

Discussion. — This species is easily distinguished from *D. cristagalli*, the only other *Desmophyllum* known from the Atlantic, by its much smaller size, fewer septa, and very distinctive thecal striae, which occur even on an individual 1.5 mm in calicular diameter.

D. striatum could also easily be confused with individual coralites of *T. riisei*, particularly because these two species are often collected together. It can usually be differentiated by its thecal striae, thicker pedicel, and less exsert septa.

Etymology. — The specific name *striatum* (Latin, =groove, channel) refers to the distinctive, horizontal thecal striae.

Material. — Nekton-244 (4) USNM, (1) UMML 8: 284; Nekton (*beta*)-563 (1). — Lindström's (1877) specimen (NRM); Types.

Types. — Holotype: CI-6 (USNM 46886). — Paratypes: P-1411 (1) USNM 46887; SB-3494 (1) USNM 46888; BL-69 (1) MCZ; BL station off Havana, 158 fm (= 289 m) (1) MCZ; Bay of Cochinos, Cuba (1) USNM 46889.

Type-Locality. — 25°10'N, 77°05'W (Virgin Islands); 320 m.

Distribution. — Greater Antilles; Bahamas (Map 32). 130–823 m.

Genus **Thalamophyllia** Duchassaing, 1870

Diagnosis. — Colonial, forming reptoid colonies by extratentacular budding from stolons. Corallites ceratoid. No pali or columella. Type-species: *Desmophyllum riisei* Duchassaing, 1860, by monotypy.

48.

Thalamophyllia riisei

(Duchassaing & Michelotti, 1860)

Plate XXIII, figures 1, 4–6, 9–10

Desmophyllum rusei DUCHASSAING & MICHELOTTI, 1860: 61, pl. 9, fig. 5.

Desmophyllum riisei: DUCHASSAING & MICHELOTTI, 1864: 66. — POURTALÈS, 1880: 96, 106, pl. 1, fig. 14. — AGASSIZ, 1888: 150, fig. 469. — GOREAU & WELLS, 1967: 449. — PORTER, 1972: 113. — WELLS & LANG, 1973: 58. — LANG, 1974: 278, fig. 7. — LAND, LANG & BARNES, 1977: 170.

Thalamophyllia riisei: DUCHASSAING, 1870: 28. — ZIBROWIUS, 1976: 187.

Desmophyllum simplex VERRILL, 1870: 371, fig. 2. — GRAVIER, 1920: 81.

Desmophyllum solidum POURTALÈS, 1871: 17, pl. 5, figs. 5, 6; 1880: 96. — AGASSIZ, 1888: 150, fig. 470.

Lophohelia exigua: LINDSTRÖM, 1877: 14.

Cyathoceras riisei: VAUGHAN, 1907: 68.

?*Desmophyllum fasciculatum*: ALLAN & WELLS, 1962: 390, pl. 3, figs. 5-6.

Description. – The reptoid colony forms loose aggregations of corallites separated from one another by 5–10 mm but all interconnected basally by very thin, narrow stolons. Often the delicate stolons are obscured or abraded away. An individual ceratoid corallite has a thin pedicel, which expands into a flared calice. The largest specimen examined measures 13.0 × 11.0 mm in calicular diameter and 19.2 mm tall. Highly ridged, narrow C₁ extend to the base; C₂ extend only halfway to the base. The highest cycle costae (C₃ or C₄) are usually broader than the others and are covered by low, inconspicuous granules.

Septa are arranged in six systems and four cycles; the fourth is never complete. The largest specimen examined contains 42 septa. Corallites measuring 4–10 mm in calicular diameter usually have 24 septa; S₄ occur only in larger specimens. S₁ are extremely exsert, with rounded upper edges and vertical, straight inner edges, which almost meet in the bottom of the fossa. S₂ are also quite exsert but much less than the S₁. If S₄ are not present in a system, the S₃ are often very thick, with correspondingly broad costae. If S₄ are present, they become the thick septa with broad costae, whereas the S₃ remain thin. When the highest cycle septa are thick, it is the result of a secondary thickening of stereome and corresponds to the “*solidum*” form. If the highest cycle septa are thin, the specimen is the typical form. Both forms are found within millimeters of each other and have no taxonomic validity. Very low, rounded, uniformly spaced granules cover the septal faces. The fossa is usually elongate and deep. There is no columella.

Discussion. – ZIBROWIUS (1976) resurrected *Thalamophyllia* Duchassaing, 1870, to accommodate two species, *D. riisei* and *D. gasti* Döderlein, 1913. It differs from *Desmophyllum* only in its tendency to reproduce asexually by budding from a basal expansion. *T. riisei* is easily distinguished from *T. gasti* by its prominent costae and flared calice.

VAUGHAN (1907) placed *D. riisei* in the genus *Cyathoceras* be-

cause he observed a columella in the holotype. I agree with JOUBIN (1928) in assuming that a labelling error occurred regarding the holotype, since it distinctly does not have a columella (WELLS, pers. comm.).

Material. – P-405 (USNM 46491); P-596 (USNM 46492); P-991 (UMML 8: 256); G-103 (USNM 46486); G-984 (USNM 46487); G-985 (USNM 46488); G-986 (USNM 46489); CI-158 (USNM 46493); O-4297; SB-3494; BL-22 (MCZ); BL-155 (MCZ); BL-156 (MCZ); BL-157 (MCZ); BL-177 (MCZ); BL-203 (MCZ); Alb-2135 (USNM 16076); Alb-2157 (USNM 16090); Alb-2166 (USNM 7384); Alb-2323; Alb-2327 (USNM 16073); Alb-2332 (USNM 16071); Alb-2334 (USNM 10193); Alb-2336 (USNM 10210A); Gos-39 (Cornell); E-30159; E-30178; Chain-43; Nekton (*gamma*)-244; Cardiff Hall, Jamaica, 39–43 m (USNM 46495); off Golding Cay, Bahamas, 914 m (USNM 46496); off Acklin's Island, Bahamas, 33 m (USNM 46494). – Holotype of *D. solidum*; holotype of *D. simplex*; Lindström's (1877) specimens (NRM).

Types. – The holotype of *D. riisei* was reported to be at the MIZS in 1962 but could not be found there in the summer of 1975. The type-colony of *D. simplex* Verrill, is at the YPM (3862). The holotype of *D. solidum* Pourtalès, collected at Bibb-141, is deposited at the MCZ (2760).

Type-Localities. – St. Thomas, Virgin Islands.

Distribution. – Antillean distribution, ranging from Bahamas to off Surinam; off Panama (Map 33). 18–1317 m.

49. ***Thalamophyllia gombergi*, new species**

Plate XXIII, figures 7–8, 11

Description. – Small, phaceloid colonies are formed by closely adjacent budding from a common basal layer of coenosteum. The colonies are secondarily increased by settlement of planulae on old or dead corallites. The corallites are cylindrical, tapering only slightly toward the base; the diameter of the thickened pedicel ranges from one-half to three-fourths that of the calicular diameter. The calice is round to slightly elliptical, measuring 7.0×6.8 mm in the largest corallite of the holotype colony; its height is 10.8 mm. Broad, flat, equal costae correspond to all septa. They are set apart by very faint striae, which become indistinguishable halfway to the base. Four–five very fine, rounded costal granules occur across the width of each costa near the calice. The theca is very thick.

Mature corallites have 24 septa arranged in six systems and three cycles. A small, cylindrical corallite measuring 1.4 mm in diameter and 2.1 mm in height possesses only the first cycle of septa. All septa are slightly exsert. S_1 are larger than the S_2 and both have entire, vertical inner edges. S_3 are much smaller and have irregular, slightly sinuous inner edges. Low, blunt, randomly arranged granules cover the septal faces. The fossa is extremely deep and narrow, bordered by the inner edges of the S_1 and S_2 . There is no columella.

Discussion. – This species is placed in the genus *Thalamophyllia* because of its tendency to bud from a common basal expansion. It is easily distinguished from the other two species in the genus, *T. riisei* and *T. gasti*, by its broad, granulated costae, thick wall, and cylindrical corallites.

Etymology. – This species is named in honor of DAVID GOMBERG, who provided me with the Gilliss (Geology) ahermatypes, which included the holotype of this species.

Material. – Types.

Types. – Holotype: a small colony of five corallites from GS (G)-25 (USNM 46890). – Paratypes: GS (G)-25 (7) USNM 46891, (1) UMML 8: 285; GS (G)-27 (13) USNM 46892, (4) UMML 8: 292; GS (G)-71-6 (2) USNM 46893; GS (G)-71-7 (1) USNM 46894.

Type-Localities. – 24°21.3'N, 81°40.2'W (Pourtales Terrace); 190 m.

Distribution. – Known only from the Pourtales Terrace, Florida (Map 33). 155–220 m.

Genus *Lophelia* Milne Edwards & Haime, 1849

Diagnosis. – Colonial, forming large dendroid colonies by intra-tentacular budding. Coenosteum dense. Costae and columella poorly developed. Pali absent. Sparse tabular endothelial dissepiments. Type-species: *Madrepora prolifera* Pallas, 1766, by subsequent designation (MILNE EDWARDS & HAIME, 1850).

50. **Lophelia prolifera** (Pallas, 1766)

Plate XXIV, figures 1-5

Synonymy incomplete:

?Madrepora pertusa LINNAEUS, 1758: 797.*Madrepora prolifera* PALLAS, 1766: 307. - LINNAEUS, 1767: 1281. - ELLIS & SOLANDER, 1786: 153, pl. 2, figs. 2-5. - ESPER, 1791: 104, 289, pl. 11.*Lophelia prolifera*: MILNE EDWARDS & HAIME, 1850a: 81. - CECCHINI, 1917: 149. - TEICHERT, 1958: 1066. - SQUIRES, 1959: 22-23 (in part: V3-23; Station V7-12 is *Solenosmilia variabilis*). - MOORE & BULLIS, 1960: 125-128, fig. 2. - ROSSI, 1960: 9-10. - STETSON, SQUIRES & PRATT, 1962: 22, fig. 13. - SQUIRES, 1963: 23, fig. - CHEVALIER, 1966: 974-975. - SQUIRES, 1969: 16. - BEST, 1969: 312-313, fig. 13. - LABOREL, 1970: 156. - CAIRNS, 1977b: 5; 1978: 11.*Lophohelia prolifera*: MILNE EDWARDS & HAIME, 1857: 117. - POURTALÈS, 1871: 24-25, pl. 1, figs. 3-5. - DUNCAN, 1873: 328-332, pl. 42, figs. 7-8. - MOSELEY, 1881: 178-179, pl. 8, figs. 7-8 (not Chall-109). - VERRILL, 1883: 63-64. - AGASSIZ, 1888: 151, fig. 472. - JOURDAN, 1895: 25. - MARENZELLER, 1904: 307, pl. 15, figs. 3, 3a. - GOURRET, 1906: 121, pl. 11, fig. 10, pl. 12, fig. 10A. - GRAVIER, 1920: 87-89 (in part: not pl. 10, fig. 157). - NOBRE, 1931: 67-68, pl. 19-20.*Lophohelia affinis* POURTALÈS, 1868: 135.*Lophohelia tubulosa* STUDER, 1878: 631, pl. 1, figs. 8a-e.*Bathelia candida*: JOURDAN, 1895: 27.*Lophelia pertusa*: DONS, 1944: 38. - CARLGRÉN, 1945: 151, fig. 74. - ZIBROWIUS, 1974a: 761, pl. 2, figs. 6-9; 1976: 192-197, pl. 21, figs. A-L.*Dendrosmilia nomlandi* DURHAM & BARNARD, 1952: 85, pl. 10, fig. 47.*Desmophyllum cristagalli*: SQUIRES, 1959: 18-22 (in part: figs. 8-10).

