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BIOLOGICAL RESULTS OF THE UNIVERSITY OF MIAMI
DEEP-SEA EXPEDITIONS. 121. A REVIEW OF THE RECENT
SPECIES OF *BALANOPHYLLIA* (ANTHOZOA: SCLERACTINIA)
IN THE WESTERN ATLANTIC, WITH DESCRIPTIONS
OF FOUR NEW SPECIES

Stephen D. Cairns

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Introduction

The genus *Balanophyllia* Searles Wood, 1844, is worldwide in distribution. Most of its species are endemic to one ocean and usually to one side of one ocean. The exception in the Atlantic is *B. floridana* Pourtalès, 1868, which is ampho-Atlantic. The bathymetric range for the genus extends from 0 to 1,100 m and all but one species are ahermatypic (Zibrowius, 1976). Species of this genus are best known in the Atlantic and East Pacific: there are eight valid species in the western Atlantic; five in the eastern Atlantic; six in the eastern Pacific; and one in the Antarctic. Over 30 nominal species have been reported from the Indo-West Pacific, but they are the least well-known and are in need of revision. In addition to the Recent species of *Balanophyllia*, over 30 are known as fossils, ranging from the Eocene to the Pleistocene. *Eupsammia* Milne Edwards and Haime, 1848, was once considered to be a subgenus of *Balanophyllia*, differentiated from the nominal subgenus by being free. Today, however, most coral systematists consider it as a junior subjective synonym of *Balanophyllia*. Since *Balanophyllia grandis* n. sp. occurs both fixed and free, I agree with this synonymy.

Previously, only four species of *Balanophyllia* were known from the western Atlantic, three of which have not been reported since 1880. Only the common, shallow-water *B. floridana* has been collected frequently since its original description. Because the original descriptions and the illustrations of all species were short or inadequate, and since many additional specimens were available, including four new species, all eight *Balanophyllia* from the western Atlantic are reviewed in this paper.

Material and Methods

This study is based primarily on the corals dredged by the National Geographic Society—University of Miami Deep-Sea Biology Program (1962-1974) under the direction of Drs. G. L. Voss and F. M. Bayer. It is part of a larger review of all western Atlantic deep-water Scleractinia (Cairns, 1976).

The following abbreviations are used in the text: cd—calicular diam-

eter; S_x , C_x —collective terms for the septa and costae, respectively, of whatever cycle x represents; G—R/V *Gerda*; P—R/V *Pillsbury*; BL—*Blake*; UMML—University of Miami Marine Laboratory (Rosenstiel School of Marine and Atmospheric Science); USNM—National Museum of Natural History; MCZ—Museum of Comparative Zoology; AMNH—American Museum of Natural History. The numbers in parentheses following a station number refer to the number of specimens in that lot. All *Gerda* and *Pillsbury* specimens examined in this study are deposited at the USNM unless otherwise indicated.

Suborder DENDROPHYLLIINA Vaughan and Wells, 1943

Family Dendrophylliidae Gray, 1847

Genus *Balanophyllia* Searles Wood, 1844

Balanophyllia Searles Wood, 1844:11.

Eupsammia Milne Edwards and Haime, 1848:77.

Leptopsammia Milne Edwards and Haime, 1848:90.

? *Clonotrochus* Schafhäntl, 1863.

Rhodopsammia Semper, 1872:243.

Diagnosis.—Solitary, turbinate to trochoid, fixed or free. Costae well developed. Synaptienlothea porous, especially near calicular edge. Septa arranged in Pourtalès Plan. Columella spongy. Type-species: *B. calyculus* Searles Wood, 1844 (Pliocene, England). Gender feminine.

Key to the Eight Western Atlantic Species of *Balanophyllia*

1. S_1 equal to S_2 in size (exsertness and extension toward the columella) 2
 S_1 larger than S_2 (either more exsert and/or extend farther toward the columella) 4
2. Columella large, convex, ellipsoidal, and composed of numerous, twisted trabeculae arranged in a clockwise whirl; corallum usually attached to a small object *Balanophyllia dineta*, n. sp.
 Columella small, elongate, and composed of numerous, interconnected, twisted trabeculae arranged linearly; corallum usually solidly attached to the substrate by a thick pedicel and expanded base 3
3. Calice flared; S_5 rare; inner edges of all septa entire; granules on upper outer faces of S_1 and S_2 fuse with those of adjacent septa; not reported shallower than 400 m *Balanophyllia wellsii*, n. sp.
 Calice not flared; S_5 common, even S_6 are present in large coralla; inner edges of S_5 lacinate; granules on septal faces never fuse with those of adjacent septa; not reported deeper than 183 m. *Balanophyllia floridana*

4. Corallum small (cd of adult usually less than 10 mm); S_5 rare or absent; distinct or indistinct pali or paliform lobes present before each S_3 5
 Corallum large (cd of adult usually greater than 10 mm); S_5 common; no pali present 6
5. Corallum subcylindrical; thin epithecal hands often mask costae; distinct P_3 ; S_1 only slightly larger than S_2 *Balanophyllia palifera*
 Corallum conical; no epithecal bands; indistinct paliform lobes sometimes present at the junction of S_1 before the S_3 ; S_1 distinctly more exsert than S_2 *Balanophyllia cyathoides*
6. Columella very weak, composed of a loosely twisted group of tall, slender, crispate trabeculae; fossa extremely deep; parvicidal budding common *Balanophyllia caribbeana*, n. sp.
 Columella prominent and elongate, composed of a fused, spongy mass of trabeculae; fossa moderately deep; parvicidal budding unknown 7
7. Columella large, its spongy nature sometimes extending to inner edges of the higher cycle septa; base often pointed (free) or attached by a slender pedicel *Balanophyllia grandis*, n. sp.
 Columella discrete, never extending to the septa; attached by a thick base *Balanophyllia goesi*

