

DESCRIPTION. — The single Philippine specimen measures 24.9 x 32.0 mm in calicular diameter, 21.8 mm in height, and is curved 45° in plane of LCD. Its edge angle is 48° and its face angle is also approximately 48°, but the lower 6 mm of the corallum has a much higher edge angle and lower face angle than the upper part. Thecal faces convex, in lower half of corallum, meeting in an acute angle at thecal edges; in upper half thecal edges rounded. Calicular edge lacerate, each S₁₋₂ and adjacent pair of S₄ forming a lancet about 3 mm in height. Pedicel circular, 1.6-1.7 mm in diameter, containing 6 protosepta at basal disc. Corallum white with very faint reddish-brown stripes associated with C₁₋₂ and upper, outer edges of S₁₋₂.

Septa hexamerally arranged in 5 cycles, the 5th incomplete: S₁₋₂>S₃>S₄>S₅; pairs of S₅ occur only adjacent to S₃ (not S₁₋₂), resulting in 72 septa. Inner septal edges sinuous, the lower edges of S₁₋₂ contributing to an elongate columella.

A well-preserved specimen from the New Zealand region ("Tangaroa" stn G3) is larger (29.8 x 33.6 mm in calicular diameter and 31.1 mm in height), curved 90°, and has more septa, *i.e.*, 90. It is otherwise similar to the Philippine specimen.

REMARKS. — The specimens reported above are similar to *F. moseleyi* Pourtalès, 1880, which is the only other species in the subgenus known to have a secondarily free, curved corallum. It differs in having fewer septa at a corresponding GCD (the 5th cycle of *F. moseleyi* is complete at a GCD of about 30 mm) and in its method of septal insertion, *i.e.*, S₄ pairs insert adjacent to S₃ before adjacent to S₁₋₂. *F. moseleyi* also has much more prominent (up to 6 mm) and more slender, triangular calicular lancets. *F. moseleyi* is known only from the Caribbean and eastern Gulf of Mexico, depth 216-1097 m (CAIRNS, 1979). Although the specimens reported above may represent an undescribed species, not enough specimens are available to properly describe it or definitively distinguish it from *F. moseleyi*.

DISTRIBUTION. — *Philippines*: Verde Island Passage; 441-550 m. *Elsewhere*: Norfolk Ridge between Norfolk Island and New Caledonia; Three Kings Ridge; 710-1058 m.

Flabellum (U.) sexcostatum Cairns, 1989

Flabellum (U.) sexcostatum Cairns, 1989a: 59, pl. 30, fig. j, pl. 31, figs a-b.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 1: stn 47, 4: 2 (MNHN), 2 (USNM 97470).

TYPE LOCALITY. — "Albatross" stn 5284: 13°42'05"N, 120°30'45"E (Verde Island Passage, Philippines), 772 m.

DIAGNOSIS. — Corallum laterally compressed, the slightly convex thecal faces meeting at acute, carinate edges; edge crests small and present only on lower half of corallum. Angle of thecal edges changes from 90°-130° to 55°-75° 12-15 mm above the base; angle of thecal faces changes from 61°-73° to 29°-36°. Also at this height the 4 lateral C₁ are prominently ridged. Largest known specimen (MUSORSTOM 1 stn 47) 32.3 x 50.7 mm in calicular diameter and 42.2 mm in height. Calicular edges serrate, each S₁₋₂ producing a tall (up to 4 mm) triangular lancet. Pedicel elliptical in cross section (2.0-2.1 mm in greater diameter), short, containing 12 protosepta at the basal disc. Septa hexamerally arranged in 5 cycles: S₁₋₂>S₃>S₄>S₅ (96 septa).

REMARKS. — This is the 2nd report of *F. sexcostatum*, the MUSORSTOM specimens being collected close to the type locality.

Flabellum sexcostatum was not placed by CAIRNS (1989a) in a species group within the subgenus *Flabellum (Ulocyathus)* because it is intermediate in shape between the laterally compressed and bowl-shaped groups. The species is more fully described and illustrated by Cairns (1989a).

DISTRIBUTION. — *Philippines*: known from only 12 specimens from the Verde Island Passage Luzon; 685-772 m.

Flabellum (U.) conuis Moseley, 1881

Figs 21 b-c

Flabellum conuis Moseley, 1881: 165-166, pl. 7, figs 6a-b.*Flabellum (U.) conuis* - CAIRNS, 1989a: 59-60, pl. 31, figs c-g.MATERIAL EXAMINED. — **Philippines.** "Hakuho Maru": stn KH72-1-8, 3 (USNM 97472).

ESTASE 2: stn 6, 1 (MNHN).

Indonesia. "Galathea": stn 489, 2 (ZMUC).**Japan.** "Tansei Maru": stn KT86-16 F, 1 (USNM 97473).

TYPE LOCALITY. — "Challenger" stn 218: 2°33'S, 144°04'E (Admiralty Islands), 1994 m.

DIAGNOSIS. — Angle of thecal edges 45°-65°; angle of thecal faces 35°-50°. Corallum campanulate. Largest known specimen ("Hakuho Maru" stn KH72-1-8) 43.8 x 47.6 mm in calicular diameter and 37.3 mm in height. Calice slightly elliptical: GCD:LCD = 1.05-1.30. Thecal edges and faces convex. No edge crests, but the 6 C₁ are slightly ridged on lower half of corallum. Calicular edge serrate, a short (up to 3.5 mm) equilaterally triangular apex corresponding to each S₁₋₂, but generally damaged because of high fragility. Pedicel circular in cross section (2.1-2.3 mm in diameter), short, containing 12 protosepta at the basal disc. Theca smooth, light grey in colour. Septa hexamerally arranged in 5 cycles, the 5th cycle rudimentary and sometimes missing: S₁₋₂>S₃>S₄>>S₅. Fossa deep and narrow.

REMARKS. — *Flabellum conuis* is unique in this region within the subgenus in having a bowl-shaped or campanulate corallum (CAIRNS, 1989a) and an almost circular corallum. Its deep range also distinguishes it from other *Flabellum* in the region. It is more fully described by CAIRNS (1989a).

DISTRIBUTION. — *Philippines*: Sulu Sea (Palawan); Sulu Archipelago (Sibuto Passage); 2021-2570 m. *Indonesia*: Bali Sea; 1160 m. *Elsewhere*: Admiralty Islands; Bungo Strait, Japan; 1994-2603 m.

Genus *POLYMYCES* Cairns, 1979*Polymyces wellsi* Cairns, 1991*Polymyces wellsi* Cairns, 1991: 22, pl. 8, figs f, i, pl. 9, figs a-b; 1995: 108-109, pl. 35, figs d-f.MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3: stn 94, 1 (USNM 97484).**Indonesia.** DEKI: stn 59, 22 (NNM 22721).

KARUBAR: stn 13, 3 (MNHN).

TYPE LOCALITY. — "Johnson-Sea-Link" stn 1916: 1°18.7'S, 89°48.8'W (Española, Galápagos), 545-562 m.

DIAGNOSIS. — Corallum elongate-conical, straight, with a slightly flared calice; corallum fragile. Philippine specimen 14 mm in GCD and 45 mm in height. Calicular edge jagged, a high (up to 5 mm) triangular lancet corresponding to each S₁₋₂. Pedicel thickened by asymmetrical development of 4 contiguous, hollow rootlets, 2 flanking each side of the 2 principal septa. These rootlets grow downward, completely encircle the base, and fuse, forming a V-shaped junction near the base of opposite thecal side. Theca smooth, streaked with reddish-brown pigment corresponding to the C₁₋₂, although rootlets and pedicel remain white. Septa hexamerally arranged in 5 complete cycles: S₁₋₂>S₃>S₄>S₅.

REMARKS. — The distinctive asymmetrically placed rootlets distinguish *P. wellsi* from all other flabellids in the region. It is more fully described by CAIRNS (1991, 1995).

DISTRIBUTION. — *Philippines*: Lubang Island; 842 m. *Indonesia*: Banda Sea (Kai Islands); 385-417 m. *Elsewhere*: Galápagos; northeastern New Zealand; Kermadec Islands; 355-1165 m.

Genus *RHIZOTROCHUS* H. Milne Edwards & Haime, 1848

Rhizotrochus typus H. Milne Edwards & Haime, 1848

Figs 22 d-e

Rhizotrochus typus H. Milne Edwards & Haime, 1848a: 282, pl. 8, fig. 16. — CAIRNS, 1989a: 79-81, pl. 41, figs f-j (synonymy); 1994: 81, pl. 35, figs a-c, pl. 40, figs h-i (synonymy).

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn 131, 9: 5 (MNHN), 4 (USNM 97486).

Indonesia. "Siboga": stn 260, 1 (ZMA).

DEKI: stn 5, 2 (NNM 22426). — Stn 24, 4 (NNM 22420, 22422). — Stn 25, 1 (NNM 22423, 23096). — Stn 26, 2 (NNM 22419). — Stn 27, 3 (NNM 22427). — Stn 53, 2 (NNM 22428). — Stn 54, 1 (NNM 22421).

SNELLIUS 2: stn 4.106, 1 (NNM 22424). — Stn 4.115, 2 (NNM 22425).

"Cable Ship Telegraaf": northern coast of Sumatra (Segli), 549 m, 1 (ZMA).

South China Sea. Macclesfield Bank (cf. BASSETT-SMITH, 1890), 73-92 m, "dredge 22", 1 (BMNH 1893.9.1.213).