Description. - The corallum increases by intratentacular budding, producing massive, dendroid, bushy colonies with branches which often anastomose. Terminal branches are slender and bear opposite, alternately arranged corallites. Toward the base, which can reach several centimeters in diameter, budding is less regular and often random. The calicular size and branching pattern are quite variable. DUNCAN'S (1873) form *gracilis* is a slender phenotype with widely spaced corallites separated by four-five times their own calicular diameters. MOSELEY'S (1881) form *brachycephala* has a closer branching pattern with stout, vertically compressed corallites having very thick walls. It can also occur as thick (12 mm in diameter), massive branches, bearing flared corallites reaching 20 mm in calicular diameter. Virtually all intergrades are expressed; none have subspecific value.

The shape of the calice is also variable, ranging from round to elliptical to highly irregular. The coenosteum is covered by very fine, rounded, uniform granules and sometimes shallow striae. Short, ridged costae sometimes correspond to the primary septa.

Septa are not arranged in regular systems or cycles; instead there are usually seven–nine primary septa (up to 11), which are slightly exsert and extend to the bottom of the fossa. Secondary septa, almost as wide but less exsert, also extend into the fossa. The tertiaries are smaller, less exsert, and rudimentary lower in the fossa; they are often missing from many systems and rarely flank every secondary septum. The granulation on the septal faces is variable. Usually the granules are small, inconspicuous, and widely spaced, producing a smooth texture, but sometimes they are prominent, arranged in close-set lines or even short carinae oriented parallel to the trabeculae.

The fossa is very deep and sometimes curved as the corallite is curved. Often a thin, endothecal dissepiment considerably shortens the fossa. A columella is rare but when present it is very small, composed of one–three short rods.

Discussion. – In view of the great variation found in *L. prolifera* and its wide geographic and depth ranges, it is probable that both *Dendrosmilia nomlandi* Durham & Barnard, 1952 and *Lophelia californica* Durham, 1947, both described from the eastern Pacific, are junior synonyms. The type-specimen of *D. nomlandi* is only a small fragment of a branch with broken corallites. Extratentacular budding cannot be proven from this specimen. Also, the presence of a columella does not exclude it from being a *Lophelia*. No characters were given by DURHAM for differentiating *L. californica* from *L. prolifera*.

Material. – P-105 (USNM 46020, UMML 8: 310); P-112 (USNM 46019); P-197 (USNM 46018); P-639 (USNM 46017, UMML 8: 309); P-776 (USNM 46016); colonies from 12 Gerda stations in the Straits of Florida (USNM 46006–46015); CI-140 (USNM 46021, UMML 8: 253); CI-246 (USNM 46023); O-2776; O-2780; O-3651; O-6690; O-11301; O-11703; O-11716; O-11725; O-11726; BL-117 (MCZ); BL-153 (MCZ); BL-260 (MCZ); BL-318 (MCZ); Alb-2415 (USNM 10504); Alb-2416 (USNM 17047); Alb-2625 (USNM 19164); Alb-2661 (USNM 14568); Alb-2663 (USNM 16159); Alb-2667 (USNM 14498); Alb-2669 (USNM 14462); Alb-2671 (USNM

16154); Combat-308; Combat-412; Combat-436; Gos-1606; Gos-1615; Gos-1642; Gos-1643; Gos-1644; Gos-1645; Gos-1731; Gos-1738; Gos-1739; Gos-1742; Gos-1743; Gos-1764; Gos-1796; Gos-2191; Gos-2468; E-14449 (USNM 54498); E-26004 (USNM 46022); E-26017; E-26019; E-26028 (USNM 46026); E-26031 (USNM 46027); E-26034; E-26037; WH-83/68 (SME); WH-89/68 (SME); WH-90/68 (SME); WH-91/68 (SME); SME-1776 (SME); SME-1777 (SME); TAMU 68A7-12B (TAMU); Almirante Saldanha-2803 (USNM 46238). — Syntypes of *L. affinis*; holotype of *D. nomlandi*; Squires's (1959) specimens (AMNH); Moseley's (1881) specimens (BM).

Types. — The types of PALLAS's *prolifera*, based on material from Norway, are unknown. Likewise, no type-material of *M. pertusa* is known to exist. Syntypes of *Lophohelia affinis* Pourtalès are present at the MCZ (5612), represented by 31 fragments including the illustrated specimen (POURTALÈS, 1871: figs. 3–5). A branch is also deposited at the YPM (4774). POURTALÈS's material was collected at Bibb-5, off Coffin's Patches, Florida. Finally, the type-material of *L. tubulosa* Studer, from Gazelle-8, is deposited at the Berlin Museum (ZIBROWIUS, 1976).
Type-Localities. — Off Norway.

Distribution. — Western Atlantic: from Nova Scotia to off Florida; Straits of Florida; eastern Gulf; Lesser Antilles; off south-eastern Brazil (Map 34). 95–1000 m, most common between 500–800 m. 3°–12°C, based on 11 records. — Elsewhere: eastern Atlantic; Indian Ocean; eastern Pacific. 60–2170 m.

Subfamily PARASMILIINAE Vaughan & Wells, 1943

Genus *Anomocora* Studer, 1878

Diagnosis. — Solitary, subcylindrical, free. Tendency to bud new coralla from edge zone with subsequent loss of organic connection. Wall thin. Columella trabecular, no pali. Tabular endothelial dissepiments common and widely spaced. Type-species: *Coelosmilia fecunda* Pourtalès, 1871, by monotypy.

51. *Anomocora fecunda* (Portalès, 1871)

Plate XXIV, figures 6–8

Coelosmilia fecunda POURTALÈS, 1871: 21–22 (in part: pl. 1, fig. 12, pl. 6, figs. 14–15; not pl. 3, figs. 4–5).

Parasmilia fecunda: LINDSTRÖM, 1877: 21. — POURTALÈS, 1878: 206 (in part: BL-45).

- Anomocora fecunda*: STUDER, 1878: 641-642, pl. 1, figs. 9f-g, pl. 2, figs. 9a-e. - SQUIRES, 1959: 15-19. - CAIRNS, 1977b: 5; 1978: 11.
- Blastosmilia fecunda*: DUNCAN, 1878: 245.
- Not *Parasmilia fecunda*: POURTALÈS, 1880: 109 (= *C. arbuscula*). - MARENZELLER, 1904: 311-312, pl. 15, fig. 5. - GRAVIER, 1920: 91-94, pl. 11, figs. 169-173 (= *C. arbuscula*). - GARDINER & WAUGH, 1939: 229.
- Ceratotrochus* ? GRAVIER, 1920: 57, pl. 6, figs. 104-105.
- Not *Anomocora fecunda*: EGUCHI, 1968: C-42, pl. C-10, figs. 1-5, pl. C-20, figs. 10-11, pl. C-23, fig. 3.
- Coenosmilia fecunda*: ZIBROWIUS, 1976: 198-200 (in part: pl. 14, figs. A-K).

Description. - The corallum is cylindrical, straight to gently curved, and slightly tapered toward the base, which is invariably broken. Large coralla exceed 10 cm in length and 10 mm in calicular diameter. Numerous buds and scars of former buds are scattered irregularly on the theca. The buds detach from the parent at a small size; while still attached to the parent they rarely exceed 20 mm in length and never produce additional buds. Low costae, separated by shallow grooves, are distinguishable from the calice to the base. Both the theca and septa are very thin (about 0.3 mm) and tabular dissepiments are widely spaced (about one every 4 mm), giving the corallum a very low density. The calice is round to elliptical.

Septa are irregularly arranged; however, the fully developed condition is six systems and four cycles, in which case the S_1 are slightly exsert, larger than the S_2 , and have entire, straight, vertical inner edges reaching the columella. S_2 are less exsert and often bear large, thin lobes or elongate, slender ribbons on their lower, inner edges. S_3 are smaller, not exsert, and usually bear two-five long, slender, contorted ribbons oriented perpendicular to the septal edge or inclined upward from it. These twisted ribbons intermingle with the lobes of the S_2 , sometimes forming a dense columella. If present, each S_4 consists of a row of low spines. The septal faces are often smooth, with curved growth lines parallel to the septal margin, or are inconspicuously granulated in rows perpendicular to the trabeculae.

The fossa can be very deep or quite shallow, depending on how recently a dissepiment has formed. Dissepiments in the process of forming are common. They originate from the septal and thecal edges as numerous slender, adjacent plates, which merge with those of adjacent septa in the center of the interseptal space. Often a line remains where the junction occurred.

Discussion. – Both POURTALÈS (1880) and ZIBROWIUS (1976) have synonymized *C. arbuscula* and *A. fecunda*. POURTALÈS (1880: 109) stated that they were simply extreme forms of the same species and that there were “. . . numberless intermediate ones, often parts of the same stock.” After careful examination of all of POURTALÈS’s material, the USNM collection, and additional eastern Atlantic material, I cannot find any such intermediates. *A. fecunda* is consistently and distinctively different from *C. arbuscula* in many characters, such as: (1) a longer, cylindrical corallum, (2) a random budding pattern with buds that break off before a third generation occurs, (3) more widely spaced dissepiments, (4) conspicuous lobes and ribbons on the inner edges of S_2 and S_3 , and (5) absence of a solid, fused columella.

Material. – P-198 (17) USNM 46498; P-199 (2) USNM 46499, (1) UMML 8: 337; P-584 (3) USNM 46510; P-707 (2) USNM 46504; P-709 (25) USNM 46505, (1) UMML 8: 254; P-736 (20) USNM 46506; P-737 (7) USNM 46507; P-773 (2) USNM 46508; P-775 (19) USNM 46509, (11) UMML 8: 336; P-838 (1) USNM 46503; P-874 (1) USNM 46502; P-991 (1) USNM 46501; G-1270 (1); O-4832 (1); O-4939 (1); O-5648 (10); BL-45 (1) MCZ; Alb-2327 (1); Alb-2343 (3) USNM 10244; Gos-35 (1) Cornell; Caroline-102 (1); TAMU 65A9-15 (6) TAMU; TAMU 65A9-20 (9) TAMU; TAMU 65A9-21 (5) TAMU; Chain-16 (10); Explorer-4 (9). – Syntypes of *C. fecunda*; Lindström’s (1877) specimens (NRM).

Types. – Six syntypes are deposited at the MCZ in three lots: one contains the figured specimen of plate 6, figures 14–15 (MCZ 2752); the second lot contains four fragments, including the figured specimen of plate 1, figure 12; and the third lot (MCZ 5621) contains the figured specimen of plate 3, figures 4–5 (all POURTALÈS, 1871). The last specimen is neither *A. fecunda* nor *C. arbuscula* and may be an undescribed species. It differs from *A. fecunda* in that it is strongly attached, bears no buds, and has more distinct costal and septal granules and a solid columella. Since the description is obviously based on the specimen numbered MCZ 2752, it is designated lectotype and the five remaining fragments as paralectotypes.

Type-Localities. – Southern Straits of Florida; 124–576 m.

Distribution. – Western Atlantic: throughout Caribbean, south-eastern Gulf of Mexico; St. Peter and Paul Rocks (Map 35). 73–567 m. – Eastern Atlantic: Azores; Madeira; Canary Islands. 130–540 m.

Genus **Coenosmilia** Pourtalès, 1874

Diagnosis. – Colonial; small bushy colonies produced by extra-tentacular budding from edge zone below calice. Columella trabecular; no pali. Tabular endothecal dissepiments abundant. Type-species: *Coenosmilia arbuscula* Pourtalès, 1874, by monotypy.

52. **Coenosmilia arbuscula** Pourtalès, 1874

Plate XXIV, figures 9–11

Coenosmilia arbuscula POURTALÈS, 1874: 39–40, pl. 7, fig. 1; 1878: 206. – LEWIS, 1960: 12; 1965: 1062. – CAIRNS, 1977b: 5; 1978: 11.

Parasmilia fecunda: POURTALÈS, 1878: 206 (in part: BL-32); 1880: 109. – GRAVIER, 1915: 3; 1920: 91–94, pl. 11, figs. 169–173.