Balanophyllia floridana Pourtalès, 1868

Pl. I, Figs. 1-3

Balanophyllia floridana Pourtalès, 1868:137; 1871:41-42, pl. 4, figs. 5-6; 1878:207; 1880:97.—Bourne, 1905:206, 208.—Horst, 1922:61.—Wells, 1933:32, 35, pl. I, figs. 8-11 (Pleistocene).—Squires, 1959:31.—Goreau & Wells, 1967:449.—Macintyre, 1970:178.—Porter, 1972:113.—Wells, 1973:58.

Not *Balanophyllia floridana*: Pourtalès, 1874:43, pl. 6, fig. 20 (= *Balanophyllia palifera*).

Balanophyllia palifera: Pourtalès, 1878:207 (in part: BL-12); 1880:110 (in part: BL-300, 253).

Balanophyllia florideana: Moseley, 1881:190.

Balanophyllia cf. floridana: Chevalier, 1966:1371, pl. 7, figs. 1-4.

Material examined.—Types: MCZ 5475, syntypes (16), MCZ 5475, syntypes (3), MCZ 5585, syntype (1), all presumably from *Bibb-52*, 24°26'N, 81°47'W, 47 m; the syntype from off Havana was not found at the MCZ.—Other material: Off Georgia: P-112 (4), 32°08'N, 79°16'W, 70-95 m.—Bermuda: AMNH 3442, Squires's specimen.—Straits of Florida: G-604 (4), 25°14'N, 80°09'W, 91 m; G-617 (4), 25°33'N, 80°04'W, 91-101 m; G-834 (1), 25°15'N, 80°10'W, 79-86 m; *Bibb-143*, off French Reef, Fla., 83 m;

Bibb-147, 25°12'N, 80°10'W, 88 m; *Bibb-151*, 25°11'N, 80°10'W, 116 m; *Bibb-199*, 24°56'N, 80°26'W, 72 m; *Bibb-209*, 25°20'N, 80°07'W, 90 m; BL-72, off Sand Key, Fla., 92 m.—Lesser Antilles: BL-300 (2), 13°06'N, 59°39'W, 150 m; P-708 (1), 11°24.7'N, 62°40.5'W, 69–73 m.—Eastern Atlantic: P-23 (2), 5°10'N, 0°25'W, 42 m; P-24 (9), 4°56'N, 0°47.5'W, 35–37 m; P-69 (5), 4°29.5'N, 8°06'W, 29 m; Chevalier's specimens.

Description.—Corallum straight, ceratoid to trochoid, strongly compressed, resulting in an elliptical calice; corallum tapers regularly to thick pedicel (also elliptical in cross section), with diameter of about one-half that of calice. Pedicel usually re-expands at substrate to form encrusting base of attachment unless specimen originally settled on small object, in which case base may completely grow around it and thus appear free. Largest specimen reported (Wells, 1933) measures 25.4 × 18.7 mm in calicular diameter and 45.0 mm tall, but an average-size specimen is much smaller: 18 × 14 mm in calicular diameter, 22 mm tall. Costae thin, equal, rounded or slightly ridged, and set apart by very deep, narrow intercostal grooves. Each costa bears a row of large, blunt granules directed outward and numerous smaller granules arranged on lateral surfaces.

Septa arranged in 6 systems and 4 complete cycles; S₅ and even S₆ present in larger specimens, S₆ occurring in end half-systems. S₁ and S₂ equal, slightly exsert and extending almost to columella; remaining septa arranged according to Pourtales Plan. Development of S₅ can be very irregular within one corallum. Inner edges of last cycle often lacinate, those of other septa smooth and straight. Small, pointed granules cover septal faces.

Fossa deep, elongate. Columella a distinct, elongated structure, formed from a fused mass of twisted ribbons.

Discussion.—Chevalier (1966) hesitated to call his specimens from the eastern Atlantic *B. floridana* because his had shallower fossae, no S₅, and one had a groove through the base of the corallum. However, the groove was simply the cavity formed as the specimen overgrew a rodlike object (perhaps an echinoid spine); no S₅ were present because of the small size of his 2 specimens; and the depth of the fossa is variable. I have examined numerous specimens from the Gulf of Guinea (one has a complete fifth cycle—96 septa) and conclude that they are the same species.

B. cyathoides is morphologically similar to *B. floridana* but usually occurs at a greater depth, although there is a slight overlap in their bathymetric ranges. *B. floridana* is distinguishable by its less exsert S₁, equality of S₁ and S₂, the presence of S₅ and even S₆ (both of which are rare in *cyathoides*), and a larger corallum size.

Type-locality.—Straits of Florida, 48–115 m.

Geographic distribution.—Western Atlantic: from Onslow Bay, North Carolina (34°N) through the Straits of Florida; west coast of Florida; off

Jamaica; Lesser Antilles; off Caribbean Panama; off Louisiana (Pleistocene).—Eastern Atlantic: off Senegal; Gulf of Guinea.—(Squires's (1959) record from Bermuda, although not unlikely, is impossible to verify because of the worn condition of the specimen.)

Bathymetric range.—37–183 m. Pourtalès's report of a worn specimen off Havana at 494 m was probably one transported there after death.

Balanophyllia cyathoides (Portalès, 1871), new comb.