TYPE LOCALITY. — Singapore, South China Sea (depth not given).

DIAGNOSIS. — Corallum conical (turbinate); calice elliptical (GCD:LCD = 1.20-1.45); calicular margin smooth. Largest Philippine specimen ("Albatross" stn 5357) 40.1 x 57.2 mm in calicular diameter and 38.3 mm in height. Pedicel narrow (1.0-1.5 mm in diameter) and not reinforced; however, several cycles of discrete, hollow rootlets (rootlet diameter 1.0-2.5 mm), extend from lower corallum to substrate, firmly anchoring the corallum. Corallum white. Septa hexamerally arranged in 6 cycles, the 6th complete only in large specimens: $S_{1-2} > S_3 > S_4 > S_5 > S_6$. Upper, outer margin (near calice) of S_{1-3} quite narrow, but upper axial edge of same septa project as broad lamellae into fossa.

REMARKS. — *Rhizotrochus typus* is easily distinguished from all other flabellids in the Philippine/Indonesian region by having numerous, discrete (i.e., free standing, not contiguous with corallum) rootlets. One large specimen at the BMNH (1950.1.11.630) from Mauritius measures 108 mm in GCD. The species is more fully described and figured by CAIRNS (1989a).

One unusual specimen of *Rhizotrochus* from DEKI stn 25 (NNM 23096) deserves special note. It is 13.3 x 19.1 mm in calicular diameter, 11.5 mm in height, and has 96 septa. It differs from other *Rhizotrochus* in having a truncated base with a basal scar of 5.2 x 8.5 mm in diameter, which suggest that transverse division occurred. It also has a polygonal calicular cross section, each C_1 being slightly ridged, rootlets occurring only in series on the C_1 . The presence of transverse division in *Rhizotrochus* is unexpected, since the upper part of the corallum is held stationary by numerous rootlets, which should not even allow division to occur. Nonetheless, one specimen is known with this character combination (Figs 22 d-e).

DISTRIBUTION. — *Philippines*: Mindoro Strait; Sulu Sea (Balabac); 120-124 m. *Indonesia*: Banda Sea (Kai Islands); Flores Sea (Lintah Strait); 70-296 m. *Elsewhere*: South China Sea (Macclesfield Bank); Malaysia (Darvel Bay, Celebes Sea); Red Sea; Persian Gulf; Bay of Bengal; Singapore; Pelau; Japan (Honshu and Kyushu); 20-1048 m.

"Rhizotrochus" flabelliformis Cairns, 1989

Flabellum latum - ALCOCK, 1902c: 31. [Not *Flabellum latum* Studer, 1878].

Rhizotrochus flabelliformis Cairns, 1989a: 81, pl. 41, figs k-l, pl. 42, figs b, d; 1995: 109-110, pl. 35, figs g-i, pl. 36, figs b, d.

MATERIAL EXAMINED. — **Indonesia**. DEKI: stn 48, 1 (NNM 22412). — Stn 56, 1 (NNM 22413). — Stn 59, 6 (NNM 22414).

"*Galathea*": stn 500, 1 (ZMUC).

TYPE LOCALITY. — "*Siboga*" stn 105: 6°08'N, 121°19'E (Sulu Archipelago, Philippines), 275 m.

DIAGNOSIS. — Corallum highly laterally compressed (GCD:LCD = 2.4-3.4); calicular edge smooth. Largest known specimen (DEKI stn 59) 25 x 73 mm in calicular diameter. Pedicel quite narrow (1.2-1.5 mm in diameter), but attachment reinforced by 2 compressed, massive (4-5 mm in diameter) rootlets, one originating from each calicular edge and firmly anchored to the substratum. Corallum light reddish-brown, young ones having a more intense C₁₋₂ pigmentation. Septa hexamerally arranged in 6 to 7 cycles (S₁₋₄>S₅>S₆>S₇), but even largest specimens with incomplete 7th cycle. Fossa deep and narrow; columella rudimentary.

REMARKS. — The second author disagrees with the first in placing "*R.*" *flabelliformis* in this genus. He considers that it is not a true *Rhizotrochus*, not being attached by circles of adventitious, cylindrical rootlets. The general morphology is closer to that of a species of *Flabellum* (*Flabellum*), the anchoring pair of compressed opposite thecal edge eversions, by position and formation, being similar to irregular spurs on edge crests of *Flabellum* (*Flabellum*) and to spines on edge crests of *Truncatoflabellum*. The use of these eversions for attachment is a qualitative leap with respect to edge crest formation in those two other taxa.

This species is more fully described and illustrated by CAIRNS (1989a, 1994).

DISTRIBUTION. — *Philippines*: Sulu Archipelago; 275 m. *Indonesia*: Banda Sea (Kai Islands); Arafura Sea (east of Tanimbar Islands); 263-390 m. *Elsewhere*: New Zealand region; 228-419 m.

Genus *GARDINERIA* Vaughan, 1907

Gardineria philippinensis Cairns, 1989

Gardineria philippinensis Cairns, 1989a: 82, pl. 42, fig. a.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 1: stn 63, 1 (MNHN).

Indonesia. KARUBAR: stn 86, 1 (USNM 97488).

TYPE LOCALITY. — "*Albatross*" stn 5217: 13°20'N, 123°14'15"E (Sibuyan Sea, Philippines), 192 m.

DESCRIPTION. — Corallum conical (turbinate), with a basal angle of 38°-42° and a circular calice. Largest known specimen (MUSORSTOM 1 stn 63) 17.5 mm in calicular diameter and 19.6 mm in height, with a robust pedicel 7.1 mm in diameter (PD:GCD = 0.41). Corallum attached exclusively through the base of its pedicel. Theca usually heavily encrusted with bryozoans, foraminifera, serpulid tubes, and sponges. Unencrusted theca white, bearing fine horizontal epithecal striae. Calicular margin smooth, rising as a thin lip as much as 1.5 mm above upper, outer septal edges.

Septa hexamerally arranged in 4 complete cycles (48 septa): S₁>S₂>S₃>S₄. S₁ thick, their inner edges vertical and straight, extending to columella; their peripheral edges meet the theca below the calicular margin, their upper edges rise slightly above calicular edge. S₂ similar to S₁ in shape, but slightly less exsert and narrower, also attaining the columella. S₃ about 1/2 width of S₂, each bearing a small paliform lobe that merges with the columella. S₄ rudimentary. Fossa of moderate depth, containing a well-developed columella consisting of 12-17 papillose elements.

REMARKS. — The original description of *G. philippinensis* was based on a type series consisting of the dead, poorly-preserved holotype; a juvenile corallum; and a damaged pedicel of a 3rd specimen. The 2 specimens reported above are larger and better preserved, permitting the observation that the species attains 4 full cycles of septa and that it attaches exclusively through the base of its pedicel, not laterally.

Gardineria philippinensis is similar to *G. hawaiiensis* Vaughan, 1907, in shape and size but differs in attaining a full 4th cycle of septa and in having a robust columella. It differs from *Gardineria* sp. A (reported by CAIRNS, 1995 from the Chesterfield Islands, Lord Howe Seamount Chain, and Norfolk Ridge, depth 291-378 m) by its robust columella.

DISTRIBUTION. — *Philippines*: Lubang Island; Ragay Gulf, Luzon; Iligan Bay, Mindanao; 192-494 m. *Indonesia*: Arafura Sea (southeast of Tanimbar Islands); 222-226 m.

Gardineria paradoxa (Pourtalès, 1868)

Figs 21 g-h

Haplophyllia paradoxa Pourtalès, 1868: 140-141.

Duncania barbadensis Pourtalès, 1874: 45, pl. 9, figs 5-7.

Gardineria barbadensis - LEWIS, 1965: 1063.

Gardineria paradoxa - CAIRNS, 1979: 160-161, pl. 31, figs 4-6, 10 (synonymy).

MATERIAL EXAMINED. — *Indonesia*. KARUBAR: stn 5, 2: 1 (MNHN), 1 (USNM 97489).

TYPE LOCALITY. — "Bibb" stn 22: 24°14'20"N, 80°59'40"W (Straits of Florida), 692 m.

DESCRIPTION (larger specimen). — Corallum elongate-conical: 20.2 mm in length and 11.2 mm in calicular diameter. Corallum attached to substratum by pedicel as well as theca on one side all along from pedicel to calice. Theca exteriorly eroded and encrusted with bryozoans. Although collected alive, specimen resembles a fossilized corallum. Theca dense, up to 1.5 mm thick, extending as a robust lip about 1.3 mm above upper, outer septal edges.

Septa decamerally arranged in 3 size classes: 10:10:20 (40 septa). Primary septa nonexsert, having straight, vertical inner edges that join the columella low in fossa. Secondary septa similar in shape, about 2/3 width of a primary, each secondary bearing a discrete paliform lobe about 0.8 mm in width. Tertiary septa narrow, about 1/2 width of a secondary, having finely dentate inner edges and extending only about 6 mm from calicular edge. Columella papillose, composed of 13 cylindrical (0.5 mm in diameter), granular elements.

The smaller of the 2 specimens is a juvenile only 5.1 mm in calicular diameter and contains only 30 septa.

REMARKS. — This is first report of *G. paradoxa* outside the western Atlantic, where it is known from the Greater and Lesser Antilles (CAIRNS, 1979). Comparison of the KARUBAR specimens to those from the Antilles shows no significant differences; a specimen from Barbados (Fig. 21 g) is particularly similar to the large KARUBAR specimen.