Coenosmilia fecunda: ZIBROWIUS, 1976: 198–200 (in part: pl. 15, figs. A–F).

Description. – Small, bushy colonies form by extratentacular budding. The corallites are typically 10–15 mm long with an elliptical to round calice measuring 7–10 mm in diameter. Larger, massive founder corallites also occur, measuring up to 50 mm in length, with calicular diameters of up to 14.5 mm. However, single corallites are rare. Budding occurs from the edge zone usually within 5 mm of the top of the corallite and is very regular; two corallites often bud on opposite sides of the parent calice but three corallites, separated from one another by 120°, or four at 90°, are not rare. The parent corallite often dies after budding, giving the colony the appearance of an independent settlement of planulae on older, dead coralla. The buds never lose their attachment to the parent. The largest colony examined has a series of four successive buds.

The corallites are ceratoid and elongate, firmly attached by a thick pedicel. Costae correspond to all septa but are usually distinct only near the calice. C₁ and C₂ are slightly ridged and narrower than the C₃ and C₄. All costae bear fine, pointed granules. The wall is 0.5–0.6 mm thick.

Septa are arranged in six systems and four cycles, but corallites with 40 regularly arranged septa are common. S₁ are slightly larger

than or equal in size to the S_2 ; both are exsert and extend to the columella. S_3 and S_4 are progressively smaller. S_4 are absent in small corallites and rudimentary in larger ones, represented only by a row of lacinate spines in the latter. The inner edges of the S_1 and S_2 are entire and usually straight, sometimes becoming sinuous on their lower, inner margins near the columella. The inner edges of the S_3 are dentate but not as irregular as those of the S_4 . Septal granules are arranged in lines parallel to the trabeculae. The granules are low and rounded on the upper septal margins and higher and pointed deeper in the fossa.

The fossa is moderately deep. Long corallites contain tabular dissepiments (about one every 2 mm), which obscure much of the columella and shorten the fossa. The columella is a massive, elongate, convex structure, composed of numerous spongy, crispate trabeculae usually solidly fused together.

Discussion. — This species is very abundant in the Pourtalès collection at the MCZ. Perhaps because of a hasty examination or the lack of proper cleaning, POURTALÈS included three other species in his identified material: *Caryophyllia antillarum*, *Paracyathus pulchellus*, and *Thalamophyllia riisei*.

Anomocora fecunda, *C. arbuscula*, and *Asterosmilia prolifera* are often collected together at the same station and the latter two are sometimes attached to *A. fecunda*. Because of the variation in growth form of all three species and their external similarities, they easily could be confused.

Material. — P-757; P-874 (UMML 8: 340); P-969 (USNM 46559); P-991; P-1143 (USNM 46557); P-1354 (USNM 46558); G-251 (USNM 46553); G-688 (USNM 46554, UMML 8: 338); G-691 (UMML 8: 255); G-694 (USNM 46555); G-1327 (USNM 46556, UMML 8: 339); O-3568; O-4398; O-4832; O-4932; O-5015; O-5430; O-5648; O-10513; BL-32 (MCZ); BL-45 (MCZ); BL-62 (MCZ); colonies from 19 additional Blake stations throughout the Windward Group of Lesser Antilles (MCZ); Alb-2135 (USNM 7101); colonies from 13 additional Albatross stations from off Havana, Cuba (USNM); Alb-2354 (USNM 16084); Caroline-49; Caroline-102; E-30178; Explorer-4; Hummelinck-1443. — Syntypes of *C. arbuscula*.

Types. — Three lots of syntypes, including one small colony (2761) and nine other corallites (5622), are deposited at the MCZ. All were collected from a Hassler station off Barbados.

Type-Localities. — Off Barbados; 183 m

Distribution. – Western Atlantic: throughout Caribbean; south-eastern Gulf of Mexico; off Guyana (Map 36). 109–622 m. – Eastern Atlantic: Azores; Madeira; Canary Islands, 130–540 m.

Genus **Dasmosmilia** Pourtalès, 1880

Diagnosis. – Solitary, turbinate or trochoid, free. Parricidal budding common. Theca very thin. Paliform lobes, usually several on each septum, before all but last cycle. Trabecular columella formed by mingling of inner paliform lobes. Type-species: *Parasmilia lymani* Pourtalès, 1871, by subsequent designation (WELLS, 1933).

53. **Dasmosmilia lymani** (Portalès, 1871)

Plate XXV, figures 1–3, 8–9

Parasmilia lymani POURTALÈS, 1871: 20, pl. 6, figs. 8–10. – VERRILL, 1882: 316; 1882a: 406–407.

Dasmosmilia lymani: POURTALÈS, 1880: 96, 108. – VERRILL, 1883: 64; 1885a: 535, fig. 17; 1908: 449. – CHEVALIER, 1966: 949. – TOMMASI, 1970: 56, fig. 2. – LABOREL, 1970: 155; 1971: 175. – DEFENBAUGH, 1976: 27, 39, fig. 56. – ZIBROWIUS, 1976: 142–143, pl. 26, figs. A–L, pl. 27, figs. A–L. – CAIRNS, 1977b: 5, 13–14, pl. 1, figs. 7–8; 1978: 11.

Description. – The corallum is cylindrical or ceratoid, often slightly curved, and usually has a broken base or is attached to a fragment of an older corallum. Individuals attached to the substrate are extremely rare. The shape of the calice is quite variable; it can be triangular, rectangular, round, or elliptical. Strongly compressed calices attain 28 mm in greater diameter with a corallum height of 50 mm; however, populations exist with calicular diameters never exceeding 14 mm and heights that never exceed 30 mm. Costae are also variable. They are usually ridged, equal, and separated by broad, flat furrows. However, sometimes they are unequal (more prominent costae alternate with less prominent ones), rounded, or flat, and separated by narrow, shallow intercostal spaces. Low, rounded granules cover the costae; near the calicular edge they are arranged such that, on the average, two–four occur across the width

of a costa. The theca and septa are very fragile (0.3–0.5 mm thick) and often light brown.

Septa are arranged in six systems and six cycles, the last cycle never complete. S_{1-3} are equal in size, slightly exsert, and each septum may bear a thin, small paliform lobe on its inner edge. If no paliform lobe is present, the septum merges with the columella. S_4 are smaller, less exsert, and usually have sinuous inner edges. They bear much larger paliform lobes, which are sometimes divided into two–five lobes, all of which merge with the columella. S_5 and S_6 are progressively smaller, do not reach the columella, and do not have paliform lobes. There are usually 12–24 larger septa (S_{1-2} or S_{1-3}), with or without lobes; 12–24 paliferous septa (S_3 or S_4); and 24–48 S_4 or S_5 , resulting in 12–24 quartets of septa composed of three different sizes. Pairs of S_6 occur in some quartets, resulting in coralla of 106+ septa. The septal granules are large and arranged both in lines parallel to the trabeculae as well as in curved rows perpendicular to the trabeculae.

The trabecular columella is composed of numerous crispate, twisted processes originating from the lower inner, edges of S_{1-4} deep in the fossa. The fossa is deep, extending to the last formed tabular dissepiment, one of which occurs every 3–6 mm; in a corallum with a calicular diameter of 15 mm, the fossa is 22 mm deep.

Remarks. – Evidence of three methods of propagation have been observed for *D. lymani*: (1) sexual reproduction, (2) asexual reproduction by longitudinal fission, and (3) asexual reproduction from fragments of a crushed or broken corallum. Coralla formed by the first method result from planulae settling on a hard substrate and would therefore be firmly attached. These individuals are rare. The second method results from an enlargement of the calice and a subsequent constriction into two separate calices and coralla, which produces only one additional specimen at a time. Coralla formed by this method can be found in various stages of division but are uncommon. Asexual budding from wedge-shaped fragments of a parent corallum is the most common condition observed. VERRILL (1882) reported over 30 buds from one broken piece.

Material. — P-112 (68) USNM 46567, (2) UMML 8: 258; P-722 (15) USNM 46566, (5) UMML 8: 387; G-19 (2) USNM 46561; G-132 (1) USNM 46562; G-610 (1) USNM 46563; G-866 (2) USNM 46564; G-1036 (4) USNM 46565, (1) UMML 8: 386; GS (G)-5 (1) USNM 46568; O-10729 (10); SB-1694 (10); SB-1789 (3); SB-2416 (1); SB-2547 (4); SB-2813 (1); SB-2863 (30); SB-3520 (1); 77 specimens from 10 Albatross stations off northeastern coast of North America; FH-899 (4) USNM 5055; FH-940 (9) USNM 19188; FH-949 (1) USNM 36474; FH-1040 (1) USNM 19178; Combat-164 (7); Combat-165 (1); 26 specimens from 10 Gosnold stations off northeastern coast of North America; BLM-33 III C (1) Alabama BLM; BLM-33 IV B (4) Alabama BLM; MAFLA-2212 (1); TAMU 67A5-10B (4) TAMU; TAMU 67A5-13B (2) TAMU; TAMU 68A7-9A (1) TAMU; TAMU 72 F1-48 (1) TAMU; IOSP-2 (1) SME; SME-1775 (1) SME. — Syntypes of *P. lymani*; Verrill's specimens (YPM).

Types. — Forty-nine syntypes, divided into six lots, bearing the numbers 2770, 5625, or 5469, are deposited at the MCZ. Of the six stations at which syntypes were collected, only three (Bibb-187, 194, and 203) are known for certain. Two additional specimens, perhaps also syntypes, are at the BM (1891.2.4.27 and 1970.1.26.33).
Type-Locality. — Off Florida Keys; 128–269 m.

Distribution. — Western Atlantic: from off Massachusetts to Florida Keys; eastern Gulf of Mexico; off Isla de Margarita, Venezuela; off southeastern Brazil (Map 37). 48–366 m. 7°–21°C, based on 15 records. — Eastern Atlantic: area bounded by Portugal, the Azores, and Spanish Sahara. 85–316 m.

54. *Dasmosmilia variegata* (Pourtalès, 1871)

Plate XXV, figures 4–7, 10; Plate XXVI, figure 1

Parasmilia variegata POURTALÈS, 1871: 21, pl. 1, fig. 13.

Bathycyathus elegans STUDER, 1878: 628–629, pl. 1, figs. 1a–d.

Dasmosmilia variegata: POURTALÈS, 1880: 96, 109, pl. 2, figs. 11–12. — GARDINER & WAUGH, 1938: 172–173. — ZIBROWIUS, 1976: 143–144, pl. 28, figs. A–K. — CAIRNS, 1977b: 5; 1978: 11.

Paracyathus confertus: JOURDAN, 1895: 15.

Description. — The corallum is ceratoid to trochoid, usually strongly compressed, and almost always attached by a thick pedicel to a fragment of the parent corallum from which it budded. An independently attached specimen has never been reported. Small calices are round but become elliptical or irregular in shape with an increase in size. The largest specimen examined measures 20.2 × 17.0 mm in calicular diameter and 21.0 mm tall. Prominent, convex costae

are bordered by narrow, sharply incised intercostal striae. All costae but the C_5 extend to the base. Small, pointed granules cover the costae; near the calicular edge they are arranged five-seven across the width of a costa. C_1 and C_2 are usually dark brown or black but occasionally the entire corallum is white. The corallum wall is very thin (0.2–0.4 mm).

Septa are arranged in six systems and five cycles, the last cycle rarely complete. S_1 and S_2 are equal in size, highly exsert, swollen looking, and usually dark brown or black. Sometimes the septa adjacent to the S_1 and S_2 are also black. In half-systems lacking S_5 , the S_4 are larger than the S_3 , highly exsert, and, together with their adjacent S_1 and S_2 , form exsert projections. When S_5 are present, both the S_3 and S_5 are larger than the S_4 ; in this case the S_5 , together with their adjacent S_1 , S_2 , and S_3 , form the exsert projections. Rounded septal granules are arranged both in lines parallel to the trabeculae and in rows perpendicular to the trabeculae.