Pl. I, Figs. 5–8

Dendrophyllia cyathoides Portalès, 1871:45–46, pl. 1, figs. 8–9; 1878:208; 1880:97.

Balanophyllia palifera: Portalès, 1880:110 (in part: BL-300).

Material examined.—Types: MCZ 2774, holotype, *Corvin*-2 or 4, off Havana, 494 m.—Other material: Straits of Florida: G-251 (1), 27°25'N, 78°41'W, 293–311 m; G-692 (1), 26°35'N, 78°25'W, 329–421 m; G-701 (1), 26°29'N, 78°40'W, 275–311 m; BL-69 (4), off Havana, 183 m.—Off Barbados: BL-300 (2), 13°06'N, 59°39'W, 150 m.

Description.—Corallum ceratoid, straight, attached by expanded base. Pedicel narrows to about 50% of calicular diameter at narrowest point. Holotype measures 27.1 mm tall, 9.6 mm in lesser calicular diameter. Costae narrow, equal, rounded and separated by deep, narrow furrows. Sometimes C_1 and C_2 are raised slightly above other costae. Every costa bears a row of tall, bluntly pointed granules.

Septa arranged in 6 systems and 4 cycles, rarely with additional S_5 . S_1 highly exsert and extend to columella; S_2 much less exsert and extend almost to columella; S_3 and S_4 follow Portalès Plan: two S_4 join before every S_3 and extend to columella. At point of junction there is often a small, indistinct paliform lobe, compressed and aligned with the adjacent S_3 . Inner edges of all septa straight and entire; septal faces bear numerous prominent, pointed granules slightly smaller than costal granules.

Fossa fairly shallow. Columella elongate and narrow, usually ridged down the center. It varies from spongy to solidly fused and is sometimes swirled as in *Balanophyllia dineta*, n. sp., and has oblique lateral ridges.

Discussion.—Portalès placed this species in *Dendrophyllia* because his single specimen was attached, as though by budding, to an older specimen of presumably the same species. In my opinion, this specimen independently settled on an older corallum and was not produced asexually. All 9 specimens subsequently examined are clearly solitary, which leads me to transfer this species to *Balanophyllia*.

The holotype has been cut in half (vertically) along its lesser calicular diameter; only one-half is present at the MCZ.

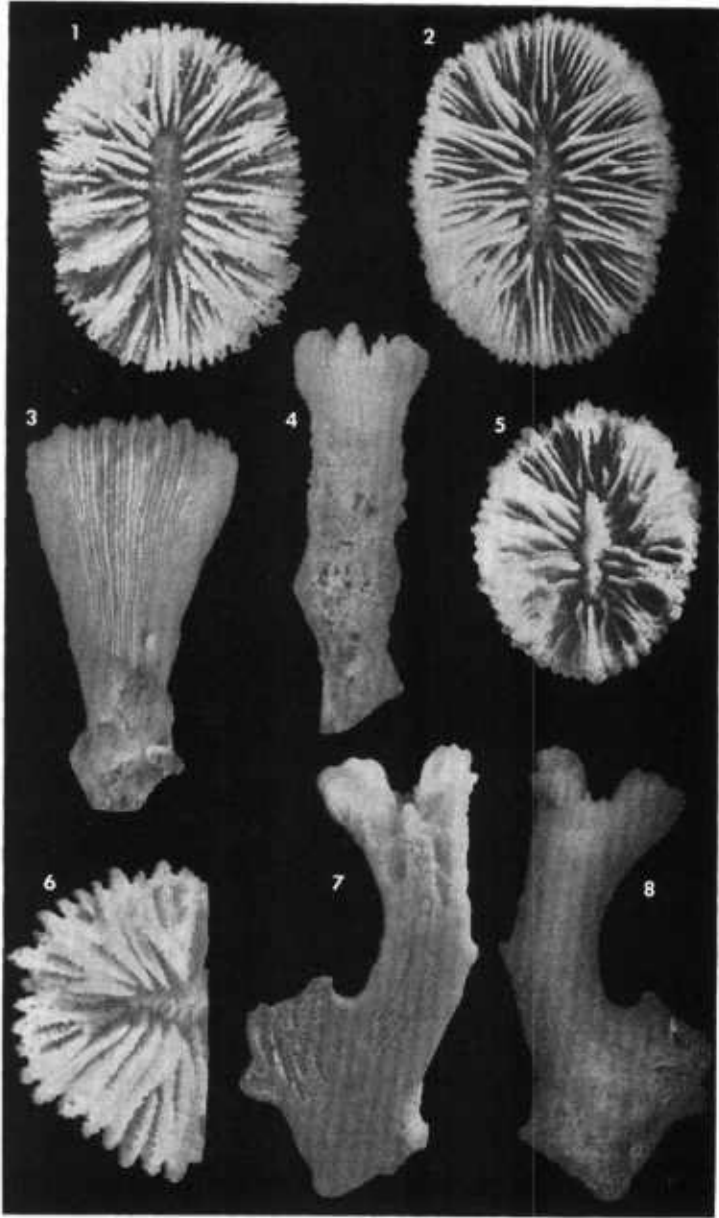


Plate 1. 1, *Balanophyllia floridana*: no locality data, cd = 19.3×14.0 mm; 2, *Balanophyllia floridana*: $30^{\circ}29.7'N$, $80^{\circ}36'W$, 37 m, cd = 18.5×14.0 mm; 3, Same specimen, 28.7 mm tall; 4, *Balanophyllia palifera*: BL-273, 15.1 mm tall, deposited at MCZ; 5, *Balanophyllia cyathoides*: C-251, cd = 10.9×8.3 mm; 6, *Balanophyllia cyathoides* (holotype of *Dendrophyllia cyathoides*): Corwin, lesser cd = 9.6 mm, MCZ 2774; 7-8, Same specimen, 27.1 mm tall, both sides.