Gardineria paradoxa is distinguished from the other species in the genus by having decameral septal symmetry and a strong secondary lateral attachment.

DISTRIBUTION. — *Indonesia*: Banda Sea (Kai Islands); 285-323 m. *Elsewhere*: western Atlantic (Antilles); 91-700 m.

Genus *JAVANIA* Duncan, 1876

Javania insignis Duncan, 1876

Javania insignis Duncan, 1876: 435, pl. 39, figs 11-13. — ZIBROWIUS, 1974c: 8-9, pl. 1, figs 1-6. — CAIRNS, 1989a: 77-78, pl. 40, figs d-e, g-h, j-k (synonymy); 1994: 80, pl. 34, figs i-k. — CAIRNS & KELLER, 1993: 272.

Flabellum weberi Alcock, 1902a: 107.

MATERIAL EXAMINED. — *Philippines*. MUSORSTOM 2: stn 32, 1 (MNHN). — Stn 33, 19 (USNM 97490). MUSORSTOM 3: stn 131, 4 (USNM 97491).

Indonesia. DEKI: stn 24, 2 (NNM 22435).
 CORINDON 2: stn 248, 2 (MNHN).
 SNELLIUS 2: stn 4.100, 1 (NNM 22434).
 KARUBAR: stn 22, 1 (MNHN). — Stn 32, 2 (POLIPI).

TYPE LOCALITY. — 34°13'N, 136°13'E (Honshu, Japan), 88 m.

DIAGNOSIS. — Corallum elongate-conical, straight, robust, and slightly flared distally; calice usually highly elliptical (GCD:LCD = 1.3-1.7). Pedicel thickened with concentric layers of dense stereome, its diameter up to 55% of GCD. Corallum rarely over 25 mm in GCD or 43 mm in height; white. Septa hexamerally arranged in 5 cycles according to formula: S₁₋₂>S₃>>S₄>S₅. S₅ begin to appear at a GCD of 9-10 mm and the cycle is usually complete at a GCD of 15-17 mm. S₁₋₂ highly exsert, producing a lacerate calicular margin, but S₄₋₅ nonexsert and much smaller than lower cycle septa.

REMARKS. — This species is more fully described and illustrated by CAIRNS (1989a, 1994).

DISTRIBUTION. — *Philippines*: Verde Island Passage; Sulu Sea (west of Panay and Balabac); Davao Gulf, Mindanao; 122-192 m. *Indonesia*: Makassar Strait; Banda Sea (Kai Islands); Flores Sea (Sumbawa); 73-296 m. *Elsewhere*: widespread from southwest Indian Ocean to Hawaiian Islands, including Celebes Sea (Darvel Bay) and Japan; 46-825 m.

Javania lamprotichum (Moseley, 1880)

Desmophyllum lamprotichum Moseley, 1880: 41-42, figs 1-2.

? *Desmophyllum alabastrum* Alcock, 1902a: 105; 1902c: 28-29 (in part: "*Siboga*" stn 105, pl. 4, fig. 27, 27a). — FAUSTINO, 1927: 64, pl. 5, figs 11-12.

Javania lamprotichum - CAIRNS, 1984: 21, pl. 4, figs D-E; 1995: 112, pl. 37, figs b-c.

MATERIAL EXAMINED. — **Philippines.** "*Siboga*": stn 105, 1 (ZMA, see Remarks).
 MUSORSTOM 1: stn 62, 1 (MNHN). — Stn 63, 1 (MNHN). — Stn 65, 1 (USNM 97492).
 MUSORSTOM 2: stn 53, 1 (USNM 97493).
 MUSORSTOM 3: stn 88, 1 (MNHN). — Stn 94, 1 (USNM 97494).

TYPE LOCALITY. — Unknown.

DIAGNOSIS. — Corallum elongate-conical and straight, having a pedicel thickened with layers of dense stereome up to a diameter of 10 mm; theca of upper part of corallum relatively thin and delicate. Largest known specimen (MUSORSTOM 1 stn 63) 29.5 x 44 mm in calicular diameter and 48 mm in height, with a pedicel diameter of 9.0 mm. Corallum flared distally, having an elliptical calice: GCD:LCD = 1.25-1.50. Upper corallum usually light reddish-brown, occasionally white; lower corallum usually white. Septa hexamerally arranged in 5 complete cycles: S₁₋₂>S₃>S₄>S₅. All septa exsert to some degree, producing a serrate calicular edge.

REMARKS. — The figured syntype of *Desmophyllum alabastrum* Alcock, 1902 ("*Siboga*" stn 105) is missing from the ZMA; however, ALCOCK's (1902c) illustration appears to show the lower half of a *Javania*. In 1994, a large, previously unidentified and well-preserved specimen of *J. lamprotichum* (35.8 x 27.6 mm in calicular diameter, 8.3 mm pedicel diameter), was found at the ZMA, also from "*Siboga*" stn 105. Although not the illustrated specimen and probably not even seen by ALCOCK, this is considered to be indirect evidence that ALCOCK's (1902c) figured specimen of *D. alabastrum* might have been *Javania lamprotichum*. The other syntype of *D. alabastrum*, from "*Siboga*" stn 95 (ZMA Coel. 1252), appears to be a *Thalamophyllia*.

Javania lamprotichum differs from *J. insignis* Duncan, 1876, in having a larger, more delicate, flared corallum; usually a pigmented, noncostate theca; and more prominent S₄₋₅.

Coralla of 3 lots (MUSORSTOM 1 stns 63, 65, 2 stn 53) contain 1 or more borings of acrothoracican cirripedes.

DISTRIBUTION. — *Philippines*: Lubang Island; Sulu Sea (Sulu Archipelago); 191-842 m. *Elsewhere*: Kermadec Ridge; Johnston Atoll; Hawaiian Islands; 244-710 m.

Javania pachythea Cairns, 1995

Figs 21 i, 22 a

Javania pachythea Cairns, 1995: 112-113, pl. 36, figs j-l, pl. 37, fig. a.

MATERIAL EXAMINED. — **Indonesia**. "Albatross": stn 5584, 1 (USNM 97495). — Stn 5634, 1 (USNM 97496). SNELLIUS 2: stn 81.2, 3 (NNM 23089).

TYPE LOCALITY. — "Tangaroa" stn K846: 30°13.1'S, 178°32.0'W (off Macauley Island, Kermadecs), 610 m.

DIAGNOSIS. — Corallum tall and slender, the specimen figured herein being 7.6 x 9.0 mm in calicular diameter, 20.2 mm in height, and 4.3 mm in pedicel diameter. Thecal wall quite thick (0.9-2.3 mm), covered with a fine granulation. Corallum white or light brown. Septa hexamerally arranged in 4 complete cycles: S₁₋₂>S₃>>S₄, the S₄ being nonexsert and quite slender. Inner edges of all septa moderately sinuous. Fossa deep and narrow.

DISTRIBUTION. — **Indonesia**: Ceram Sea (Obi Islands); 534-601 m. *Elsewhere*: Malaysia (Celebes Sea off Sabah); southwest Pacific from North Island, New Zealand to the Chesterfield Islands, including the Lord Howe Seamount Chain; 360-1045 m.

Javania sp.

Figs 22 b-c

MATERIAL EXAMINED. — **Indonesia**. KARUBAR: stn 44, 1 (MNHN). — Stn 49, 1 fragment (USNM 97498). — Stn 86, 1 (MNHN).

DIAGNOSIS (specimen from KARUBAR stn 44). — Corallum straight, slightly flared distally: 13.7 x 15.6 mm in calicular diameter and 33.8 mm in height, with a pedicel diameter of 7.2 mm. Upper part of corallum smooth and porcellaneous, a light purple-grey in colour; lower corallum superficially eroded, discoloured, and encrusted. Septa hexamerally arranged in 4 cycles: S₁>>S₂>S₃>S₄. S₁ extremely exsert (up to 6.5 mm), having vertical, straight inner edges. S₂ 1/2 as exsert but almost as wide as S₁, having slightly sinuous inner edges. S₃ only 0.5-1.5 mm exsert, about 3/4 width of an S₂, also having slightly sinuous inner edges. S₄ not exsert (not even reaching the top of the calice), about 1/3 width of an S₃, having slightly sinuous inner edges. Fossa deep and narrow.

REMARKS. — The KARUBAR specimens reported above resemble the widespread species *J. cailleti* (Duchassaing & Michelotti, 1864), but differ in having more exsert S₁ (much more exsert than their S₂), and in having a purple-grey pigmentation. Whereas some specimens of *J. cailleti* have highly exsert septa (e.g., holotype of *D. nobile* Verrill, 1885; USNM 82016 from Lydonia Canyon, NW Atlantic), the S₁ of most specimens rarely exceed 4 mm in exsertness, and in all cases S₂ equal in size to S₁. Furthermore, the corallum of *J. cailleti* is always white, whereas the KARUBAR specimens are pigmented.

Descriptions and illustrations of *J. cailleti* are found in CAIRNS (1979, 1982, 1991) and ZIBROWIUS (1980). It is a widely distributed species known from the Atlantic, Pacific, and Indian Oceans at depths of 86-2165 m.

DISTRIBUTION. — **Indonesia**: Arafura Sea (south of Tanimbar Islands); 209-291 m.