Large, black, coarsely granulated paliform lobes are present on the lower, inner edges of the S_1 and S_2 . These lobes also bear strong horizontal carinae. As seen in a longitudinal cross-section of the corallum, these septa also have up to 10 additional long, slender, twisted paliform lobes directed upward into the center of the fossa; the ends of the uppermost lobes form the columella. Twisted or stout paliform lobes are also present on the inner edges of the S_3 and S_4 . They are smaller than the P_1 and P_2 but terminate much higher in the fossa. Widely spaced tabular dissepiments are present in larger coralla.

Material. – GS (G)-48 (1) USNM 46570; O-4226 (1+) USNM 46572; BL-254 (10) MCZ; off Egmont Key, Florida, 366 m (1) UMML 8: 257; off Anna Maria Key, Florida, 366–484 m (1) USNM 46571. – Syntypes of *P. variegata*.

Types. – Four syntypes, divided into two lots, both labelled “Florida Straits, 60–77 fms”, are deposited at the MCZ. One lot of two specimens is numbered 2780; the other lot of two (5624) includes the figured type. Although not stated in the text or included with the specimens, the syntypes were collected from Bibb-201, 202, and 151. The type of *B. elegans* Studer is deposited at the Berlin Museum (ZIBROWIUS, 1976).
Type-Localities. – Off Florida Keys; 110–141 m.

Distribution. – Western Atlantic: Florida Keys; off Tampa, Florida; off Peninsula de Paria, Venezuela; off Amazon, Brazil

(Map 38). 110–366 m. – Eastern Atlantic: Cape Verde Islands; Azores. 185–600 m.

Genus **Solenosmilia** Duncan, 1873

Diagnosis. – Colonial, dendroid, or subphaceloid colonies formed by intratentacular budding. Stereome granular, costae sometimes correspond to first cycle. Tabular endothecal dissepiments. Columella small. Type-species: *Solenosmilia variabilis* Duncan, 1873, by monotypy.

55. **Solenosmilia variabilis** Duncan, 1873

Plate XXVI, figures 2–4

- Solenosmilia variabilis* DUNCAN, 1873: 328, pl. 42, figs. 11–18; 1877: 361. – POURSALÈS, 1878: 206, pl. 1, figs. 1–3; 1880: 96, 108. – MOSELEY, 1881: 181, pl. 9, figs. 1–5. – MARENZELLER, 1904: 310–311, pl. 15, figs. 4, 4a. – GRAVIER, 1915: 3; 1920: 94–96, pl. 9, figs. 153–156. – HOFFMEISTER, 1933: 14, pl. 4, fig. 7. – GARDINER & WAUGH, 1939: 229–230. – WELLS, 1958: 262; 1964: 109. – SQUIRES, 1969: 16, map 2. – LABOREL, 1970: 153, 156; 1971: 175. – LIVINGSTON & THOMPSON, 1971: 788. – ZIBROWIUS, 1974a: 768–769; 1976: 210–211, pl. 22, figs. A–N. – CAIRNS, 1978: 11.
- Solenosmilia jeffreyi* ALCOCK, 1898: 27–28, pl. 3, figs. 3, 3a–b.
- Lophelia prolifera*: GRAVIER, 1920: 87–89 (in part: pl. 10, fig. 157). – SQUIRES, 1959: 22–23 (in part: V7–12).
- Madrepora oculata*: SQUIRES, 1959: 5–8 (in part: A 180–112).
- Solenosmilia* sp. KELLER, 1975: 177.

Description. – Colonies are bushy, achieved by intratentacular budding and its resultant dichotomous branching. Budding begins with an elongation of the calice and an increase in the number of septa. Next, the septa on opposite sides of the calice bridge over the fossa, dividing the calice in two but maintaining a connection between the polyps. Eventually the two corallites elongate and are completely partitioned by coenosteum. Normally, calices rarely exceed 5 mm in calicular diameter. The end branches may be quite slender (3–5 mm in diameter) or thick and massive (7–8 mm) and often anastomose. Basally the branches are very thick (up to 20 mm

in diameter) and the colony is attached by an encrusting base also bearing corallites. The coenosteum is variable: it can be completely smooth and white; granular, glossy, and light gray; or granular with 8–10 ridged costae around the circumference of the branch.

Septa are usually arranged in six systems and three complete cycles. S_1 are highly exsert and have straight inner edges, which meet in the bottom of the fossa. S_2 are about one-third the size of the S_1 and are much less exsert but considerably larger than the S_3 , which are developed only in the upper fossa. Sometimes, just before intratentacular division, a complete fourth cycle of septa is attained and some S_5 may be present (e.g., 60 septa); however, the development of the S_4 and S_5 is very irregular. The inner edges of the S_{1-3} are straight and entire, whereas those of the S_4 and S_5 are dentate or lacinate. Septal granulation is low and very fine, producing a smooth texture.

Tabular endothelial dissepiments are present. When the fossa is deep, a rudimentary columella is often present, composed of spongy, crispate trabeculae.

Discussion. — *S. variabilis* is another branching species found on deep-water banks, probably contributing significantly to the bank's framework. In the eastern Atlantic it is found with the branching *L. prolifera* and *M. oculata*; in the western Atlantic it is found with *L. prolifera* and *E. profunda*. Earlier authors often failed to recognize *S. variabilis* from deep-water banks, usually mistaking it for *L. prolifera*, which it closely resembles. *S. variabilis* was found at the deep-water bank reported in this paper (see *E. profunda*).

Although not examined by the author, KELLER's (1975) *Solenosmilia* sp. is undoubtedly *S. variabilis*. *Solenosmilia* is considered to be monotypic.

Remark. — Colonial deformities produced by tube-dwelling polychaetes (*Eunice*?) were noted in western Atlantic specimens, a condition that has also been reported by ZIBROWIUS (1976) in specimens from the northeast Atlantic and Indian Oceans.

Material. — P-881 (USNM 46573); P-891 (USNM) 46574, UMML 8: 260); P-892 (USNM 46575); P-1262 (USNM 46576); G-118 (USNM 46577); G-1029 (USNM

46578); CI-140 (USNM 46579); O-1991; O-4301; O-4377; O-4405; O-10514; BL-20 (MCZ); BL-100 (MCZ); BL-154 (MCZ); BL-171 (MCZ); BL-218 (MCZ); BL-298 (MCZ); Alb-2416 (USNM 36345); Alb-2672; Gos-112/78 (Cornell); WH-104/68 (SME); TAMU 65A9-4 (TAMU); SME-1776 (SME); Akaroa-5c (SME). – Syntypes of *S. variabilis*; Squires's (1959) specimens (AMNH).

Types. – The original description of *S. variabilis* mentions specimens from two Porcupine stations: number 17 and number 32, both from the second expedition, all deposited at the BM. Syntypes of *S. jeffreysi* are deposited at the Indian Museum, Calcutta; MNHNP; and the ZMA (ZIBROWIUS, 1976).

Type-Locality. – Off southwestern Spain; 1190–2003 m.

Distribution. – Western Atlantic: Muir Seamount; Antillean distribution, ranging from off Georgia to off Surinam; Recife to São Paulo, Brazil (Map 38). 220–1383 m. – Elsewhere: eastern Atlantic; Indian Ocean; off southeastern Australia. 280–2165 m.

Genus *Asterosmilia* Duncan, 1867

Diagnosis. – Solitary, trochoid to ceratoid, free. Paliform lobes usually opposite third cycle. Columella papillose, lamellar, or crispate at surface, trabecular below. Type-species: *Trochocyathus abnormalis* Duncan, 1865, by subsequent designation (VAUGHAN, 1919).

56. *Asterosmilia prolifera* (Pourtalès, 1871)

Plate XXVI, figures 5–6, 8

Ceratocyathus prolifer POURTALÈS, 1871: 19–20, pl. 3, figs. 8–10.

Asterosmilia prolifera: POURTALÈS, 1880: 96, 109–110, pl. 2, figs. 9–10. – VAUGHAN, 1919: 354. – ZIBROWIUS, 1976: 206–208, pl. 18, figs. A–N. – CAIRNS, 1977b: 5; 1978: 11.

? *Ceratotrochus johnsoni* DUNCAN, 1882: 217, pl. 8, figs. 5–8.

Not *Asterosmilia prolifera*: SQUIRES, 1959: 12 (= *Tethocyathus variabilis*, n. sp.).

Description. – This is an exceedingly variable species which, for the sake of convenience, is divided here into two distinctive forms primarily based on the shape of the pali and secondarily on the corallum shape, costae, and color. The most common form (Pl.

XXVI 5) is trochoid to ceratoid, slightly curved, and has a rather large, elliptical calice typically measuring 12.5×11.0 mm in diameter. The costae are prominent only near the calice. A pointed, slender paliform lobe stands before each S_3 and is separated from the septum by a deep, narrow notch. The columella is usually massive, elliptical, and composed of numerous slender rods, which either are fused together loosely or stand alone.

The previous form grades imperceptibly into another common form (Pl. XXVI 6) characterized by wider paliform lobes often two-three times wider than the S_3 . The corallum is usually more elongate (ceratoid), shaped like a tall, curved cone, and has a smaller calice, typically less than 10 mm in diameter. It has conspicuous, equal costae, which are prominent to the base; the costae are slightly convex, and bear fine, rounded granules. Sometimes the paliform lobes are so large that there is no room for a columella, but usually a single, thin, lamellar plate is present. In addition to these two forms, occasional variant specimens also occur that have no pali (Pl. XXVI 8) or only rudimentary ones.

Both forms are free; their bases are usually narrow, sometimes pointed and usually showing signs of repair from a previous fracture. They often reproduce asexually by parricidal budding, with one or two coralla originating from the calice of a parent. Most specimens are slightly curved and measure 20 mm in length on the average, although the longest is 50.0 mm.

Septa are typically arranged in six systems and four-five cycles. S_1 and S_2 are equal, exsert, and extend to the columella. Higher cycle septa are progressively smaller; often S_4 are represented only by spines or have a dentate inner margin. S_5 are rare. The figured type of *A. prolifera*, similar to the second described form, is atypical in that it has 32 S_5 . In this specimen there are 21 primary septa enclosing 21 groups of three higher cycle septa (four S_5 are missing). The ornamentation on the septal faces is also variable; granules may be completely absent or range from small and pointed to prominent, measuring two-three times the thickness of the septum. When present they are arranged predominantly in rows running perpendicular to the trabeculae.

Pali and columella have already been discussed. The fossa is of

variable depth ranging from very shallow to deep. Tabular endothecal dissepiments are present, particularly in the elongate coralla; however, most of the short coralla are solidly filled internally with stereome.

Material. – P-198 (1500) USNM 46777, (18) UMML 8: 259; P-199 (100) USNM 46778; P-200 (20); P-848 (1); P-913 (2) USNM 46802; 159 specimens from 19 additional Pillsbury stations from the northern coast of South America from Trinidad to Panama (USNM 46780–46797); O-4459 (3); O-4461 (7); O-5698 (1); SB-2445 (34); BL-253 (2) MCZ; BL-262 (1) MCZ; BL-272 (8) MCZ; BL-276 (1) MCZ; Combat-457 (4); Gos-1564 (3); TAMU 65A14–9 (11) TAMU. – Syntypes of *C. prolifer*; Squires's (1959) specimens (AMNH).

Types. – Twelve syntypes in two lots bearing numbers 2776 and 2789 are deposited at the MCZ. They are all from Bibb-143. A topotypic specimen, perhaps a syntype, is at the BM and bears the number MCZ 2776. Another syntype is at the YPM (4767). The syntypes of *C. johnsoni*, from Madeira (55 m), are missing from the BM.
Type-Locality. – Off French Reef, Florida; 82 m.

Distribution. – Western Atlantic: Straits of Florida; north-eastern Gulf of Mexico; Bay of Campeche, Mexico; very common along coast of South America from Colombia to French Guiana; Windward Group, Lesser Antilles (Map 39). 32–311 m. – Eastern Atlantic: Madeira; Canary Islands; off Spanish Sahara. 110–125 m.