Type-locality.—Off Havana, Cuba, 494 m.

Geographic distribution.—Straits of Florida; Barbados.

Bathymetric range.—150–494 m.

Balanophyllia goesi (Lindström, 1877), new comb.

Pl. 2, Figs. 1–3

Dendrophyllia goësi Lindström, 1877: 24, pl. 3, figs. 40–42.—?Pourtalès, 1880:97, 111.—Marenzeller, 1907:3.

Material examined.—Types: Naturhistoriska Riksmuseet 206, syntypes (5), off St. Martin, 73–274 m.—Other material: BL-100 (2), off Morro Light, Havana, 458–733 m.

Description.—All 5 syntypes are in worn condition; no adult specimens are known subsequent to the original description. The following description is therefore based primarily on the best preserved of the 5 syntypes. Corallum large, ceratoid to trochoid, and broken off at level of pedicel; 27.6 mm tall, 18.9 × 14.6 mm in calicular diameter, and 10.0 × 8.2 mm in basal diameter (at break). Other syntypes indicate it to be a firmly attached, solitary species. Costae not visible on any specimens because of very heavy encrustation of calcareous organisms. Corallum wall thin.

Septa arranged in 6 systems and 5 cycles, but last cycle incomplete: 6/6/12/24/24. One half-system fully developed with 4 S_5 , another includes no S_5 , and the other 10 half-systems have 2 S_5 apiece. Degree of septal exertness cannot be determined because of badly damaged calicular edge. S_1 and S_2 independent; S_1 are slightly larger than S_2 and extend farther toward columella; higher cycle septa arranged in Pourtalès Plan. Septa very thin, with entire inner margins and small, low, close-set, pointed granules.

The spongy columella, which lies deep within the fossa, is elongate and aligned in the direction of the 2 opposing terminal S_1 .

Discussion.—Lindström (1877) expressed doubt about the colonial nature of the syntypes but nonetheless placed the species in *Dendrophyllia*. Likewise, Pourtalès (1880) reported simple coralla but did not call them *Balanophyllia*. In my opinion, the apparent colonial nature of the syntypes is simply the result of close settlement of separate planulae.

Portalès's (1880) record was based on 2 specimens, but the record is questionable because of their immaturity (largest calice measures 6.3 mm in diameter). Additional specimens are required to further characterize this species.

Type-locality.—St. Martin, Lesser Antilles, 73–274 m.

Geographic distribution.—Known only from the type-locality.

Bathymetric range.—73–274 m.

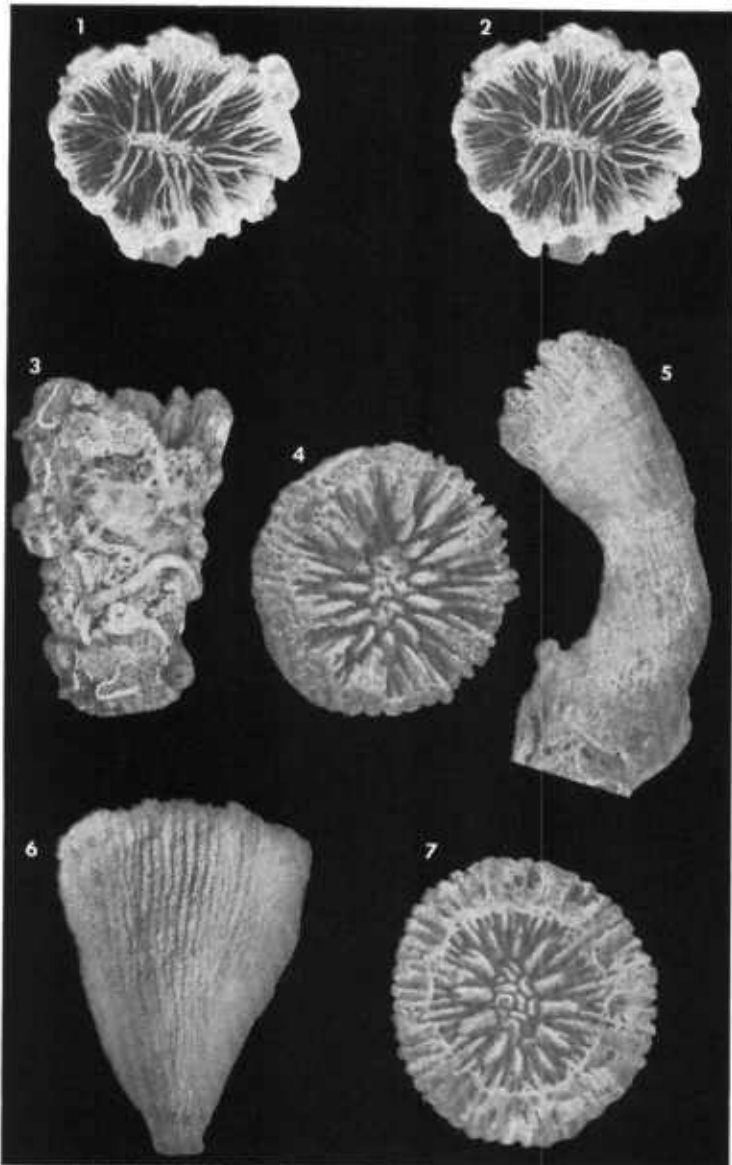


Plate 2. 1-2, *Balanophyllia gosci* (syntype of *Dendrophyllia goësi*): St. Martin, Lesser Antilles, cd = 19.0×14.5 mm, NRM-206, stereo pair; 3, Same specimen, 27.6 mm tall; 4, *Balanophyllia palifera* (lectotype): BL-68, cd = 6.6×6.0 mm, MCZ 5438; 5, Same specimen, 16.0 mm tall; 6, *Balanophyllia caribbeana* (holotype): P-705, 23.7 mm tall, USNM 45842; 7, *Balanophyllia palifera* (paralectotype): BL-68, cd = 6.9×6.0 mm, MCZ 5438.