Genus *TRUNCATOFLABELLUM* Cairns, 1989*Truncatoflabellum spheniscus* (Dana, 1846)

Figs 23 a-b

Euphyllia spheniscus Dana, 1846: 160-161, pl. 6, figs 1a-e.

Truncatoflabellum spheniscus - CAIRNS, 1989a: 65-66, pl. 32, figs g-k (synonymy); 1994: 76, pl. 33, figs a-d (synonymy).

MATERIAL EXAMINED. — **Indonesia.** "Siboga": stn 299, 1 (ZMA Coel. 1229).
 DEKI: stn 67, 15 (NNM 22616). — stn 71, 3 (NNM 22617). — Stn 74, 3 (NNM 22618). — Stn 90, 3 (NNM 22619).
 — Stn 103, 100 (NNM 22620). — Stn 106, 13 (NNM 22621).
 "Galathea": stn 501, 1 (ZMUC).
 "Hakuho Maru": stn KH72-1-29, 4 (USNM 97500). — Stn KH72-1-30, 7 (USNM 97501).
 KARUBAR: stn 65, 99: 40 (MNHN), 29 (POLIPI), 30 (USNM 97499).
South China Sea. "Galathea": stn 330, 1 (ZMUC).
 Singapore. 1, Phyletisches Museum, Jena, Germany (Coel. 922), coll. E. HAECKEL, October 1900.
Australia. "Akademik Oparin": stn 18, 3 (USNM 93197).

TYPE LOCALITY. — Singapore, South China Sea, 3-6 m.

DESCRIPTION. — Anthocyathus highly compressed (GCD:LCD up to 3.65), the planar thecal faces meeting in rounded, but narrow, edges that bear 1 pair of edge spines about 4 mm above basal scar. Angle of thecal edges 57°-165°; angle of thecal faces quite low, 20°-31°. Largest known specimen (KARUBAR stn 65) 14.5 x 52.8 mm in calicular diameter. Basal scar of most Indonesian specimens reported herein small, only 3.2-5.0 mm in greater diameter. Calicular margin strongly arched, smooth. Corallum white but often encrusted with bryozoa, foraminifera, serpulids, and calcareous algae.

Large specimens (GCD > 45 mm) have septa hexamerally arranged in 6 cycles (S₁₋₄>S₅>S₆, 192 septa), often with additional pairs of S₇, but smaller specimens have only 40, 42, 44, or 46 primary septa, a corresponding number of secondaries, and twice that number of tertiary septa, resulting in coralla of 160, 168, 176, or 184 septa. S₁₋₄ (primary septa) narrow, notched near the calicular margin, and slightly concave midway down fossa. Lower, inner edges of S₁₋₄ quite thick and fused to columella. S₅ (secondary septa) about 3/4 width of S₁₋₄, not attaining the columella. S₆ (tertiary septa) about 1/2 width of S₅, extending only a short distance from calicular edge. When present, S₇ (quaternary septa) are paired but are quite narrow and short. Fossa deep and elongate, containing a well-developed columella about 1.4 mm in width.

REMARKS. — Specimens from "Galathea" stns 330 and 501, and HAECKEL's specimen are typical *T. spheniscus*, with the large basal scar as in the type series. The other specimens reported above differ in having a much smaller basal scar: 3.2-5.0 mm in greater diameter vs 10.0-11.2 mm for the syntypes. The specimens appear otherwise consistent in all characters, and thus scar diameter is considered by the first author to be variable in this species. The second author is highly skeptical about identifying these small-scar specimens as *T. spheniscus*. His general experience is that the size of the basal scar, reflecting the size at which transverse division occurred, is standard in species of *Truncatoflabellum* and other transversely dividing species. *T. spheniscus* is distinguished from most other species in the genus by its elongate, narrow calice and its distinctively shaped S₁₋₄.

DISTRIBUTION. — **Indonesia:** Arafura Sea (south of Tanimbar Islands); Timor Sea; Savu Sea; Sunda Strait, Java Sea; 30-174 m. **Elsewhere:** Japan (Shikoku; Korea Strait; Honshu; northern Ryukyu Islands); Formosa Strait; South China Sea (Singapore); Australia (Torres Strait, Gulf of Carpentaria, Western Australia); 2-106 m.

Truncatoflabellum aculeatum (H. Milne Edwards & Haime, 1848)

Flabellum aculeatum H. Milne Edwards & Haime, 1848a: 272, pl. 8, figs 3, 3a.

Truncatoflabellum aculeatum - CAIRNS, 1989a: 61, 64, pl. 31, figs h-l, pl. 32, figs a-c (synonymy).

MATERIAL EXAMINED. — **Philippines.** "Albatross": stn 5141, 3 (USNM 97502). — Stn 5253, 1 (USNM 97503).
 MUSORSTOM 3: stn 142, 3 (MNHN).
Indonesia. DEKI: stn 14, 1 (NNM 22651). — Stn 60, 8 (NNM 22653). — Stn 82, 220 (NNM 22669). — Stn 84, 2 (NNM 22655). — Stn 89, 1 (NNM 22656). — Stn 90, 1 (NNM 22657). — Stn 92, 2 (NNM 22658).
 "Hakuho Maru": stn KH72-1-29, 4 (USNM 97506). — Stn KH72-1-30, 5 (USNM 97507).
 CORINDON 2: stn 260, 1 (USNM 97505). — Stn 292, 1 (MNHN).
 SNELLIUS 2: stn 4.099, 2 (NNM 22663). — Stn 4.134, 1 (NNM 22664). — Stn 4.228, 1 (NNM 22665). — Stn 4.232, 2 (NNM 22666). — Stn 4.234, 4 (NNM 22667).

TYPE LOCALITY. — Philippines (depth not given).

DIAGNOSIS. — Anthocyathus compressed (GCD:LCD = 1.8-2.6), the slightly convex thecal faces meeting in rounded edges that usually bear 1 pair of edge spines directly adjacent to basal scar. Angle of thecal edges 45°-53°; angle of thecal faces 28°-31°. Largest known specimen (KH72-1-29) 16.5 x 41.0 mm in calicular diameter and 25.5 mm in height, with a basal scar of 6.2 x 14.3 mm. Calicular margin of septal faces arched; corallum white. Septa of most specimens hexamerally arranged in 5 complete cycles: S₁₋₃>S₄>S₅ (96 septa); however, large specimens have additional primary septa equal to S₁₋₃ in size. Shape of septa as described for *T. spheniscus*, but inner edges of S₁₋₃ highly sinuous.

REMARKS. — Although not noted by CAIRNS (1989a), *T. aculeatum* is similar to *T. spheniscus* (Dana, 1846), especially in septal shape, and both species have been collected from the same stations. *T. aculeatum* is distinguished by having a lower edge angle and higher face angle and thus a smaller GCD:LCD; a smaller corallum; and less septa, most specimens having only 5 cycles (96 septa). The species is more fully described by CAIRNS (1989a).

DISTRIBUTION. — *Philippines*: Visayan Sea; Bohol; Sulu Archipelago; 11-33 m. *Indonesia*: Makassar Strait; Banda Sea (Kai Islands); Flores Sea (Lintah Strait and Selayar Island); Timor Sea; Sunda Strait, Java Sea; 18-81 m. Pleistocene of Talaud (UMBGROVE, 1938).

Truncatoflabellum candeanum (H. Milne Edwards & Haime, 1848)

Flabellum candeanum H. Milne Edwards & Haime, 1848a: 278, pl. 8, fig. 13.

Flabellum elegans H. Milne Edwards & Haime, 1848a: 277.

Truncatoflabellum candeanum - CAIRNS, 1989a: 70-71, pl. 36, figs d-h (synonymy); 1994: 76-77, pl. 33, figs e-f.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 1: stn 56, 8 (USNM 97508). — Stn 62, 1 (MNHN). — Stn 64, 1 (MNHN). — Stn 72, 11: 10 (MNHN), 1 (USNM 97509).

MUSORSTOM 2: stn 2, 1 (USNM 97510). — Stn 6, 5 (USNM 97511). — Stn 10, 2 (USNM 97512). — Stn 68, 1 (USNM 97513).

MUSORSTOM 3: stn 88, 4 (USNM 97514). — Stn 90, 1 (MNHN). — Stn 91, 1 (MNHN). — Stn 92, 1 (USNM 97515). — Stn 96, 3 (USNM 97516). — Stn 99, 1 (MNHN). — Stn 102, 25 (MNHN). — Stn 107, 2 (USNM 97517). — Stn 108, 5 (MNHN). — Stn 109, 1 (MNHN). — Stn 110, 1 (USNM 97518). — Stn 143, 20.

Indonesia. DEKI: stn 54, 16 (NNM 22593). — Stn 58, 1 (NNM 22594).

TYPE LOCALITY. — "*Albatross*" stn 5369: 13°48'N, 121°43'E (Luzon, Philippines), 194 m.

DIAGNOSIS. — Angle of acute thecal edges 40°-80°; angle of slightly convex thecal faces 30°-41°. GCD:LCD = 1.6-1.9. Largest known specimen (holotype of *F. elegans*) 16.5 x 32.3 mm in calicular diameter and 21.7 mm in height. Most coralla bear 3 pairs of thecal edge spines: the lowest pair directly adjacent to basal scar and curved downward; the middle pair directed horizontally; and the uppermost pair directed slightly upward. Spines often quite long (up to 10 mm) and strongly compressed, having wide triangular bases. Basal scar up to 6 mm in greater diameter. Calicular margin serrate, a small apex corresponding to each of the 20-24 primary septa. Upper, peripheral edges of primary septa and corresponding costae, reddish-brown. Septa arranged in 3 size classes: 20-24:20-24:40-48, resulting in 80-96 septa. Columella well developed.