57. *Asterosmilia marchadi* (Chevalier, 1966)

Plate XXVI, figures 7, 9–10

?*Trochosmilia elongata* STUDER, 1879: 176; 1879a: 675.

Dasmosmilia marchadi CHEVALIER, 1966: 944–949, pl. 5, figs. 3–4, text-figs. 11–13.

Asterosmilia marchadi: ZIBROWIUS, 1976: 208–209, pl. 19, figs. A–K. – CAIRNS, 1977: 87, lower left figure.

Description. – The corallum is ceratoid, usually slightly curved, and tapers to a pointed, free base. Coralla bud asexually from the edge zone just below the calicular edge and remain attached to the parent until they are about 10 mm long, at which time they detach. Among the four western Atlantic specimens examined, the longest is 30 mm; the most typical specimen measures 11.1×9.7 mm in calicular diameter and 19.8 mm tall, and has two buds near the

calice (P. XXVI 7, 10). The corallum and septa are usually light brown or reddish-brown. The costae, separated by shallow, broad grooves, consist of thin, elevated ridges covered by small granules. They are unequal: those of the highest cycle (C_4 or C_5) are narrower and less prominent.

Septa are arranged in six systems and four cycles with some S_5 . S_1 are exsert and have straight, entire inner edges reaching to the columella. The remaining cycles of septa are progressively smaller and less exsert; S_5 , if present, are rudimentary. The lower, inner edges of the S_3 usually bear broad, crispate paliform lobes, which tend to fuse together in pairs before the S_2 and extend to the columella. The inner edges of S_{4-5} are irregular. The septal granules are arranged in lines parallel to the trabeculae and form low carinae near the upper septal edges. The low-lying columella is seated in a relatively deep fossa. It is composed of several irregular, crispate lamellae, which are indistinguishable from the paliform lobes. Thin, closely spaced, slightly inclined tabular dissepiments are present in the lower half of the coralla.

Discussion. — *A. marchadi* is similar to the extremely variable *A. prolifera* but usually can be distinguished by the irregular junctions of the S_3 before the S_2 near the columella. Other characters that help to distinguish *A. marchadi* but are not diagnostic are: (1) a brownish color of the corallum, (2) a low, crispate columella, (3) S_1 larger than S_2 , and (4) budding from the edge zone, not intratentacularly.

Trochosmia elongata Studer, 1879, based on two specimens collected by the Gazelle off the mouth of the Congo River (180 m), may be the senior synonym of this species (ZIBROWIUS, 1976). Unfortunately, the types of *T. elongata* are not present at the Berlin or Berne museums, where the other Gazelle corals are deposited (ZIBROWIUS, pers. comm.).

Remarks. — According to descriptions of eastern Atlantic specimens (ZIBROWIUS, 1976; CHEVALIER, 1966), this species attains lengths of 50 mm and calicular diameters of 18 mm. Also, the eastern Atlantic specimens do not show a dichotomy in size of the S_1 and S_2 .

ZIBROWIUS (1976: 71) was the first to report the symbiotic relationship between

Troglocarcinus balssi Monod, 1956 and *A. marchadi*. The crab chemically excavates a perfectly fitted cavity in the corallum wall and seems to obtain nourishment (mucous?) from the coral. Among the four western Atlantic specimens examined, one (Pl. XXVI 9) revealed this characteristic niche, identical to the eastern Atlantic ones.

Material. – P-198 (1); P-734 (1); P-749 (1); P-781 (1). – Holotype of *D. marchadi*.

Types. – The holotype of *A. marchadi*, collected by the Gerard Tréca (18.2.1954), is deposited at the MNHNP. Eight paratypes are at the IFAN, Dakar.

Type-Locality. – South of the peninsula of Cape Verde; 97–98 m.

Distribution. – Western Atlantic: off eastern Florida; off northern coast of South America (Map 40). 32–229 m. – Eastern Atlantic: from Spanish Sahara to Gabon. 32–85 m.

Genus **Rhizosmilia** Cairns, 1978

Diagnosis. – Small, phaceloid, clumped colonies formed by extra-tentacular budding. Corallite bases increase in diameter by adding exothecal dissepiments over raised costae, producing partitioned, concentric rings. Paliform lobes present before penultimate cycle. Columella prominent, varying from spongy to fascicular (a line of pillars) to lamellar. Endothecal dissepiments. Type-species: *Rhizosmilia gerdae* Cairns, 1978, by original designation.

58. **Rhizosmilia gerdae** Cairns, 1978

Plate XXVII, figures 5–8

Rhizosmilia gerdae CAIRNS, 1978a: 219–222, pl. 1, figs. 1–7.

Description. – The colony forms phaceloid clumps by extra-tentacular budding from a common basal coenosteum. Corallites are cylindrical or slightly tapered at the base. The base of a corallite increases in diameter by adding exothecal dissepiments over raised costae as described by Cairns (1978a). A typical corallite measures 12×10 mm in calicular diameter and 21 mm tall, although adult corallites vary from 7–17 mm in greater calicular diameter and may

be up to 45 mm tall. Costae are usually well-defined only in the upper half of the corallum, where they are equal, low, rounded ridges separated by equally shallow grooves. Very small granules cover the costae.

Septa are arranged in six systems and four–five cycles. A corallite of 8–11 mm calicular diameter usually has a complete fourth cycle (48 septa), whereas, above 11 mm, pairs of S_5 are common, but a complete fifth cycle is rare. S_1 are usually slightly larger than S_2 , exsert, and have straight, vertical inner edges, which do not reach the columella. The remaining cycles are progressively smaller and less exsert; S_5 are rudimentary with dentate inner edges. The low, rounded septal granules are arranged in lines parallel to the trabeculae.

A large paliform lobe occurs before each septum of the penultimate cycle, separated from it by a deep, narrow notch; together they form a palar crown set deep in the fossa.

The columella is prominent and quite variable. It may be an elliptical, spongy mass; or linear, individualized pillars; or a single lamella. Widely spaced (about one every 5 mm) endothecal dissepiments are present.

Discussion. – *R. gerdae* is similar to *Rhizosmilia maculata* (Pourtalès, 1874), particularly in its growth form and aspects of its paliform lobes, dissepiments, costal roots, and columella. It may be distinguished by the smaller size of its corallites (none known to exceed 15 mm in greater calicular diameter), complete absence of S_6 , absence of brown speckled pigmentation, and shallower fossa.

Material. – G-526; Alb-2326 (USNM 10146). – Types.

Types. – The holotype and paratypes are deposited at the USNM.

Type-Localities. – 26°01'N, 79°10'W (off Bimini, Straits of Florida); 143–210 m.

Distribution. – Straits of Florida (Map 40). 123–355 m.

Genus **Phacelocyathus**, new genus

Diagnosis. – Quasicolonial, new corallites arising from encrusting coenosteum. Basal diameter increases by adding exothecal dissepiments over raised costae. Pali before all but last cycle. Columella papillose or lamellar. Sparse tabular endothecal dissepiments. Type-species: *Paracyathus flos* Pourtalès, 1878, here designated.

Discussion. – A new genus is named for the single species *Paracyathus flos* Pourtalès, 1878, which previously had been uncomfortably forced into *Paracyathus*, *Caryophyllia*, and *Trochocyathus*. Additional characters of this heretofore poorly known species are now evident, as observed in many previously unexamined specimens. These characters include: endothecal dissepiments, method of basal reinforcement, and colonial structure. It is most similar to *Rhizosmilia* Cairns, 1978, particularly in its growth form and basal reinforcement, but differs primarily by having pali before all but the last cycle, not just the penultimate cycle as in *Rhizosmilia*.

Etymology. – The generic name refers to the phaceloid growth form. Gender: masculine.

59. **Phacelocyathus flos** (Portalès, 1878), new comb.

Plate XXVII, figures 1–4

Paracyathus flos POUTALÈS, 1878: 201; 1880: 96, pl. 2, figs. 7–8.

Caryophyllia flos: GOREAU & WELLS, 1967: 449. – PORTER, 1972: 113. – WELLS & LANG, 1973: 58. – LAND, LANG & BARNES, 1977: 170.

“*Trochocyathus*” *flos*: CAIRNS, 1978: 11.

Description. – Small corallites are ceratoid with narrow pedicels and greatly flared calices. The base and pedicel increase in diameter by repeatedly covering thin, raised costae with exothecal dissepiments, so as to produce partitioned concentric rings. The corallites arise from a thin basal coenosteum forming small phaceloid colonies. LANG (pers. comm.) reported a colony approximately 30 cm in di-

ameter. Corallites are usually separated from one another by a distance equal to their own calicular diameter. The calice is elliptical; the largest corallum examined measures 13.7×11.5 mm in calicular diameter and 17.0 mm tall. The upper quarter of the corallum, including all septa, is usually a dark brown or reddish-brown; however, some specimens and colonies are entirely white. The pali and columella are always white; the lower three-quarters of the corallum is also white or a lighter shade of brown. Costae are well distinguished only near the calicular edge, where they are broad and flat to slightly ridged, separated by narrow, shallow striae. Costal granules are large, low, and rounded.

Septa are arranged in six systems and four cycles; only in the larger coralla are S_5 present. S_1 and S_2 are equal in size, highly exsert, and usually quite thick, appearing inflated. S_3 are smaller, less exsert, but also usually thick. S_4 are considerably less exsert, but extend toward the columella equally as far as, or farther than, the S_3 . The inner edge of each septum is straight and entire; the upper edge forms a well-defined, round profile. The hemispherical septal granules are very large and randomly arranged on the lower half of the septum. Toward the upper septal edge, granules are often fused into vertical carinae.

Pali occur before all but the last cycle. P_1 and P_2 are tall and narrow. P_3 are considerably larger (about three times as thick and four times as wide), extend farther toward the columella, and reach higher in the fossa than the P_{1-2} . Their calicular edges are usually broader than their axial edges and consequently are closely adjacent to the inner edges of the S_4 as well as the S_3 . Sometimes, even before the development of S_5 , lobes will begin to form before the S_4 in the following manner: each P_3 , which is triangular in cross-section in its most developed state, is notched on top by two grooves that unite to form a V, the apex of which is directed toward the columella. Eventually, these grooves deepen, elongate, and finally separate the lateral components into two P_4 . The P_3 is thereby reduced to a very small size (previously the triangular area bordered by the two original grooves). The two P_4 are each about half as large as the original P_3 and recessed from the columella.

The columella is elongate, very deep-set, and surrounded by an

elliptical ring of pali. In small coralla it is composed of four-eight tall rods arranged in one or two parallel rows. With greater size, four or five of the largest rods fuse to produce a carinate, lamellar columella, which is flanked by a row of rods on either side. Tabular endothecal dissepiments are present.

Material. – P-405 (USNM 46076); P-1432 (USNM 46075); G-701; G-702; G-983 (USNM 46073); G-984 (SNM 46074); O-1890; O-1993; O-4832; SB-2460; SB-3494; Alb-2321 (USNM 16078); Alb-2326; Alb-2407 (USNM 10466); E-30158; E-30176; E-30178; Hudson-3B (NMC); Nekton (*beta*)-563 (USNM 46080); Nekton (*gamma*)-232 (USNM 46078); Akaroa-5b (SME); 26°33'N, 78°34'W, 76 m (USNM 46077); Hummelinck- 1442. – Syntypes.

Types. – One lot of syntypes (5483) is deposited at the MCZ. It contains one complete specimen broken into three parts and fragments of another. They were collected at BL-69.

Type-Localities. – Off Havana, Cuba; 183 m.

Distribution. – Antillean distribution; western Caribbean; eastern Gulf of Mexico; off Recife, Brazil (Map 41). 22–560 m.