Balanophyllia palifera Pourtalès, 1878

Pl. 1, Fig. 4; Pl. 2, Figs. 4, 5, 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).

Material examined.—Types: MCZ 5438, lectotype and paralectotype (1), BL-68, off Havana, 444–838 m.—Other material: off Yucatan Peninsula: G-1275 (1), 21°02'N, 86°29'W, 225–439 m; P-584 (2), 21°02'N, 86°24'W, 347–353 m; P-595 (1), 21°08.5'N, 86°27'W, 33–586 m.—Barbados: BL-273 (1), 13°03'N, 59°36'W, 188 m; undetermined *Hassler* station, 183 m (1).

Description.—Corallum subcylindrical or ceratoid to trochoid, usually straight but sometimes slightly curved, firmly attached to substrate. Lectotype 6.6 × 6.0 mm in calicular diameter and 16.0 mm tall. Thin epithelial bands usually present, covering all or part of costae; they are most common toward base, where they may completely obscure costae. Costae equal, narrow, compact, slightly ridged, and separated by narrow, deeply incised furrows. Costal granulation not evident.

Septa arranged in 6 systems and 4 complete cycles. S_1 are largest septa, with slightly exsert, thick, porous upper margins; S_2 slightly smaller, less exsert and not extending as far toward columella as S_1 ; S_3 very small and always flanked by 2 much larger S_4 , which unite before each S_3 . At point of junction there is a large palus, almost as large as an S_4 , compressed in the plane of the enclosed S_3 , and extending to columella. Inner edges of S_{1-3} straight and entire; those of S_4 sometimes lacinate, especially deeper in fossa. Numerous close-set, pointed granules cover septal faces, sometimes measuring higher than septal width. Palar granules even more prominent but blunter. Calicular edges of 2 pali of paralectotype bifurcated, the split ends directed toward flanking S_4 .

Fossae vary in depth from shallow to deep and narrow. Incompletely formed dissepiments sometimes found deep within fossa. Columellas vary in shape but usually composed of numerous slender, twisted ribbons interconnected in an elongate structure.

Discussion.—Portalès (1878, 1880) included 3 other species in his original description and subsequent identification of *B. palifera*: *B. floridana*, *B. cyathoides*, and *B. dineta*, n. sp. *B. palifera* is easily distinguished from other western Atlantic species of *Balanophyllia* by its distinct pali and long, slender corallum.

Of the 2 syntypes deposited at the MCZ collected from BL-68, one (Pl. 2, Figs. 4–5) is designated as lectotype, the other (Pl. 2, Fig. 7) as paralectotype. The third syntype, from BL-12, is *B. floridana*.

Type-locality.—Off Havana, Cuba, 444–838 m.

Geographic distribution.—Off Havana; Yucatan Channel; Barbados.
Bathymetric range.—183–444 m.

Balanophyllia caribbeana, new species

Pl. 2, Fig. 6; Pl. 3, Figs. 1–2

Material examined.—Types: USNM 45842, holotype, P-705, 10°45'N, 62°00'W, 77–86 m; UMML 8:302, paratype (1), P-396, 9°18.2'N, 76°24.8'W, 67–69 m; UMML 8:287, paratype (1) and USNM 45843, paratype (1), P-708, 11°24.7'N, 62°40.5'W, 69–73 m; USNM 45844, paratypes (2), P-709, 11°08.8'N, 62°46.1'W, 46 m; USNM 45845, paratype (1), P-710, 10°47.4'N, 62°55'W, 46–48 m; USNM 45846, paratypes (2), P-728, 10°22.5'N, 65°23'W, 86 m; UMML 8:303, paratype (1) and USNM 45847, paratypes (2), P-842, 11°10.6'N, 60°31.2'W, 68–73 m; USNM 45848, paratype (1), P-913, 14°53.8'N, 61°04.9'W, 46–48 m; USNM 45849, paratype (1), P-768, 12°33.4'N, 71°10.8'W, 64–66 m.

Description.—Corallum ceratoid, straight or slightly curved and attached by narrow base measuring $\frac{1}{8}$ – $\frac{1}{4}$ diameter of calice. Half of coralla examined originated asexually from parent fragments. Corallum strongly compressed, producing an elliptical calice. Holotype measures 16.8 × 12.1 mm in calicular diameter, 23.7 mm tall. Costae equal, thin, very porous, and separated by narrow, shallow intercostal furrows. Each costa bears 1–2 rows of low, pointed spines.

Septa arranged in 6 systems and 5 cycles, last cycle never complete. S_1 are largest septa, slightly exsert and broadened at their upper edges; S_2 lower in profile, not exsert and also independent like S_1 ; remaining cycles of septa very low in profile, not exsert, but extending very deep into fossa, and arranged according to Pourtalès Plan. Inner edges of S_1 and S_2 smooth, straight, and descending vertically into deep, narrow fossa, where they join columella; inner edges of S_3 dentate; those of S_4 and S_5 dentate to lacinate. Septa very thin and porous near theca; their faces are smooth except for low, widely spaced, pointed granules.