REMARKS. — *Truncatoflabellum candeanum* is distinguished from other species by its multiple pairs of long, flattened edge spines; and its scalloped calicular margin. It is more fully described by CAIRNS (1989a).

DISTRIBUTION. — *Philippines*: Lubang Island; Tayabas Bay; Samar Sea; Visayan Sea; 146-249 m. *Indonesia*: Banda Sea (Kai Islands); 70-290 m. *Elsewhere*: Malaysia (Celebes Sea off Sabah); South China Sea off Hong Kong; Japan (Korea Strait; Kyushu); 88-223 m.

Truncatoflabellum incrustatum Cairns, 1989

Truncatoflabellum incrustatum Cairns, 1989a: 68-69, pl. 35, figs d-e.

Truncatoflabellum formosum Cairns, 1989a: 69-70 (in part: "Albatross" stns 5137, 5484).

MATERIAL EXAMINED. — **Indonesia**. "Siboga": stn 303, 1 (ZMA Coel. 1207).

Southwestern Sulawesi, 16.07.1985, 27-30 m, 1 (NNM 22595).

South China Sea. Macclesfield Bank, 64-82 m, 1 (BMNH).

TYPE LOCALITY. — "Albatross" stn 5251: 7°05'12"N, 125°39'35"E (Mindanao, Philippines), 37 m.

DIAGNOSIS. — Angle of rounded thecal edges 23°-32°; angle of thecal faces 15°-19°. GCD:LCD = 1.65-2.10. Largest known corallum (anthocyathus from "Albatross" stn 5253) 28 mm in GCD and 42 mm in height. One pair of downward-projecting edge spines present near basal scar. Basal scar up to 6.0 mm in greater diameter. Theca black-brown, but usually covered with a heavy encrustation of sessile organisms. Calicular edge smooth. Septa hexamerally arranged in 5 complete cycles (S₁₋₂>S₃>S₄>S₅). Fossa deep and elongate, containing a rudimentary trabecular columella.

Truncatoflabellum incrustatum is compared to *T. irregulare* (Semper, 1872) in the following account, and is described in greater detail by CAIRNS (1989a).

DISTRIBUTION. — *Philippines*: Verde Island Passage; Leyte Gulf; Davao Gulf; Sulu Sea (Sulu Archipelago); 37-415 m. *Indonesia*: Savu Sea; Flores Sea (southwestern Sulawesi); 30-36 m. *Elsewhere*: South China Sea (Macclesfield Bank); 64-82 m.

Truncatoflabellum irregulare (Semper, 1872)

Flabellum irregulare Semper, 1872: 242-245, figs 1-3, pl. 16, figs 7-17. — CAIRNS, 1989a: 67-68, pl. 34, figs i-k, pl. 35, figs a-c (synonymy).

Not *Flabellum irregulare* - ALCOCK, 1902c: 32 (= *Truncatoflabellum* sp.).

MATERIAL EXAMINED. — **Indonesia**. "Siboga": stn 303, 3 (ZMA Coel. 1212).

TYPE LOCALITY. — Lapinig Canal, Philippines, 11-18 m.

DIAGNOSIS. — Angle of rounded thecal edges 36°-43°; angle of thecal faces 19°-21°. GCD:LCD = 1.6-2.0. Largest known specimen (anthocyathus from "Albatross" stn 5145) 27.5 mm in GCD and 42.8 mm in height. Usually one pair of downward-projecting thecal edge spines near basal scar. Basal scar usually 3 x 4 mm in diameter. Theca white and often encrusted with sessile organisms. Calicular edge smooth. Septa arranged in a variety of symmetries, 18:18:36 (72 septa) being the most common, but coralla with 16, 17, 19, and 12 primary septa are also known. Primary septa slightly exsert and notched near calicular edge. Fossa deep and elongate, containing a rudimentary trabecular columella.

REMARKS. — *Truncatoflabellum irregulare* is distinguished from *T. incrustatum* by having irregular septal symmetry and only 3 (not 4) size classes of septa. It also has a white (not dark) theca, a smaller basal scar, and a septal notch on each primary septum.

The specimens reported as *Flabellum irregulare* by ALCOCK (1902c) ("Siboga" stns 49a, 253) were re-examined and found to be juvenile specimens of an unknown species, not *T. irregulare*. *T. irregulare* is more fully described and illustrated by CAIRNS (1989a).

DISTRIBUTION. — *Philippines*: Bohol; Sulu Archipelago; 18-42 m. *Indonesia*: Savu Sea (Hainsisi, Samau Island); 36 m.

Truncatoflabellum paripavoninum (Alcock, 1894)

Fig. 22 f

Flabellum pari-pavoninum Alcock, 1894: 187; 1898: 21, pl. 2, figs 3a-b.*Truncatoflabellum paripavoninum* - CAIRNS, 1989a: 72-73, pl. 37, figs j-l, pl. 38, fig. a (synonymy); 1995: 113-114, pl. 37, figs d-e.MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1: stn 44, 1 (MNHN). — Stn 47, 2 (MNHN).

MUSORSTOM 2: stn 25, 3 (MNHN). — Stn 77, 1 (MNHN).

MUSORSTOM 3: stn 106, 2 (USNM 97548).

Indonesia. KARUBAR: stn 39, 1 (POLIPI). — Stn 56, 8 (USNM 97549). — Stn 57, 1 (MNHN). — Stn 70, 1 (USNM 97550). — Stn 71, 9: 3 (MNHN), 6 (USNM 97551). — Stn 87, 2 (MNHN). — Stn 91, 1 (POLIPI).

TYPE LOCALITY. — "Investigator" stn 177: 13°47'04"N, 73°07'E (Laccadive Sea), 1163 m.

DIAGNOSIS. — Angle of thecal edges 57°-138°; angle of thecal faces 31°-62°. Thecal faces virtually planar, meeting in straight, nonspinose, noncrested, acute thecal edges. Largest known specimen (KARUBAR stn 71) 34.4 x 61.7 mm in calicular diameter and 48.2 mm in height. Basal scar elliptical but variable in size, greater diameter 6.8 to 14.5 mm. Corallum white or uniformly reddish brown, the theca of most specimens being worn and discoloured. Septa hexamerally arranged in 6 cycles (S₁₋₃>S₄>S₅>S₆, 192 septa), the 6th cycle beginning to appear at a GCD of 26-30 mm. Columella well developed, consisting of a robust fusion of the lower, inner edges of S₁₋₃, and being about 2.1 mm in width.

REMARKS. — Among the western Pacific species, *T. paripavoninum* is distinguished by having a large corallum; nonspinose and noncrested thecal edges; and by occurring in relatively great depths. The diagnosis above is based on the anthocyathus stage, only one specimen (KARUBAR stn 56) being an anthocaulus. The species is more fully described and illustrated by CAIRNS (1989a, 1995).

Four specimens from KARUBAR stns 56 and 71 serve as the substratum for a stalked suberitid sponge (? *Rhizaxinella*, identified by K. RÜTZLER) (Fig. 22 f). The slender stalk (up to 60 mm long and 3 mm in diameter) supports a "head" about 20 x 10 mm in size. The stem of the sponge is attached to the theca of the living coral just below the calicular edge.

DISTRIBUTION. — *Philippines*: Lubang Island; Bohol Strait; Sulu Archipelago; 512-772 m. *Indonesia*: Arafura Sea (southeast of Tanimbar Islands); Gulf of Bone, Sulawesi; Bali Sea; 411-1022 m. *Elsewhere*: Malaysia (Darvel Bay, Celebes Sea); Laccadive Sea; Kermadec Islands; 1035-1450 m.

Truncatoflabellum formosum Cairns, 1989*Truncatoflabellum formosum* Cairns, 1989a: 69-70 (in part: not "Albatross" stns 5137, 5484, 5162, and 5483, the first 2 stations being *T. incrustatum*, the latter 2 unidentified species of this genus), pl. 35, figs j-k, pl. 36, figs a-b (synonymy); 1994: 77, pl. 33, figs g-h (synonymy).*Truncatoflabellum* sp. nov. - CAIRNS, 1989a: 73, pl. 38, figs g-h.? *Truncatoflabellum formosum* - CAIRNS & KELLER, 1993: 265, pl. 10, fig. I, pl. 11, fig. A.MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 2: stn 2, 1 (MNHN). — Stn 32, 1 (MNHN).

MUSORSTOM 3: stn 131, 5 (USNM 97540).

Indonesia. "Siboga": stn 274, 1 (ZMA Coel. 1208).

CORINDON 2: stn 216, 6 (MNHN).

KARUBAR: stn 1, 4: 1 (POLIPI), 3 (USNM 97541). — Stn 3, 1 (POLIPI).

TYPE LOCALITY. — "Albatross" stn 5249: 7°06'06"N, 125°40'08"E (Mindanao, Philippines), 42 m.