Superfamily FLABELLICAE Bourne, 1905

Family FLABELLIDAE Bourne, 1905

Genus *Flabellum* Lesson, 1831

Diagnosis. – Solitary, cuneiform to compressed-turbinate, free. Wall epithelial. Base not thickened by stereome; no roots. Calicular edge jagged or entire. Pali absent. Columella rudimentary or absent. Type-species: *Flabellum pavoninum* Lesson, 1831, by subsequent designation (MILNE EDWARDS & HAIME, 1850).

60. *Flabellum moseleyi* Pourtales, 1880

Plate XXVIII, figures 1–3

Flabellum moseleyi POURTALES, 1880: 96, 105–106, pl. 2, figs. 13–14. – AGASSIZ, 1888: 150, figs. 468, 468a. – ZIBROWIUS, 1974c: 21; 1976: 217. – CAIRNS, 1977b: 5; 1978: 11.

Description. – The corallum is originally attached by a small

pedicel 2–3 mm in diameter, but at a very early stage it detaches and rests on its convex side. The adult corallum is regularly curved about 90° from its original orientation. The corallum expands into a flared elliptical calice, measuring 72.0 × 63.0 mm in the largest specimen examined. The calicular margin is scalloped, with its points corresponding to the exsert S_1 and S_2 . C_1 and C_2 are very low and smooth, and extend to the pedicel. Faint intercostal striae delimit costae that correspond to the higher cycles. When the specimen measures 14–20 mm in calicular diameter, the principal S_1 and their corresponding costae become strongly produced, forming carinate costae on each end. At this stage, the corallum is compressed, with a greater to lesser calicular diameter ratio of 1.5 : 1. With an increase in size the calice becomes more elliptical and the principal costae less prominent, but there is always an indication of this growth stage in larger coralla. Very fine costal granulation is present and growth lines in irregular chevrons are particularly noticeable at the calicular edge. The color of the corallum, particularly the septa, is reddish-brown.

Septa are arranged in six systems and five complete cycles. S_1 and S_2 are equal in size, highly exsert, and meet in the bottom of the fossa. The higher cycle septa are not exsert and are progressively smaller, except for those S_5 adjacent to S_1 and S_2 , which are almost as exsert as the septa they flank but are narrower than the S_4 . All septal margins are entire and straight; the lower margins of S_{1-3} thicken and fuse in the bottom of the fossa, forming a rudimentary columella. The septal granules are large and arranged in lines on low crests oriented parallel to the trabeculae.

Discussion. — This species was synonymized with *F. alabastrum* Moseley, 1873 by SQUIRES (1959); however, *F. moseleyi* is quite distinct from *F. alabastrum* in many characters, including shape of corallum, septal granulation, costae, and geographic distribution.

Material. — P-374 (1) USNM 46585; P-478 (23) USNM 46582, (1) UMML 8: 261; P-585 (6) USNM 46581; P-776 (1) USNM 46587; P-861 (24) USNM 46583, (4) UMML 8: 327; P-881 (1) USNM 46584; P-1225 (1) USNM 46588; G-861 (2) USNM 46586; G-970 (1) USNM 46580; O-489 (8) USNM 53384; O-490 (12) USNM 45645; O-1887 (1); O-1982 (2); O-2771 (4); O-2774 (7); O-2775 (4); O-2776 (1); O-2777 (2); O-3252

(1); O-3560 (3); O-3601 (1); O-4412 (4); O-4413 (2); O-4841 (2); O-4882 (3); O-5028 (3); O-5925 (1); O-5929 (2); O-6703 (4); O-6705 (10); O-10170 (1); O-10491 (1); O-10632 (1); O-10633 (10); O-10825 (1); O-10827 (3); O-10828 (1); O-10831 (1); O-10845 (3); O-10847 (1); O-11227 (1); O-11228 (1); O-11244 (1); O-11284 (1); O-11302 (13); O-11303 (2); O-11307 (1); O-11310 (16); SB-3515 (5); Gos-112/76 (1) Cornell; 53 specimens from 11 Atlantis stations off the northern coast of Cuba (MCZ); TAMU 70A10-35 (1) TAMU; Hudson-3A (1) NMC. - Syntypes.

Types. - Five syntypes are deposited at the MCZ, collected from five Blake stations: BL-188, BL-274, BL-279, BL-281, and BL-288. The single specimen from BL-188 bears the number MCZ 5460.

Type-Locality. - Lesser Antilles; 216-871 m.

Distribution. - Widespread in Caribbean and eastern Gulf of Mexico, ranging from off northern Florida to off Trinidad (Map 42). 216-1097 m. 6°-18°C, based on eight records.

61.

***Flabellum fragile* Cairns, 1977**

Plate XXIX, figures 1-3, 7

Flabellum fragile CAIRNS, 1977b: 14-15, pl. 2, figs. 1, 4-6, 9; 1978: 11.

Description. - The corallum is trochoid to turbate, tending to become cylindrical with continued growth. The basal angle is about 50°. The pedicel is very narrow (often only one-tenth the calicular diameter), not reinforced by stereome, and often slightly bent. Adult coralla often are not firmly attached, in which case the base usually contains a small, hard object. The calice is elliptical; the holotype is 18.2 × 16.6 mm in calicular diameter and 19.4 mm tall. The largest known specimen measures 20.0 × 17.4 mm in calicular diameter and 17.2 mm tall. The epithelial wall is very thin, bearing chevron-shaped growth lines forming points at the upper, outer edge of every S₁₋₃. The epitheca is usually encrusted by foraminifera, polychaetes, and/or bryozoans. The calicular margin is smooth, continuous, and not jagged.

Septa are regularly arranged in six systems and four complete cycles. S₁ and S₂ are equal in size, slightly exsert, and extend to the rudimentary columella. Their inner edges are vertical and sinuous. S₃ are half as large as S₁ and S₂, not exsert, and do not reach the

columella. They also have less sinuous inner edges. S_4 are small (rudimentary lower in the fossa) and have straight inner edges. Septal granulation is prominent on all septa, expressed as tall (one-two times the septal thickness in height), pointed granules arranged in poorly-defined, widely spaced lines oriented parallel to the trabeculae.

The fossa is moderately deep, containing a rudimentary, elongate columella composed of a loosely fused mass of randomly arranged trabeculae. The columella extends to the lower, inner edges of the S_1 and S_2 .

Material. – BL-36 (1) MCZ 5496; MAFLA-2212 (3); TAMU 65A9-20 (11) TAMU; Explorer-4 (5); southwest of Panama City, Florida, 183 m (1) MCZ. – Types.

Types. – The holotype and three paratypes are at the USNM (45764–45767). One paratype is deposited at the FDNR (FSBC I 15286).

Type-Locality. – 27°37'N, 84°21'W (off Egmont Key, Florida); 91 m.

Distribution. – Eastern Gulf of Mexico; Florida Keys; Campeche Bank; ? off São Paulo, Brazil (Map 43). 80–366 m.

62. **Flabellum pavoninum atlanticum**, new subspecies

Plate XXVIII, figures 4–7

Flabellum sp. CAIRNS, 1977: 86, upper left fig.

Description. – The corallum is compressed and flabellate; the two faces are slightly convex. Initially the corallum is attached by a narrow, cylindrical pedicel about 3 mm in diameter but later detaches. The angle of the lateral edges varies from 75°–128°, exclusive of crests (principal costae). The inclination of the lateral faces varies from 42°–52° (see SQUIRES, 1964 for terminology). The calice is elliptical, entire, and very open. The dimensions of the holotype are 48.5 × 39.8 mm in calicular diameter and 44.7 mm tall. The theca and septa are very thin and fragile. Inconspicuous costal striae correspond to all but the last cycle of septa; otherwise, epithelial growth–mark the theca. Some coralla are marked by reddish-brown stripes aligned with the primary septa. The principal costae

form distinctive crests, which begin to appear at a greater calicular diameter of about 10 mm. They may remain small or continue to grow (projecting up to 6 mm from the theca) as the corallum increases in size. When forming, the principal septa stand free, *i.e.* without an attachment to the theca.

In a large corallum there are 112 septa arranged in 28 groups of four. The 28 primaries are equal, not exsert, and descend vertically to the bottom of the fossa, where their inner edges fuse, forming an elongate, rudimentary columella. The secondaries are half as high and slope obliquely into the fossa. The tertiaries are smaller and often extend only a short distance into the fossa; often they are poorly developed or absent from the four penultimate (lateral) groupings. The septal granules are prominent, one–two times the septal thickness in height, and arranged in short lines parallel to the trabeculae.

Discussion. – There are over 100 nominal species of *Flabellum*, most described from the Indo-Pacific region. Only seven valid Recent species are known from the tropical-temperate Atlantic: *F. macandrewi* Gray, 1849; *F. alabastrum* Moseley, 1873; *F. angulare* Moseley, 1876; *F. moseleyi* Pourtalès, 1880; *F. chunii* Marenzeller, 1904; *F. fragile* Cairns, 1977; and *F. pavoninum atlanticum*, n. subsp. All are found in the western Atlantic except *F. chunii*. Most species of *Flabellum* are poorly known and many have complicated synonymies. In a preliminary revision of the genus *Flabellum*, ZIBROWIUS (1974c) suggested that the genus could be divided into three groups. *F. pavoninum atlanticum* belongs to his “first group”, *Flabellum s. str.*

F. p. atlanticum is designated as a subspecies of *F. pavoninum* because of its remarkable resemblance to *F. p. paripavoninum* Alcock, 1894 *sensu* Vaughan, 1907. ALCOCK’s types were not examined by the author, but VAUGHAN’s (1907) Hawaiian specimens were compared and found to be extremely similar. There are already at least six nominal subspecies of *F. pavoninum*: typical Lesson, 1831; *distinctum* Milne Edwards & Haime, 1848; *latum* Studer, 1878; *paripavoninum* Alcock, 1898; *lamellosum* Alcock, 1902; and *magnificum* Marenzeller, 1904, all from the Indo-Pacific. They are distinguished

primarily by their shape (angle of lateral edges, angle of lateral faces, height: width) and presence or absence of crests on the lateral costal edges. The new subspecies is identical to *F. p. paripavoninum* *sensu* Vaughan, 1907 in shape, differing only in its larger lateral crests, more prominent septal granulation, and lesser number of septa for corresponding calicular diameter. (The Indo-Pacific subspecies has almost twice as many septa for the corresponding calicular diameter.) In the Atlantic, *F. p. atlanticum* is most similar to *F. chunii* Marenzeller, 1904, both having similar lateral crests. However, *F. chunii* is easily distinguished by the larger angle of its lateral edges (up to 180°), lesser inclination of lateral faces, and greater number of septa.

Material. – P-197 (1); G-256 (1); G-664 (6); G-667 (1); G-674 (1); G-678 (1); G-719 (1); G-720 (6); G-721 (2); G-915 (1); G-937 (1); SB-2443 (1); SB-3472 (1); Alb-2655 (10) USNM 14620; Combat-447 (18) USNM 53425; 88 specimens from 17 Atlantis stations from Old Bahama and Nicholas Channels off the northern coast of Cuba (MCZ). – Types.

Types. – Holotype: G-179 (USNM 46895). – Paratypes: G-179 (41) USNM 46896, (6) UMML 8: 286; G-254 (1) USNM 46898; G-405 (1) USNM 46897; G-666 (1) USNM 46899; G-927 (1) USNM 46900; G-938 (3) UMML 8: 299; SB-3514 (3) USNM 46901.

Type-Locality. – 27°41'N, 79°11'W (northern Straits of Florida); 549–567 m.

Distribution. – Off northern Cuba; Straits of Florida; Bahamas (Map 43). 357–618 m.

Genus **Placotrochides** Alcock, 1902

Diagnosis. – Solitary, compressed-cylindrical. Attached by base strengthened by stereome or truncated as the result of transverse division. Usually three cycles of septa. No pali. Columella rudimentary. Type-species: *Placotrochides scaphula* Alcock, 1902, by subsequent designation (WELLS, 1936).