Fossa extremely deep. Columella crispate, very rudimentary; composed of numerous slender, loosely twisted ribbons originating from lower edges of S_1 and S_5 .

Discussion.—This species can be distinguished from the other western Atlantic species of *Balanophyllia* by its extremely deep fossa and loosely arranged rudimentary columella.

Type-locality.—10°45'N, 62°00'W (off Trinidad), 77–86 m.

Geographic distribution.—Southeastern Caribbean from Colombia to Martinique.

Bathymetric range.—46–86 m.

Balanophyllia grandis, new species

Pl. 3, Figs. 3-5

Material examined.—Types: USNM 45850, holotype, P-627, 15°56.5'N, 86°14'W, 46 m; USNM 45851, paratype (1), P-324, 9°44'N, 79°31'W, 54-63 m; UMML 8:288, paratype (1) and USNM 45852, paratypes (2), P-403, 8°48.7'N, 77°12.7'W, 96-98 m; USNM 45853, paratype (1), P-425, 9°38.9'N, 79°15.3'W, 63-69 m; UMML 8:301, paratypes (2), P-626, 15°57.6'N, 86°09'W, 35-40 m; USNM 45854, paratype (1), P-1369, 16°07'N, 85°38'W, 55-57 m.

Description.—Corallum large, ceratoid, and curved between 30° and 75° in plane of greater calicular diameter; either attached by very small base ($\frac{1}{2}$ - $\frac{1}{3}$ calicular diameter) or free, with pointed tip. Corallum horizontally compressed, producing an elliptical calice. Holotype measures 23.2 × 17.5 mm in calicular diameter and 48.0 mm long. Costae equal in width, low, slightly convex, and separated from one another by narrow, shallow grooves. Often C₁ and C₂ are distinguished from other costae because they are slightly raised. Costae very porous with low, rounded granules.

Septa arranged in 6 systems and 5 cycles; fifth cycle never complete; lateral half-systems usually lack a full set of S₅. Holotype (largest specimen) contains 74 septa. S₁ are largest septa and extend into columella; S₂ less exert and extend to columella. Both S₁ and S₂ independent; higher cycle septa arranged according to Pourtalès Plan. Inner edges of S₁ and S₂ vertical, straight and very smooth; those of S₃ slightly dentate; those of S₄ and S₅ dentate to lacinate. Granules on septal faces low, pointed and close-set.

Fossa moderately deep, bearing large, elongate, spongy columella. In holotype, spongy nature of columella extends to inner edges of higher cycle septa.

Discussion.—This is the largest species of *Balanophyllia* in the western Atlantic, both in calicular diameter and length, reaching up to 65 mm in length. For this reason the specific name *grandis*, meaning large, is applied to this species. Besides its large size, it is distinguished from other species by its large, spongy columella.

Type-locality.—15°56.5'N, 86°14'W (off Honduras), 46 m.

Geographic distribution.—Southeastern Caribbean; off Panama; off Honduras.

Bathymetric range.—40-96 m.

Balanophyllia wellsi, new species

Pl. 3, Figs. 6-7; Pl. 4, Figs. 1-4

Material examined.—Types: USNM 45855, holotype and USNM 45856, paratype (1), G-1312, 26°38'N, 79°02'W, 505-527 m; UMML 8:289, para-