DIAGNOSIS. — Angle of rounded thecal edges 37°-59°; angle of thecal faces 18°-34°. GCD:LCD = 1.4-1.8. Most anthocyathi have 2 pairs of thecal edge spines, the lowermost pair 3-4 mm above the basal scar and the upper pair usually quite short, each of these upper spines with a broad, flat, triangular base. Largest Philippine specimen ("Albatross" stn 5289) 13.4 x 23.0 mm in calicular diameter and 31.4 mm in height. Calicular margin arched and smooth. Basal scar relatively small, 4-5 mm in greater diameter. Well-preserved specimens have reddish-brown thecal stripes associated with the 20 primary septa. Septa arranged in 3 size classes (20:20:40 = 80 septa), some pairs of tertiaries occasionally missing. Primary septa gracefully arched near calicular edge, having sinuous inner edges. Tertiary septa rudimentary, much smaller than the secondaries. All septa widely spaced.

REMARKS. — This species is more fully described by CAIRNS (1989a, 1994).

DISTRIBUTION. — *Philippines*: Lubang Island; Verde Island Passage; Sulu Sea (west of Panay and Sulu Archipelago); Leyte Gulf; Davao Gulf; 42-315 m. *Indonesia*: Makassar Strait; Banda Sea (Kai Islands); Gulf of Bone, Sulawesi; 57-933 m. *Elsewhere*: Japan (Honshu, Shikoku, Kyushu); ?southwest Indian Ocean; 106-230 m.

Truncatoflabellum pusillum Cairns, 1989

Truncatoflabellum pusillum Cairns, 1989a: 71-72, pl. 37, figs a-e. — CAIRNS & KELLER, 1993: 265, pl. 11, fig. E.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 2: stn 33, 10 (USNM 97532).

MUSORSTOM 3: stn 87, 1 (MNHN). — Stn 96, 1 (MNHN). — Stn 102, 4 (MNHN). — Stn 109, 1 (MNHN).

Indonesia. DEKI: stn 3, 2 (NNM 22588). — Stn 46, 4 (NNM 22589). — Stn 53, 1 (NNM 22590). — Stn 63, 4 (NNM 22591).

CORINDON 2: stn 248, 4 (USNM 97536).

KARUBAR: stn 15, 20 (MNHN). — Stn 18, 5 (MNHN). — Stn 44, 2 (POLIPI).

TYPE LOCALITY. — "Albatross" stn 5178: 12°43'N, 122°06'15"E (Sibuyan Sea, Philippines), 143 m.

DIAGNOSIS. — Angle of thecal edges 14°-18°; angle of thecal faces 18°-20°. Thecal faces convex; thecal edges rounded, each edge bearing 2-4 slender spines. Corallum slender and high, the largest specimen (DEKI stn 3) 6.4 x 10.0 mm in calicular diameter, with a greater basal scar diameter of 2.7 mm. Theca smooth and porcellaneous, bearing fine transverse striae; theca streaked with reddish-brown stripes, one corresponding to every interseptal space adjacent to each S₁₋₂. Septa hexamerally arranged in 3 cycles and usually 4 pairs of S₄, 1 pair occurring in the half-systems adjacent to each principal septum, resulting in 32 septa: S₁₋₂>S₃>S₄. However, large specimens may contain a full 4th cycle of septa. Inner edges of S₁₋₂ highly sinuous.

REMARKS. — This species is more fully described and illustrated by CAIRNS (1989a).

DISTRIBUTION. — *Philippines*: Lubang Island; Verde Island Passage; Sibuyan Sea; Sulu Sea (Sulu Archipelago); 137-205 m. *Indonesia*: Makassar Strait; Banda Sea (Kai Islands); 85-300 m. *Elsewhere*: Mozambique; 110-132 m.

Truncatoflabellum dens (Alcock, 1902)

Flabellum dens Alcock, 1902a: 106-107; 1902c: 32, pl. 4, figs 30, 30a. — CAIRNS, 1989a: 54, pl. 28, figs g-k (synonymy).

Truncatoflabellum dens - CAIRNS, 1995: 114-115, pl. 37, figs f-h.

MATERIAL EXAMINED. — **Indonesia**. "Siboga": stn 95, 9 syntypes: 8 (ZMA Coel. 1209, 1449), 1 (USNM 97538).

SNELLIUS 2: stn 4.032, 1 (NNM 22770).

KARUBAR: stn 2, 2 (MNHN).

TYPE LOCALITY. — "Siboga" stn 95: 5°43.5'N, 119°40'E (Sulu Archipelago, Philippines), 522 m.

DIAGNOSIS. — Angle of rounded thecal edges changes from 58°-80° at a height of about 6 mm to 21°-35°. Corallum highly compressed, angle of thecal faces 14°-18° and GCD:LCD = 1.7-2.3. Corallum small, up to 12.7 mm in GCD and about 15 mm in height, having a small basal scar about 2 x 3 mm. Thecal edges usually nonspinose. Theca bears reddish-brown stripes corresponding to each interseptal space. Calicular edge smooth. Septa hexamerally arranged in 4 cycles ($S_{1-2} > S_3 > S_4$), larger coralla with up to 4 pairs of S_5 (a total of 56 septa). S_{1-2} have extremely sinuous inner edges. Fossa deep and elongate, containing a rudimentary columella.

REMARKS. — *Truncatoflabellum dens* is characterized by having a relatively small corallum with a bimodal edge angle, no edge spines, and a very small basal scar diameter. It is more fully described and illustrated by CAIRNS (1989a, 1995).

DISTRIBUTION. — *Philippines*: Sulu Sea (Sulu Archipelago); 522 m. *Indonesia*: Banda Sea (Tukangbesi and Kai Islands); 300-385 m. *Elsewhere*: Kermadec and Norfolk Ridges; New Caledonia; 320-555 m.

Truncatoflabellum phoenix Cairns, 1995

Truncatoflabellum sp. B - CAIRNS, 1994: 79, pl. 33, figs i, l.

Truncatoflabellum phoenix Cairns, 1995: 115-116, pl. 37, fig. i, pl. 38, figs a-f.

MATERIAL EXAMINED. — **Philippines**. "Albatross": stn 5146, 27 (USNM 97542). — Stn 5147, 7 (USNM 97543). — Stn 5159, 21 (USNM 97544). — Stn 5162, 13 (USNM 97545). — Stn 5179, 21 (USNM 97546).

MUSORSTOM 3: stn 137, 21 (MNHN).

Indonesia. SNELLIUS 2: stn D2, 3 (NNM 23203).

KARUBAR: stn 7, 6 (MNHN). — Stn 22, 3 (MNHN). — Stn 44, 1 (POLIPI).

TYPE LOCALITY. — "Tangaroa" stn C531: 29°14'40"S, 178°02'W (Raoul Island, Kermadecs), 179 m.

DIAGNOSIS. — Corallum elongate and compressed (GCD:LCD = 1.3-2.3), having nearly parallel thecal edges and faces, which result in a basal scar of almost equal width to calice. Largest Philippine specimen ("Albatross" stn 5179) 2.9 x 3.9 mm in calicular diameter and 6.8 mm in height, with a greater scar diameter of 3.4 mm. In addition to transverse division, this species also undergoes rejuvenescence, resulting in elongate coralla of varying diameters. Thecal faces convex; thecal edges rounded, each edge bearing 1-6 strongly downcurved spines. Theca porcellanous, well-preserved specimens brown in colour, with more intense pigmentation in stripes adjacent to each C_{1-2} . Septa hexamerally arranged in 3 cycles ($S_{1-2} >> S_3$, 24 septa), only rarely having additional pairs of S_4 in end half-systems. Inner edges of S_{1-2} sinuous. Columella robust, about 0.4 mm wide.

REMARKS. — *Truncatoflabellum phoenix* is distinguished from *T. pusillum* Cairns, 1989, and *T. dens* (Alcock, 1902), species also having small coralla, by having: parallel thecal edges and faces that result in a basal scar almost as large as the calice; usually only 24 septa; a more robust columella; an elongate corallum characterized by multiple rejuvenescence events; and strongly downcurved thecal edge spines. The species is more fully described and illustrated by CAIRNS (1994, 1995).

DISTRIBUTION. — *Philippines*: Sibuyan Sea; Sulu Sea (Sulu Archipelago); 18-421 m, but most specimens collected at 20-70 m. *Indonesia*: Banda Sea (Tanimbar Islands); Arafura Sea (southeast of Tanimbar Islands); 291-295 m. *Elsewhere*: Kermadec Islands; northern Ryukyu Islands; 80-179 m.

Truncatoflabellum mortenseni sp. nov.

Figs 22 g-h

MATERIAL EXAMINED/TYPES. — **Philippines**. MUSORSTOM 2: stn 33, 49 anthocauli and many juveniles (MNHN), paratypes.

MUSORSTOM 3: stn 124, 1 anthocaulus and 1 anthocyathus, paratypes (MNHN). — Stn 131, 93 anthocauli and 18 anthocyathi, paratypes (MNHN and USNM 97521).

Indonesia: MORTENSEN'S JAVA-S.A. EXPEDITION: Stn 5, 29 + 81: 20 anthocauli and 76 anthocyathi, paratypes (ZMUC), 1 anthocyathus, holotype (ZMUC), 9 anthocauli and 4 anthocyathi (USNM 97522). — Stn 6, 20 anthocauli and 73 anthocyathi, paratypes (ZMUC). — Stn 8, 7 anthocauli and 28 anthocyathi, paratypes (ZMUC). — Stn 9, 4 anthocyathi, paratypes (ZMUC). — Stn 18, 1 anthocaulus (ZMUC).

