES 1–4), results in 134 species of ahermatypic Scleractinia known from the western Atlantic.

In summary, of the 90 species of deep-water Scleractinia known from the tropical western Atlantic (including *Enallopsammia amphelioides* and *Stephanocyathus* (*O.*) *nobilis*), the center of species diversity is the Caribbean (76 species), specifically the Antilles. Away from the Caribbean, both north and south, there is a sharp

decrease in the number of species. The Brazilian coast, Bermuda, Gulf of Mexico, and the warm temperate coast of the United States are considered to be depauperate extensions of the Caribbean fauna. Only the warm temperate coast of the United States from Florida to Cape Hatteras is characterized by an endemic slope fauna (5 of 28 species). Otherwise endemism does not mark these areas as zoogeographic subregions.

Worldwide Faunistic Relationships

The tropical western Atlantic Scleractinia found below 200 meters form a highly endemic (54 species = 60%), independent unit (Table 5). Of the remaining 36 species, 35 are found on both sides of the Atlantic: 11 (12%) are cosmopolitan/circumtropical and 24 (27%) are exclusively amphi-Atlantic. The cosmopolitan species are: *Fungiacyathus marenzelleri, Leptopenus discus, Madrepora oculata, Desmophyllum cristagalli, Lophelia prolifera*, and *Javania cailleti*. The following species are circumtropical or widespread, except for the eastern Pacific: *Solenosmilia variabilis, Stenocyathus vermiformis, Dendrophyllia gaditana, Enallopsammia amphelioides*, and ?*Stephanocyathus* (*Odontocyathus*) *nobilis*. Analyzed at the generic level, this fauna shows a strong cosmopolitan/circumtropical (Tethyan) influence (53%), and a lesser amphi-Atlantic (14%) and endemic (12%) component. *Polymyces* and *Oxysmilia* have an amphi-American distribution. Seven genera do not fall into any of the categories of Table 5 (see footnote c).

The shallow-water ahermatypic fauna is less well known, but when analyzed in the same manner (Table 5), a higher degree of species endemism (74%) and a lower amphi-Atlantic component (19%) are apparant. There are at least an additional 10 undescribed shallow-water species, most of which are endemic to the tropical western Atlantic, which would further increase the endemic percentage. Only one species is circumtropical, *Tubastraea coccinea*, and one, *Cladocora debilis*, is amphi-Atlantic and eastern Pacific. The generic analysis reveals a pattern similar to that of the deep-water corals: a highly cosmopolitan/circumtropical (59%) and low endemic

TABLE 2

TEMPERATE (30°–55°N), NORTHWESTERN ATLANTIC AHERMATYPES NOT FOUND IN THE TROPICAL WESTERN ATLANTIC

Flabellum alabastrum Moseley, 1873
Flabellum angulare Moseley, 1876
Flabellum macandrewi Gray, 1849
Fungiacyathus fragilis Sars, 1872
Vaughanella margaritata Jourdan, 1895
Caryophyllia ambrosia ambrosia Alcock, 1898

6 Species

TABLE 3

TEMPERATE (25°–57°S), SOUTHWESTERN ATLANTIC AHERMATYPES NOT FOUND IN THE TROPICAL WESTERN ATLANTIC

Flabellum curvatum Moseley, 1881
Flabellum thouarsii Milne Edwards & Haime, 1848
Flabellum patagonichum Moseley, 1881
Caryophyllia profunda Moseley, 1881
Caryophyllia antarctica Marenzeller, 1904
Caryophyllia A Squires, 1969
Bathelia candida Moseley, 1881
Sphenotrochus gardineri Squires, 1961
Balanophyllia malouinensis Squires, 1961
Desmophyllum capense Gardiner, 1904
Oculina patagonica (Squires, 1963)

11 Species

TABLE 4

SHALLOW-WATER (EXCLUSIVELY 0–200 M) AHERMATYPES OF THE TROPICAL WESTERN ATLANTIC

Madracis sp. cf. *M. asperula* Milne Edwards & Haime, 1849
Madracis pharensis pharensis (Heller, 1868)
Madracis brueggemanni (Ridley, 1881)
Madracis formosa Wells, 1973
Agaricia cailleti (Duchassaing & Michelotti, 1864)
Cladocora debilis Milne Edwards & Haime, 1849
Astrangia danae Milne Edwards & Haime, 1849
Astrangia rathbuni Vaughan, 1906
Astrangia solitaria (Lesueur, 1817)
Phyllangia americana Milne Edwards & Haime, 1849
Colangia immersa Pourtalès, 1871
Oculina tenella Pourtalès, 1871
Caryophyllia horologium Cairns, 1977
Rhizosmilia maculata (Pourtalès, 1874)
"Coenocyathus" goreaui Wells, 1972
Pourtalosmilia conferta Cairns, 1978
Trochocyathus halianthus Lindström, 1877
Polycyathus senegalensis Chevalier, 1966
Sphenotrochus auritus Pourtalès, 1874
Gardineria simplex (Pourtalès, 1868)
Balanophyllia floridana Pourtalès, 1868
Balanophyllia goesi (Lindström, 1877)
Balanophyllia caribbeana Cairns, 1977
Balanophyllia grandis Cairns, 1977
Balanophyllia dineta Cairns, 1977
"Rhizopsammia" bermudensis Wells, 1972
Tubastraea coccinea Lesson, 1831

27 Species

(18%) and amphi-Atlantic (6%) components. *Astrangia* is Atlanto-east Pacific.

For the sake of comparison, the western Atlantic hermatypic corals were similarly analyzed (TABLE 5). This analysis reveals a very high specific (87%) and generic (58%) endemism and a small amphi-Atlantic component (13% of the species).

In summary, all three western Atlantic Scleractinian faunas (ahermatypic, 200+ m; ahermatypic, 0–200 m; hermatypic, 0–90 m), are highly endemic with small cosmopolitan and amphi-Atlantic components. However, there is a definite trend toward increase in endemism and decrease in cosmopolitan and amphi-Atlantic components of both species and genera when the faunas are ordered from greater to lesser depths, testifying to the greater effectiveness of the Atlantic Ocean as a barrier to dispersal of shallow-water species.

BATHYMETRY OF THE TROPICAL WESTERN ATLANTIC CARIBBEAN AHERMATYPES

In the Caribbean and adjacent waters the greatest number of ahermatypic species are found at depths of approximately 300 m; 59 species have bathymetric ranges that include 300 m. Thirty-five species have ranges extending to both 50 and 100 m, and 51 species occur at 200 m. (Twenty-two and 10 species occurring at 50 and 100 m, respectively, belong to the shallow-water ahermatypic fauna.) Deeper than 300 m, species diversity gradually decreases: 53 occur at 500 m, 22 at 1000 m, and 10 at 1500 m. Twelve species have ranges extending deeper than 1500 m. Two species, *Fungiacyathus marenzelleri* and *Leptopenus discus*, occur only at lower slope and upper abyssal depths. In summary, the greatest species diversity of ahermatypes is found on the upper slope, particularly between 200–500 m.