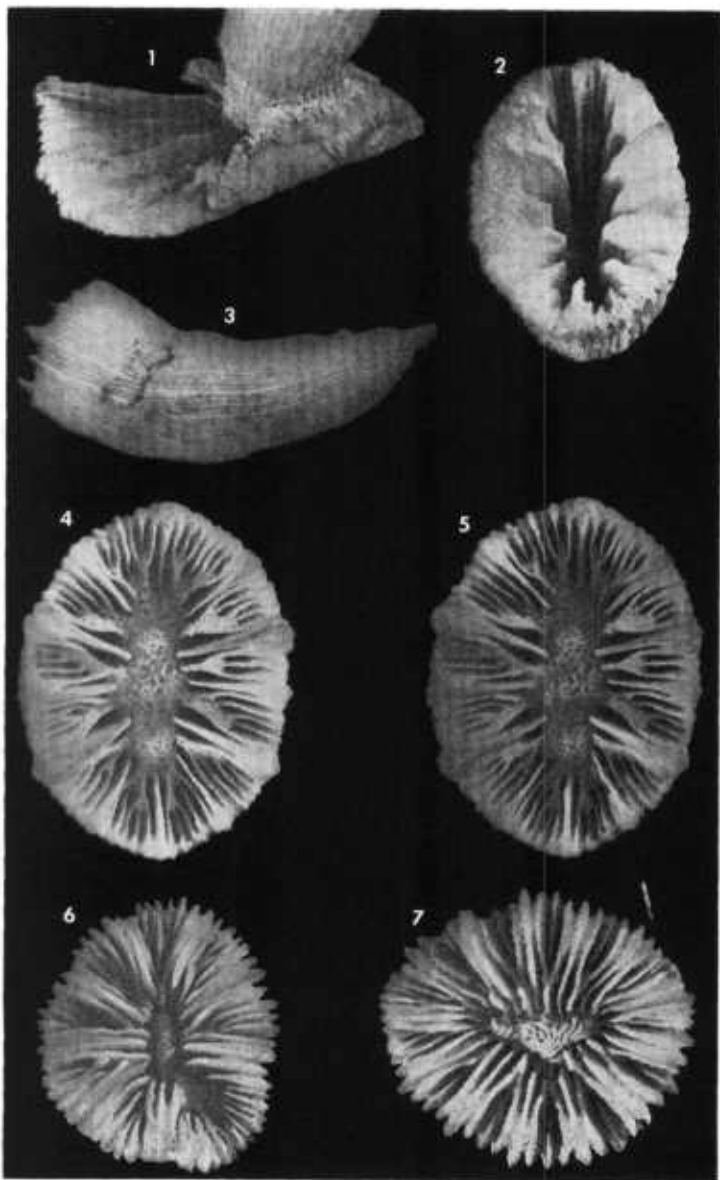


Plate 3. 1, *Balanophyllia caribbeana* (paratype): P-913, USNM 45848; 2, *Balanophyllia caribbeana* (holotype): P-705, cd = 16.8×12.1 mm; 3, *Balanophyllia grandis* (holotype): P-627, 48.0 mm long, USNM 45850; 4-5, Same specimen, cd = 23.2×17.5 mm, stereo pair; 6, *Balanophyllia wellsi* (paratype): *Atlantis* 2980B, cd = 14.6×12.9 mm, deposited at MCZ; 7, *Balanophyllia wellsi* (paratype): *Atlantis* 2980B, cd = 16.8×15.0 mm, deposited at MCZ.

type (1) and USNM 45857, paratype (1), G-1125, 26°45'N, 79°05'W, 494–531 m; MCZ, paratypes (4), *Atlantis*-2980B, 22°48'N, 78°48'W, 404–412 m.

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

Septa arranged in 6 systems and 5 cycles, last cycle never complete. Largest specimen examined (holotype) contains 62 septa. S_1 and S_2 equal in size, only slightly exsert and extend to columella; remaining septa arranged according to Pourtalès Plan: septa of last cycle (usually S_4) join in front of S_5 , where (1) they may fuse and extend to columella as one septum, (2) one of the septa may remain prominent while other joins it but appears subsidiary, or (3) both septa may remain separate and extend almost to columella in parallel fashion (as in holotype). In first 2 cases, a narrow paliform lobe is sometimes present at the junction. Inner edges of all septa straight and entire. Granulation on upper outer faces of S_1 and S_2 fuses with that of adjacent septa, filling in interseptal space with a spongy network.

Fossa deep, elongate. Columella of holotype consists of 4 linearly arranged, twisted rods compressed in plane of greater axis. Columellas of paratypes composed of numerous rods fused into a narrow, elongate mass.

Discussion.—*B. wellsii* can be distinguished from all other species of *Balanophyllia* in the western Atlantic by its thick pedicel, flared calice, and distinctive septal granulation. Furthermore, only 2 other species (*B. cyathoides* and *B. palifera*) occur in its depth range, and both of them are easily differentiated from it. This species is named in honor of Dr. John W. Wells, who independently recognized it as a new species and supplied one of the paratypes.

Type-locality.—26°38'N, 79°02'W (northern Straits of Florida), 505–527 m.

Geographic distribution.—Straits of Florida; Old Bahama Channel; off Jamaica.

Bathymetric range.—412–505 m.

Balanophyllia dineta, new species

Pl. 4, Figs. 5–7

Balanophyllia palifera: Pourtalès, 1880:110 (in part: BL-166, 253, 300).