KARUBAR: stn 1, 4 anthocauli, paratypes (MNHN). — Stn 30, 2 anthocauli and 2 anthocyathi, paratypes (MNHN).

TYPE LOCALITY. — 11°36'N, 121°43'E (Sulu Sea west of Panay), 120-122 m.

ETYMOLOGY. — This species is named for Theodor MORTENSEN, who made many collections of Indo-West Pacific fauna, including this species from the Java Sea.

DESCRIPTION. — Anthocaulus: Angle of rounded thecal edges 49°-61°; angle of convex thecal faces 23°-31°. One pair of slender edge spines occurs 4-6 mm above the pedicel, these spines being elongate (up to 7.5 mm) only on small specimens; on larger specimens these delicate structures are always broken. Base of thecal spines broad and compressed. Pedicel circular and quite small (0.8-1.1 mm in diameter), sometimes revealing the 6 protosepta. Largest anthocaulus (MUSORSTOM 3 stn 131) 10.1 x 17.1 mm in calicular diameter and 19.5 mm in height. Calicular margin of thecal faces slightly arched and smooth; GCD:LCD = 1.65-1.85. A thin reddish-brown thecal stripe corresponds to each S₁₋₃, a thinner stripe to each S₄₋₅. Most anthocauli from MUSORSTOM 3 stn 131 tend not to divide transversely after the edge spines are formed, continue to grow up to 18 mm in height, and have 64 septa; however, anthocauli from all other stations rarely exceed 7 mm in height before transversely dividing or forming an incipient transverse fracture line.

Septa hexamerally arranged in 5 cycles (S₁₋₃>S₄>S₅), pairs of S₅ present only in large anthocauli (up to 64 septa). S₁₋₃ nonexsert, attenuate, gracefully concave near calicular edge, having highly sinuous lower, inner edges. S₄ about 1/2 width of S₁₋₃, having straight inner edges. S₅ 1/3 to 1/2 width of the S₄, having slightly dentate inner edges. S₅ originate in a progression from half-systems adjacent to the principal septa towards centre of thecal face. Fossa deep and elongate; columella rudimentary.

Anthocyathus: One of the largest anthocyathi (holotype) measures 12.3 x 22.5 mm in calicular diameter and 16.9 mm in height, with a basal scar of 3.5 x 7.1 mm. Angle of thecal edges and faces similar to that of anthocaulus. One, occasionally 2, pair(s) of edge spines, the lowermost pair occurring within 1 mm of basal scar. Basal scar elliptical, 6.3-7.3 mm in greater diameter. Theca pigmented as in anthocaulus.

Septa of anthocyathus hexamerally arranged in 5 cycles (S₁₋₃>S₄>S₅) as in anthocaulus, but in most anthocyathi the 5th cycle is complete (96 septa). S₁₋₃ notched near theca, rising slightly above calicular margin toward centre of fossa. Inner septal edges highly sinuous. S₄ 1/3 to 2/3 width of S₁₋₃, but having less sinuous inner edges. S₅ rudimentary. Columella well developed, about 1.3 mm in width.

REMARKS. — In many ways the anthocaulus of *T. mortenseni* is similar to that of *T. zuluense* Cairns, 1993, the corallum of both species often resisting transverse division after the basal pair of edge spines has formed. *T. mortenseni* differs from *T. zuluense* in having: a larger edge angle; a smaller diameter pedicel; S₁₋₃ that are equal in size (versus S₁₋₂>S₃ in *T. zuluense*); and usually having more septa, *i.e.*, 56-80 vs 48-56 for *T. zuluense*. The anthocyathus of *T. mortenseni* is distinguished (CAIRNS, 1989a: table 6) by the combination of having a septal formula of S₁₋₃>>S₄>S₅ and having 1 or 2 pairs of thecal edge spines.

Many live specimens of *Truncatoflabellum mortenseni* from Bali Strait, 50-70 m (MORTENSEN's stn 5, 6, 8) were the substrate of the inarticulate disciniscid brachiopod *Discradisca stella* (Gould) (det. A. LOGAN, 1993) and the hipponicid prosobranch gastropod *Malluvium* sp. (det. A. WARÉN, 1993). Both epibionts were localized generally near the calicular edge of live corals, *Malluvium* sp. exceptionally also on a dead coral.

DISTRIBUTION. — *Philippines:* Verde Island Passage; Tablas Strait; Sulu Sea west of Panay; 122-130 m. *Indonesia:* Banda Sea (Kai Islands); Bali Sea and Bali Strait; 50-156 m.

Truncatoflabellum angustum sp. nov.

Figs 23 c-f

Truncatoflabellum dens - CAIRNS, 1995: 114 (in part: pl. 37, figs f-h). [Not *Flabellum dens* Alcock, 1902].

MATERIAL EXAMINED/TYPES. — **Philippines**. "Albatross": stn 5567, 11 paratypes (USNM 97524).

MUSORSTOM 1: stn 64, 1 paratype (USNM 97525).

MUSORSTOM 2: stn 63, 1 paratype (MNHN).

MUSORSTOM 3: stn 92, 2 paratypes (USNM 97526). — Stn 126, 4 paratypes (USNM 97527). — Stn 130, 1 paratype (MNHN). — Stn 143, holotype and 12 paratypes (MNHN).

Indonesia. KARUBAR: stn 2, 19 paratypes (MNHN). — Stn 3, 2 paratypes (POLIPI). — Stn 18, 2 paratypes (USNM 97530). — Stn 31, 1 paratype (MNHN). — Stn 44, 20 paratypes (USNM 97531).

NONTYPES: **Kermadecs**. "Tangaroa": stn K858, 1 (ex USNM 94274, now USNM 97523).

"Acheron": stn BS441, 1 (USNM 94276).

TYPE LOCALITY. — MUSORSTOM 3 stn 143: 11°28.3'N, 124°11.6'E (Visayan Sea, Philippines), 205-214 m.

ETYMOLOGY. — The species name *angustum* (Latin *angustus*, slender, thin) alludes to the highly compressed (slender) calice of this species.

DESCRIPTION. — Anthocyathus: Thecal faces flat to slightly convex, meeting in sharp edges that bear 3 or 4 pairs of slender, delicate edge spines. Angle of thecal edges 28°-52°; angle of thecal faces 17°-22°. Basal scar relatively small: 1.8-2.5 x 2.7-3.3 mm. Largest specimen (holotype) 6.1 x 14.0 mm in calicular diameter and 10.8 mm in height, with a basal scar diameter of 2.1 x 3.1 mm. Calicular margin of septal faces slightly arched and smooth; GCD:LCD = 1.85-2.31. Theca white to slightly reddish-brown.

Septa hexamerally arranged in 5 cycles, the last cycle never complete: S₁₋₂>S₃>>S₄>S₅. Most specimens have only 4 pairs of S₅, 1 pair in each half-system adjacent to the 2 principal septa, resulting in a total of 56 septa. S₁₋₂ nonexsert, attenuate, having very sinuous inner edges that fuse to the columella lower in fossa. S₃ 7/10-9/10 width of S₁₋₂ and usually less sinuous. S₄ 1/4-1/3 width of the S₃; S₅ rudimentary, 1/2 width of S₄. Fossa deep and narrow, the columella being about 0.8 mm in width.

Anthocaulus: Only one unequivocal anthocaulus is known (MUSORSTOM 3 stn 130), the anthocyathus having become detached during this study. This anthocaulus is 1.3 mm in pedicel diameter, 2.7 mm in height, and has a GCD of 3.25 mm. It bears no thecal spines and has 24 septa arranged in 2 size classes: S₁₋₂>S₃.

REMARKS. — *Truncatoflabellum angustum* has a septal number and arrangement similar to *T. zuluense* Cairns, 1993, and *T. gardineri* Cairns, 1993, both from the southwest Indian Ocean. *T. angustum* differs from both in having a more elongate calice (higher GCD:LCD). It also differs from *T. gardineri* Cairns, 1993, in having a smaller basal scar, and having thecal edge spines, not crests. It differs from *T. zuluense* in consistently severing its anthocyathus from its anthocaulus.

Several specimens of *T. angustum* were reported and figured by CAIRNS (1995) as the anthocyathus stage of *T. dens*, both species having been found at the same station and being similar in size and colouration. *T. dens* (Alcock, 1902) is distinguished from *T. angustum* by having a bimodal edge angle and tending to have 32 septa vs 56 septa in *T. angustum*.

DISTRIBUTION. — **Philippines**: Lubang Island; Sulu Sea (Semirara Islands, west of Panay, and Sulu Archipelago); Visayan Sea; 195-490 m. **Indonesia**: Banda Sea (Kai Islands); 212-288 m. **Elsewhere**: Kermadec Islands; 402-465 m.

Genus *BLASTOTROCHUS* H. Milne Edwards & Haime, 1848

Blastotrochus nutrix H. Milne Edwards & Haime, 1848

Blastotrochus nutrix H. Milne Edwards & Haime, 1848a: 284-285, pl. 8, fig. 14. — SEMPER, 1872: 238-241, pl. 16, figs 1-6. — CAIRNS, 1989a: 74-75, pl. 38, figs i-m, pl. 39, figs a-b (synonymy); 1989c: 643, figs a-b (upper). *Flabellum (Blastotrochus) nutrix* - FAUSTINO, 1927: 59-60, pl. 5, figs 1-6.