63. **Placotrochides frusta**, new species

Plate XXIX, figures 4-6, 8-9

Placotrochides sp. A ZIBROWIUS, 1976: 228-229, pl. 66, figs. E-M.

Description. - All specimens examined are unattached, having previously detached from their original bases by a transverse division. They are variable in shape, but are usually higher than broad, and round to slightly compressed in cross-section. The largest specimen examined measures 5.0×4.2 mm in calicular diameter and 8.7 mm from calice to break. The basal, transverse fracture is usually completely closed over by deposits of stereome, which fill in between the septa and columella. The epitheca is very thin and fragile; only very shallow, longitudinal striae can be seen on the theca, which correspond to the septal insertions. Thin, scalloped growth lines, perpendicular to the costae, circle the theca. The calicular edge is entire, not scalloped.

Some calices bear 12 primary septa (S_1 and S_2) and 12 much smaller septa (S_3); however, 8-13 primary septa may occur, depending on the size and shape of the corallum. No corallum examined has more than 26 septa. The S_1 and S_2 are equal in size, not exsert, and have entire, vertical, sinuous inner edges, which join with the columella. The S_3 are much smaller and extend only a short distance into the fossa. They usually appear as small ridges with serrate inner edges. A few widely spaced, pointed granules occur on the septal faces.

The fossa varies in depth: it can be either very deep or quite shallow. A large, elongate columella forms by the intermingling and/or fusion of the lower, inner edges of the S_1 and S_2 .

Discussion. - ZIBROWIUS (1974c) resurrected the genus *Placotrochides* to include those flabellids with transverse division and a massive, stereome-reinforced base. According to ZIBROWIUS (1974c: 23; 1976: 227), there are three other valid species in this genus, all from the western Pacific: both *P. alabastrum* (Alcock, 1902) and *P. scaphula* Alcock, 1902 are larger with more septa, whereas *P.*

kikutii Yabe & Eguchi, 1941 is much smaller and has a differently shaped columella.

ZIBROWIUS (1976) described and figured the fixed form of *P. frusta*.

Etymology. – The specific name *frusta* (Latin, = a bit, a part) refers to the shape of the corallum. A frustum, in geometry, is the part of a conical solid next to the base left by cutting off the top portion by a plane parallel to the base.

Material. – Alb-2756 (12) USNM 36347; Hudson-4B (9) NMC. – Types.

Types. – Holotype: Alb-2750 (USNM 36451). – Paratypes: Alb-2750 (5) USNM 36453.

Type-Locality. – 18°30'N, 63°31'W (northwest of Anguilla); 907 m.

Distribution. – Western Atlantic: Windward Group, Lesser Antilles; off Fortaleza, Brazil (Map 43). 497–907 m. – Eastern Atlantic: off Morocco. 1300 m.

Genus **Javania** Duncan, 1876

Diagnosis. – Solitary, turbinate, fixed. Wall epithecal. Base reinforced by layers of stereome. No pali. Calicular edge jagged. Columella rudimentary. Type-species: *Javania insignis* Duncan, 1876, by monotypy.

64. **Javania cailleti** (Duchassaing & Michelotti, 1864)

Plate XXVIII, figures 8–12; Plate XXX, figures 1, 4

Desmophyllum cailleti DUCHASSAING & MICHELOTTI, 1864: 66, pl. 8, fig. 11 (not fig. 2). – DUCHASSAING, 1870: 25. – POURTALÈS, 1871: 16, pl. 1, figs. 17–18; 1874: 38; 1878: 203; 1880: 96, 106. – MOSELEY, 1881: 162.

?*Galaxea eburnea* POURTALÈS, 1871: 29, pl. 3, figs. 6–7.

Not *Desmophyllum cailleti*: LINDSTRÖM, 1877: 12 (= *Desmophyllum striatum*, n. sp.).

Desmophyllum eburneum MOSELEY, 1881: 162, pl. 6, figs. 1, 1a–b. – JOURDAN, 1895: 22–23.

Desmophyllum nobile VERRILL, 1885: 150–151.

Desmophyllum vitreum ALCOCK, 1898: 20, pl. 2, figs. 2, 2a–b. – GRAVIER, 1920: 76–77, pl. 8, figs. 136–137.

Flabellum sp. MARENZELLER, 1904a: 81.

- Desmophyllum galapagense* VAUGHAN, 1906a: 63, pl. 1, figs. 1-1b.
 Not *Desmophyllum eburneum*: GRAVIER, 1920: 77-78, pl. 7, fig. 120 (= *Caryophyllia atlantica*).
 ?*Desmophyllum delicatum* YABE & EGUCHI, 1942: 115, 144, pl. 9, figs. 2a-b.
Flabellum alabastrum: SQUIRES, 1959: 27.
Javania eburnea: ZIBROWIUS, 1974c: 12-13, pl. 3, figs. 13-17; 1976: 225-227, pl. 65, figs. A-L.
Javania cf. *eburnea*: ZIBROWIUS, 1974c: 13-16, pl. 4, figs. 22-29, pl. 5, figs. 31-34.
Javania vitrea: ZIBROWIUS, 1974c: 16-17, pl. 5, figs. 18-21.
Desmophyllum gailleti: KELLER, 1975: 177.
Javania cailleti: CAIRNS, 1977b: 5; 1978: 11.

Description. - The corallum is ceratoid, expanding into a large, elliptical calice. The pedicel diameter, which measures one-fourth to one-half the calicular diameter, is reinforced by concentric layers of stereome. The pedicel re-expands basally into a large, thin, encrusting sheet, by which the corallum is attached. The largest specimen examined measures 45.0×65.0 mm in calicular diameter, but 18×14 mm is more typical. The theca and septa are initially very thin and fragile until they are secondarily thickened with stereome. The theca is very smooth and often porcelaneous, with scalloped growth lines, the peaks of which correspond to the S_{1-3} . Costae rarely occur, but when expressed they are faint to well developed ridges in the upper one-third of the corallum, corresponding to S_{1-3} .

Septa are usually arranged in six systems and four cycles but often four of the S_3 are enlarged, giving the appearance of eight regular systems with four cycles (64 septa). S_1 and S_2 are equal in size and highly exsert. S_3 are less exsert and much smaller; S_4 are not exsert and become rudimentary in the lower fossa. The inner edges of all septa are entire and usually straight, but sometimes those of the S_3 and S_4 are slightly sinuous; more rarely those of the S_1 and S_2 are also sinuous. Septal granules vary from low and rounded to narrow and pointed, and are arranged in lines parallel to the trabeculae, either on the crests of small septal undulations or over a flat septal face.

The fossa is elongate, deep, narrow, and bordered by the inner edges of the S_1 and S_2 . A solid, rudimentary columella forms deep within the fossa by the fusion of the lower, inner edges of the S_1 and S_2 .

material of *D. vitreum* Alcock, 1898, is at the Indian Museum, Calcutta, but five syntypes are deposited at the MNHNP and two are at the ZMA (Coel. 1198). The type of *D. galapagense* Vaughan, 1906 is at the USNM. The type of *D. delicatum* was not traced.

Type-Localities. – Lesser Antilles (no specific location or depth was given).

Distribution. – Western Atlantic: off Nova Scotia: widespread in Caribbean and eastern Gulf of Mexico, ranging from off Georgia to off Surinam; off Uruguay (Map 44). 86–1682 m. 6°–16°C, based on 13 records. – Elsewhere: eastern Atlantic; Indian and Pacific Oceans. 400–2165 m.

65. ***Javania pseudoalabastra* Zibrowius, 1974**

Plate XXX, figures 9–10

Flabellum alabastrum: JOURDAN, 1895: 23–24 (in part: Hirondele-203).

Javania pseudoalabastra ZIBROWIUS, 1974c: 10–11, pl. 2, figs. 7–12; 1976: 224–225, pl. 66, figs. A–D. – CAIRNS, 1977: 85, 2 figs.

Description. – [The original description was based on three broken, worn specimens. The following description is based on one perfect specimen from the Tongue of the Ocean, Bahamas]. The corallum is attached by a thick pedicel, elliptical in cross-section, measuring 11.3×9.1 mm in diameter. The pedicel is white, smooth, and thickened by concentric layers of stereome. At the height of 15 mm the pedicel changes color to reddish-brown and expands into a greatly flared calice, somewhat constricted at its center. The upper theca and septa are very thin and brittle. Prominent, ridged costae correspond to the first three cycles. C_1 and C_2 are larger than the other costae and extend to the top of the smooth pedicel. Scalloped growth lines peak at the costae. The calicular diameter is 43.8×21.4 mm; the height is 34.2 mm.

Septa are arranged in six systems and four cycles, with five supplementary septa of the fifth cycle (53 septa). S_1 and S_2 are equal in size, very exsert, and extend so far into the calice that several overlap. Exsert S_3 and nonexsert S_4 are progressively smaller. The septa of the fifth cycle are not arranged in pairs; instead they occur in five different half-systems and are as fully developed as the S_4 .

Discussion. – Even though the holotype of *D. cailletii* is lost, the two figures and brief Latin description could refer to no other nominal West Indian species. The 64 – septa holotype is simply the common variation in which four of the S_3 are accelerated to form 16 half-systems.

The holotype of *G. eburnea* Pourtalès, 1871, is also lost, but the two figures and brief description strongly suggest that it is a young specimen of *J. cailletii*.

VAUGHAN'S (1906a) *D. galapagense* is also a junior synonym. In the original description he remarked that it was very close to *D. eburneum* Moseley, differing only in the entire absence of costae and lack of septal exsertness outside the thecal margin. Both of these differences are well within the range of variation of *J. cailletii*. MARENZELLER'S (1904a) *Flabellum* sp., a small, broken, worn specimen (USNM 22084) is probably a junior synonym. Likewise, ZIBROWIUS (1976: 227) implied that *Desmophyllum delicatum* Yabe & Eguchi, 1941, is also a junior synonym.

Material. – P-587 (18) USNM 46770, (3) UMML 8: 321; P-610 (1) 46771; P-705 (1) USNM 46763; P-838 (1) USNM 46764; P-890 (1) USNM 46765; P-918 (3) USNM 46766; P-923 (1) UMML 8: 261; P-944 (2) USNM 46767; P-969 (2) USNM 46768; P-984 (1) USNM 46769; P-1187 (3); 40 specimens from 15 Gerda stations in the Straits of Florida; CI-2 (1) USNM 46772; CI-6 (2) USNM 46773; CI-46 (1) USNM 46774; CI-92 (1) USNM 46775; GS-31 (1) USNM 46776; O-1320 (1); O-1916 (1); O-2637 (1); O-4297 (25); O-4459 (1); O-4461 (1); O-4832 (4); O-4903 (1); O-5015 (8); O-5021 (1); O-5648 (2); O-5682 (1); O-5733 (1); O-5955 (1); O-5956 (3); O-6715 (2); O-10716 (1); O-10828 (1); O-10832 (3); SB-3471 (1); SB-3474 (10); BL-19 (2) MCZ; BL-36 (1) MCZ; BL-45 (1) MCZ; BL-101 (1) MCZ; 123 specimens from 15 additional Blake stations from the Windward Islands, Lesser Antilles; Bibb-141 (1) MCZ; Alb-2322 (1) USNM 16079; Alb-2327 (1) USNM 10151; Alb-2415 (2) USNM 10516; Alb-2662 (1) USNM 16091; Alb-2663 (2) USNM 14614; Alb-2666 (1) USNM 16074; Alb-2669 (1) USNM 16075; Alb-2750 (2) USNM 36351; Alb-2753 (1) USNM 36414; E-26017; E-26023; E-30176; WH-44/68 (5) SME; BLM-22 VI B (1) Alabama BLM; TAMU 65A9-20 (1) TAMU; Chain-36 (1); Chain-43 (3); Hummelinck-1443 (1). – Syntypes of *D. eburneum*; holotypes of *D. nobile* and *D. galapagense*; Lindström's (1877) specimens (NRM); Moseley's (1881) specimens (BM); Marenzeller's (1904a) *Flabellum* sp. (USNM 22084).