Material examined.—Types: USNM 45858, holotype, USNM 45859, para-

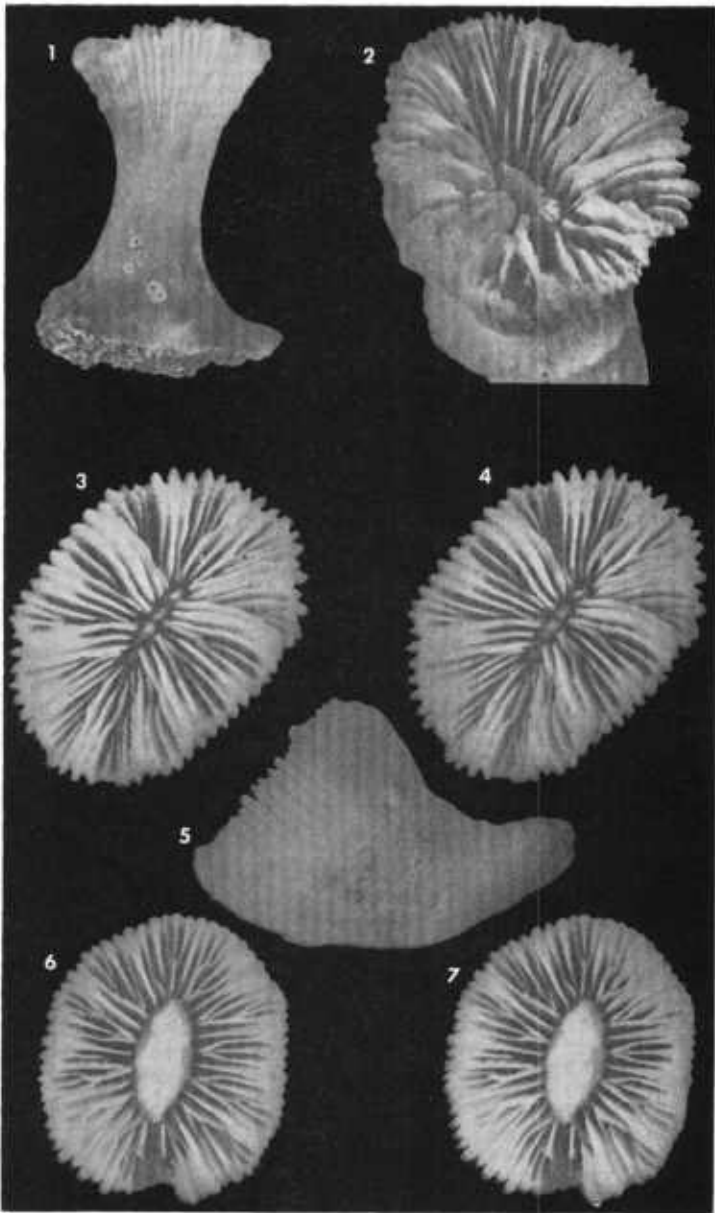


Plate 4. 1, *Balanophyllia wellsi* (holotype): G-1312, 30.0 mm tall, USNM 45855; 2, *Balanophyllia wellsi* (paratype): *Atlantis-2980B*, cd = 17.5 × 14.4 mm, deposited at MCZ; 3-4, *Balanophyllia wellsi* (holotype): G-1312, cd = 20.0 × 15.2 mm, stereo pair; 5, *Balanophyllia dineta* (holotype): P-718, 18.5 mm tall, USNM 45858; 6-7, Same specimen, cd = 16.9 × 14.0 mm, stereo pair.

types (113), UMML 8:290, paratypes (2), P-718, 11°22.5'N, 64°08.6'W, 60 m; MCZ, paratype (1), BL-166, 15°56'N, 61°37'W, 275 m; MCZ, paratypes (25), BL-253, 11°25'N, 62°04'W, 178 m; MCZ, paratype (1), BL-300, 13°06'N, 59°39'W, 150 m; USNM 45860, paratypes (2), P-694, 8°28'N, 58°12'W, 78–82 m; USNM 45861, paratypes (2), P-705, 10°45'N, 62°00'W, 77–86 m; USNM 45862, paratypes (36), UMML 8:300, paratypes (5), P-709, 11°08.8'N, 62°46.1'W, 46 m; USNM 45863, paratypes (11), P-717, 11°21'N, 64°10'W, 64 m; USNM 45864, paratype (1), P-721, 11°06.5'N, 64°22.5'W, 26 m; USNM 45865, paratypes (3), P-722, 11°04'N, 64°44'W, 91 m; USNM 45866, paratypes (5), P-734, 11°01.8'N, 65°34.2'W, 60–68 m; USNM 45867, paratypes (7), P-737, 10°44'N, 66°07'W, 60–73 m; USNM 45868, paratype (1), P-757, 11°39.6'N, 69°22.1'W, 161–187 m; USNM 45869, paratypes (6), P-769, 12°31'N, 71°41'W, 143–146 m; USNM 45870, paratypes (4), P-775, 12°05'N, 72°38.5'W, 78–82 m.

Description.—Coralla vary from short and conical to long and subcylindrical and may be straight or curved as much as 90°; usually attached to small objects such as echinoid spines or small gastropod shells. Base of attachment quite slender or thickened up to 50% of calicular diameter. Calice elliptical; largest specimen (holotype) measures 16.9 × 14.0 mm in calicular diameter and 18.5 mm tall. Thin epitheca usually covers proximal half of corallum but may either extend all the way to calice or be entirely absent. On curved coralla it usually forms a small ridge at its upper edge. Costae equal, slightly rounded, not granulated, and separated from one another by narrow, intercostal striae. Costae quite porous near calice, becoming more compact toward base.

Septa arranged in 6 systems and 5 cycles; last cycle never complete. At a calicular diameter between 7 and 11 mm, fourth cycle is usually complete; S_5 begin to appear at 12 mm; and a specimen measuring 16.4 mm in calicular diameter had 4 S_6 but lacked 2 S_5 for a total of 98 septa. S_1 and S_2 equal, not exsert, and join columella. Septa of higher cycles arranged according to Pourtalès Plan. Inner edges of highest cycle septa (S_4 or S_5 , depending on size) unite before S_3 and extend to columella; a small lobe is often present at this junction. Inner edges of all septa straight and entire except for those of last cycle, which often have irregular margins. Septa thin, porous near theca, and covered by numerous, close-set, pointed granules.

Fossae vary in depth, usually shallow but sometimes moderately deep. Columella large and distinctive, composed of numerous twisted trabeculae fused in clockwise, swirling manner into compact, discrete, elliptical structure with serrate lateral ridges.

Discussion.—*B. dineta* is differentiated from the other western Atlantic species by its distinctive columella. It resembles *B. cedrosensis* Durham, 1947 (eastern Pacific), most closely with regard to its columella and septal arrangement. *B. cedrosensis* differs in having a more flared calice, slightly

exsert S_1 and S_2 , narrower costae, no epitheca, and no paliform lobes. The specific name *dineta* is taken from the Greek *dinetos*, meaning whirled round, and refers to the whirled nature of the columella.

Type-locality.— $11^{\circ}22.5'N$, $64^{\circ}08.6'W$ (N of Isla de Margarita, Venezuela), 60 m.

Geographic distribution.—Lesser Antilles; northern coast of South America from Colombia to British Guiana.

Bathymetric range.—26–274 m.

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University of Miami, Rosenstiel School of Marine and Atmospheric Science, Miami, Florida 33149.

Present address.—Department of Invertebrate Zoology, National Museum of Natural History, Washington, D.C. 20560.