Types. – The holotype of *D. cailletii* is lost; it is not present at the MIZS or the MNHNP. The type of *G. eburnea* is one of the few POURTALÈS types that is missing (presumed lost) from the MCZ. MOSELEY'S *D. eburneum* is based on five syntypes collected from Chall-306. They are deposited at the BM (1880.11.25.65). The holotype of *D. nobile* Verrill, 1885, is at the USNM (type number 7964). Most of the type-

All septa are thin, very delicate, the same reddish-brown as the upper theca, and have straight, entire edges. The septal faces are smooth with few scattered granules. Growth lines are parallel to the septal edge. The fossa is deep but obscured by the great inward development of the S_1 and S_2 .

Material. – P-1262 (1) USNM 46612; CI-46 (1) USNM 46611. – Types.

Types. – Holotype: deposited at the MOM; collected at Hirondele-203.

Type-Locality. – 39°27'05"N, 30°55'05"W (Azores); 1557 m.

Distribution. – Western Atlantic; Bahamas; off Jamaica (Map 44). 1089–1234 m. – Eastern Atlantic: Azores. 784–1557 m.

Genus **Polomyces**, new genus

Diagnosis. – Solitary, ceratoid to trochoid, fixed. Wall epithelial, reinforced basally by six regularly placed pairs of structures resembling rootlets, which never detach from the corallum. "Rootlets" communicate with polyp by 12 small pores located adjacent to every S_2 . No pali; rudimentary columella formed by fusion of inner edges of lower cycle septa. Type-species: *Rhizotrochus fragilis* Pourtalès, 1871, here designated.

Discussion. – The genus *Monomyces* Ehrenberg, 1834 was originally created to include the species *M. anthophyllum* (= *Caryophyllia pygmaea* Risso, 1826), which has one lateral root in addition to its main attachment. The genera *Coelocyathus* M. Sars, 1857, and *Biflabellum* Döderlein, 1913, also are junior objective synonyms of *Monomyces*. The type-species of *Rhizotrochus* Milne Edwards & Haime, 1848, *R. typus* Milne Edwards & Haime, 1857, differs from *Monomyces* in that it has numerous randomly arranged lateral roots. The number of roots, one or several, was not considered of generic significance by either WELLS (1956) or ZIBROWIUS (1974c). The form typified by *P. fragilis*, however, is quite different in that the "rootlets" are regularly arranged, always 12 in number, and never detached from the corallum. For these reasons this genus is erected

to contain *R. fragilis* Pourtalès, 1868 and *Flabellum* (?) *montereyense* Durham, 1947.

Etymology. — The generic name refers to the 12 pairs of root-like structures on the base of the corallum. *Gender*: masculine.

66. ***Polymyces fragilis*** (Portalès, 1868), new comb.

Plate XXX, figures 2-3, 5-8

Rhizotrochus fragilis PORTALÈS, 1868: 134-135; 1871: 17-18, pl. 4, figs. 1-4; 1878: 203; 1880: 96. — AGASSIZ, 1888: 151, fig. 471. — ZIBROWIUS, 1974c: 22. — CAIRNS, 1977b: 5; 1978: 11.

Rhizotrochus tulipa PORTALÈS, 1874: 39, pl. 6, figs. 10-19; 1878: 203; 1880: 96, 106. — ZIBROWIUS, 1974c: 22.

Not *Rhizotrochus fragilis*: MOSELEY, 1881: 175.

Not *Monomyces fragilis*: WELLS, 1958: 261. — SQUIRES, 1961: 17.

Monomyces tulipa: LEWIS, 1965: 1062.

Description. — The corallum is ceratoid to trochoid, slightly compressed, and attached by a narrow pedicel to a slightly expanded base. The pedicel is reinforced by six pairs of symmetrically arranged "rootlets," which extend 5-10 mm up the side of the corallum from the base. Each pair of rootlets has a common atrium basally, which bifurcates distally into two tapering extensions, each of which is in open communication with the interior of the corallum via a small pore. The pores penetrate the inner theca on either side of each S_2 . These pores cannot be seen in an intact specimen because of their depth within the fossa. A decalcified specimen reveals mesenterial extensions, corresponding to these rootlets, which communicate through the pores. The calice is elliptical; an average-size specimen of 25 mm height measures 18.0×16.0 mm in calicular diameter. The theca is very thin, variable in color (see Discussion), and glossy in unworn specimens. No costae or striae occur, but inconspicuous, scalloped growth lines are present.

Septa are arranged in six systems and four complete cycles. S_1 and S_2 are equal in size, slightly exsert, and extend to the bottom of the fossa, where their inner edges fuse into an elongate, rudimentary columella. S_3 are half as large, not exsert, and do not extend to the columella. S_4 are much smaller and not exsert. All septa are very

thin and fragile, with entire and slightly sinuous inner edges. The septal granules are tall, pointed, and arranged on septal crests in widely spaced lines parallel to the trabeculae. The fossa is deep and elongate. The interior of the theca is sometimes greatly thickened with stereome.

Discussion. — CAIRNS (1976) maintained *R. tulipa* as a distinct species based on its distinctive color pattern, smaller size, and more exsert septa, but suggested that it may be synonymized with *R. fragilis*. Based on an examination of 66 additional intermediate specimens from 18 lots throughout the Caribbean, I now consider these differences to be insignificant and therefore synonymize *R. tulipa*. All intergrades in pigmentation between typical *tulipa* (with reddish-brown costal stripes) to typical *fragilis* (completely white) occur. Some specimens are uniformly reddish-brown with or without subdued stripes and one specimen (G-510) is white for the proximal 80% of the corallum but reddish-brown near the calice and upper septal margins. Other characters, such as size, shape, septal granulation, thickness or exsertness of septa, or structure of the rootlets do not differentiate the forms. Therefore all western Atlantic species of *Polymyces* are considered to be *P. fragilis*.

MOSELEY'S (1881) erroneous record from the Cape of Good Hope led both WELLS (1958) and SQUIRES (1961) to incorrectly list this species in their faunal accounts. MOSELEY'S specimen does not have basal rootlets.

Material. — P-600 (2); P-876 (1); P-891 (1); G-190 (1) USNM 46741; 83 specimens from 25 additional Gerda stations in the Straits of Florida and Northwest Providence Channel (USNM 46723–46740); CI-6 (1); CI-37 (1); GS(G)-5 (2) USNM 46743; O-1320 (4); O-1321 (8) USNM 53404; O-1348 (2); O-3704 (3); O-4226 (1); O-4398 (10); O-4832 (5); O-4833 (1); O-4834 (5); O-4938 (1); O-4939 (27); O-5648 (4); O-5733 (1); O-11716 (1); O-11725 (1); SB-2418 (8); SB-2427 (8); SB-3339 (1); SB-3494 (18); SB-3704 (1); BL-32 (2) MCZ; BL-56 (1) MCZ; BL-272 (1) MCZ; BL-273 (7) MCZ; BL-277 (1) MCZ; BL-296 (3) MCZ; BL-317 (1) MCZ; Bibb-31 (1) MCZ; Bibb-136 (1) MCZ; Alb-2323 (1);⁴Alb-2596 (5); Alb-2639 (1) USNM 16134; FH-7286 (6); FH-7296 (2) USNM 22020; Gos-1533 (2); Gos-1590 (3); Gos-1643 (2); Gos-1767 (1); Gos-1863 (1); WH-127/68 (1) SME; Hummelinck-1443 (3). — Syntypes of *R. fragilis* and *R. tulipa*; Moseley's (1881) specimens (BM).

Types. — Seven lots of syntypes of *R. fragilis*, containing 100+, 60, 37, 11, 6, 3, and 2 specimens are deposited at the MCZ (MCZ 5451 and 5628). POURTALES did not

designate specific localities in his original description nor are they present with the syntypes. Seventy-one syntypes of *R. iulipa*, all collected from a Hassler station off Barbados (183 m), are deposited at the MCZ in four lots.

Type-Locality. - Off the Florida Reef; 172-592 m.

Distribution. - Throughout the Caribbean and eastern Gulf of Mexico, ranging from off North Carolina to off the Amazon, Brazil (rare off northern coast of South America); off southeastern Brazil (Map 45). 75-796 m. 10°-18°C, based on eight records.

Genus *Gardineria* Vaughan, 1907

Diagnosis. - Solitary, turbinata to cylindrical, fixed. Wall epithelial but thickened internally by stereome. Septa not always arranged hexamerally. Paliform lobes opposite larger septa. Columella well developed, papillose. Type-species: *Gardineria hawaiiensis* Vaughan, 1907, by original designation.

67. *Gardineria paradoxa* (Pourtalès, 1868)

Plate XXXI, figures 4-6, 10

Haplophyllia paradoxa POURTALÈS, 1868: 140-141; 1871: 52, pl. 2, figs. 11-13. - DUNCAN, 1872: 34. - POURTALÈS, 1880: 97. - AGASSIZ, 1888: 154-155, figs. 480-481. - HICKSON, 1910: 5.

Duncania barbadensis POURTALÈS, 1874: 45, pl. 9, figs. 5-7. - LINDSTRÖM, 1877: 13. - POURTALÈS, 1880: 97, 112. - DUNCAN, 1883: 366. - AGASSIZ, 1888: 155.

Gardineria barbadensis: LEWIS, 1965: 1063. - WELLS, 1973: 50. - ZIBROWIUS, 1974c: 24.

Not *Gardineria* cf. *barbadensis*: GOREAU & WELLS, 1967: 449 (= *G. minor*).

Gardineria paradoxa: WELLS, 1973: 51.

Description. - The corallum is initially trochoid, becoming cylindrical with greater size. It is solidly attached to the substrate, either basally or laterally. The calice is round, with a diameter of up to 16 mm. The wall is epithelial, internally thickened by stereome. A long, cylindrical corallum is usually solidly filled in with stereome. The thin epitheca often rises above the level of the septa, producing a circular groove separating it from the outer, upper edges of the

septa. The epitheca is sometimes highly corrugated; a corallum measuring 41 mm in height has about 22 concentric ridges, or lips, corresponding to successive stages of rejuvenescence.

The septa are not arranged in distinct cycles or systems; instead, there are 19–22 (usually 20) widely spaced primary septa of equal size. In larger coralla, additional rudimentary septa are developed between the primary septa. The large septa are not exsert and each septum has one–three high, narrow paliform lobes on its inner edge. The uppermost lobe is separated from the septum by a broad, shallow notch. In some coralla, the paliform lobes alternate in size and position: one septum has larger and higher lobes, whereas adjacent septa have lobes that are narrower and closer to the columella. Both the lobes and the septa bear large, blunt, randomly arranged granules.

The paliform lobes are similar in size and shape to the columellar rods, from which they are often indistinguishable. The papillose columella is composed of 2–35 slender pillars, forming a round field in the center of the calice. The fossa is shallow and often solidly filled by dense deposits of stereome.

Material. – P-948 (1); O-6699 (1); BL-247 (1) MCZ; BL-273 (12) MCZ; Bibb-187 (1) MCZ; Gos 112/78 (1) USNM 46617; E-43 (1); Hudson-3B (1) NMC; Hummelinck-1443 (3). – Syntypes of *D. barbadensis*; Lindström's (1877) specimen (NRM); Lewis's (1965) specimens (Cornell).

Types. – The corallum of the holotype of *H. paradoxa*, collected at Bibb-22, is lost, but the soft parts are preserved in the alcoholic type-collection at the MCZ. There are 14 syntypes of *D. barbadensis* divided into three lots (2757, 2791, no number), also deposited at the MCZ. All were collected at a Hassler station off Barbados (183 m).

Type-Locality. – 24°14'20"N, 80°59'40"W (Straits of Florida); 692 m.

Distribution. – Antillean distribution; Arrowsmith Bank, Yucatan (Map 46). 91–700 m.