MATERIAL EXAMINED. — **Indonesia**. "Siboga": Stn 240, 1 (ZMA Coel. 1177); stn 315, 1 (ZMA Coel. 1176). — Unnumbered station, Banda Sea, 1 (USNM 97553, ex. ZMA Coel. 1178). — Unnumbered station, Ambon, 1 (ZMA Coel. 1175).

"*Galathea*": Stn 485, 4 (ZMUC).
 Koedingarrang Keke, southwestern Sulawesi, 30-32 m, 17.07.1985, 8 (NNM 22431, 22433); Samalona, southwestern Sulawesi, 23 m, 10.07.1985, 1 (NNM 22432).

TYPE LOCALITY. — Philippines (depth not given).

DIAGNOSIS. — Corallum elongate and compressed, having rounded thecal edges and 1 pair of downward projecting edge spines just above basal scar. Additional coralla (anthoblasts) bud from the thecal edges, up to 4 coralla occurring on each edge. Buds ultimately detach at a height of 4-5 mm. Largest Indonesian specimen (USNM 97553, ex ZMA Coel. 1178) 8.9 x 11.2 mm in calicular diameter and 27.8 mm in height. Angle of thecal edges 10°-16°; angle of thecal faces 10°-12°. Calice elliptical: GCD:LCD = 1.3-1.6. Basal scar 2.3-2.5 x 2.8-3.3 mm in diameter. Theca white and usually encrusted. Septa hexamerally arranged in 4 cycles (S₁₋₂>S₃>S₄), although 4th cycle sometimes incomplete. Columella rudimentary, consisting of a fusion of lower, inner edges of S₁₋₂.

REMARKS. — Although similar in shape to species of *Truncatoflabellum*, *Blastotrochus* differs in budding corallites from its thecal edges. *B. nutrix* is more fully described and illustrated by CAIRNS (1989a, c).

DISTRIBUTION. — *Philippines*: Lapinig Canal, north of Bohol; 11-18 m. *Indonesia*: Banda Sea (Ambon and Banda Islands); Flores Sea (southwestern Sulawesi); Bali Strait; eastern Java Sea; 23-62 m.

Genus *PLACOTROCHIDES* Alcock, 1902

Placotrochides scaphula Alcock, 1902

Placotrochides scaphula Alcock, 1902b: 121-122; 1902c: 34, pl. 4, figs 32, 32a. — CAIRNS, 1989a: 78-79, pl. 40, fig. 1, pl. 41, figs a-e (synonymy); 1994: 79-80, pl. 34, figs f-h; 1995: 116-117, pl. 38, fig. 38, pl. 39, fig. a. — CAIRNS & PARKER, 1992: 48-49, figs 15 h, i. — CAIRNS & KELLER, 1993: 272-273, pl. 12, figs D, G.
Flabellum elongatum Hu, 1987: 44, pl. 3, figs 4, 7-8 (new synonymy).

MATERIAL EXAMINED. — *Indonesia*. "*Siboga*": Stn 297, 1 (ZMA Coel. 1228).

TYPE LOCALITY. — "*Siboga*" stn 212: 5°54.5'S, 120°19.2'E (Flores Sea), 462 m.

DIAGNOSIS. — Corallum cylindrical, with virtually parallel thecal faces and parallel, rounded thecal edges. No edge spines. Calice elliptical, the specimen reported herein 9.2 mm in GCD, with a basal scar of approximately the same size as the calice. Shape of calice often asymmetrical, one thecal face being slightly less curved and having more septa than the other face. Theca white, engraved with shallow, vertical striae that delimit wide, flat costae. Septa hexamerally arranged in 4 cycles (S₁₋₂>S₃>S₄), the 4th often incomplete, resulting in 40 septa. All septa relatively thin and widely spaced. Fossa deep and elongate, containing a well-developed, elongate trabecular columella that occupies medial 1/3 of fossa.

REMARKS. — ALCOCK (1902b, c) chose a relatively small specimen ("*Siboga*" stn 212) as the holotype of this species, not even mentioning the larger, better-preserved specimen reported herein from "*Siboga*" stn 297. It is possible that ALCOCK did not have access to the entire "*Siboga*" collection when he wrote his report on the corals from that expedition, as many other large, well-preserved "*Siboga*" specimens are reported herein for the first time.

Placotrochides scaphula is more fully described by CAIRNS (1989a, 1994) and CAIRNS & PARKER (1992).

DISTRIBUTION. — *Philippines*: Verde Island Passage; Sulu Archipelago; 520-522 m. *Indonesia*: Flores Sea (southwestern Sulawesi); Timor Sea; 462-1628 m. *Elsewhere*: Japan (Honshu, Ryukyu Islands); southwest Indian Ocean; Victoria, Australia; 80-1360 m. Plio-Pleistocene of Taiwan (Hu, 1987).

Genus *PLACOTROCHUS* H. Milne Edwards & Haime, 1848*Placotrochus laevis* H. Milne Edwards & Haime, 1848

Placotrochus laevis H. Milne Edwards & Haime, 1848a: 283, pl. 8, figs 15, 15a. — SEMPER, 1872: 251-252, pl. 18, figs 11-13. — FAUSTINO, 1927: 61-62, pl. 5, figs 7-10. — CAIRNS, 1989a: 75-76, pl. 39, figs c-g (synonymy).
Placotrochus candeanus H. Milne Edwards & Haime, 1848a: 283-284. — ALCOCK, 1902c: 33.

MATERIAL EXAMINED. — **Indonesia.** "*Siboga*": stn 91, 1 (ZMA Coel. 1234). — Stn 116, 2 (ZMA Coel. 1310-1311). — Stn 133, 1 (ZMA Coel. 1312). — Stn 273, 1 (ZMA). — Stn 279, 1 (ZMA Coel. 1313).

DEKI: stn 10, 9 (NNM 22599). — Stn 18, 1 (NNM 22600). — Stn 44, 1 (NNM 22601). — Stn 64, 3 (NNM 22602). — Stn 65, 2 (NNM 22603). — Stn 66, 1 (NNM 22604). — Stn 69, 1 (NNM 22605). — Stn 89, 1 (NNM 22606). — Stn 91, 1 (NNM 22607). — Stn 110, 4 (NNM). — Stn 116, 12 (NNM 22608).

SNELLIUS 2: stn 4.232, 1 (NNM 22596). — Stn 4.234, 1 (NNM 22597). — Stn 4.235, 1 (NNM 22598).

KARUBAR: stn 65, 5 anthocyathi (USNM 97554).

TYPE LOCALITY. — Philippines (depth not given).

DIAGNOSIS. — Angle of thecal edges 40°-72°; angle of thecal faces 20°-33°. Thecal edges narrow, rounded (not ridged or carinate); 1 pair of thecal edge spines near basal scar. Largest Indonesian specimen (KARUBAR stn 65) 10.3 x 19.7 mm in calicular diameter and 18.6 mm in height, with a basal scar diameter of 3.6 x 6.8 mm. C₁₋₃ slightly ridged; corallum white. Septa hexamerally arranged in 5 complete cycles: S₁₋₃>S₄>>S₅ (96 septa). Columella lamellar, the lamellae sometimes subdivided into many smaller elements.

REMARKS. — This species is more fully described and illustrated by CAIRNS (1989a).

DISTRIBUTION. — **Philippines:** Bataan Peninsula; Sulu Sea (Basilan, Mindanao, and Sulu Archipelago); 35-69 m. **Indonesia:** Makassar Strait; Molucca Sea (Talaud Islands, Gulf of Tomini); Banda Sea (Kai, Aru, Barat Daya Islands); Arafura Sea (southeast of Tanimbar Islands); Flores Sea (Selayar Island); Bali Sea; Sunda Strait, Java Sea; 12-289 m, but most records less than 100 m. **Elsewhere:** "South China Sea"; Australia (Arnhem Land; Cape Jaubert, northwestern Australia; Queensland); India (Gulf of Mannar); 22-24 m.

Suborder DENDROPHYLLIINA

Family DENDROPHYLLIIDAE Gray, 1847

Genus *BALANOPHYLLIA* Searles Wood, 1844*Balanophyllia carinata* (Semper, 1872)

Rhodopsammia carinata Semper, 1872: 257, pl. 19, figs 6a-b.

Rhodopsammia amoena Semper, 1872: 258, pl. 19, figs 5a-b.

Balanophyllia parallela - VAN DER HORST, 1922: 62. — UMBROVE, 1938: 272. [Not *Rhodopsammia parallela* Semper, 1872].

Balanophyllia carinata - ZIBROWIUS, 1985: 235-238, figs 15-24 (synonymy). — ZIBROWIUS & GRYGIER, 1985: 127, figs 30-35.

MATERIAL EXAMINED. — **Philippines.** "*Albatross*": stn 5134, 1 (USNM 97555). — Stn 5139, 5 (USNM 97556). — Stn 5151, 1 (USNM 97557). — Stn 5152, 4 (USNM 97558). — Stn 5156, 2 (USNM 97559). — Stn 5164, 17 (USNM 97560).

SIPHILEXP: stn 78-T14, 1 (USNM 77314).

Indonesia. "*Siboga*": stn 240, 5 (ZMA Coel. 567) (*B. parallela* of VAN DER HORST, 1922).

DEKI: unnumbered station, Komkir, 75-90 m, 3 (ZMUC). — Stn 10, 20 (NNM 17352). — Stn 14, 2 (NNM 17357). — Stn 18, 20 (NNM 17358). — Stn 20, 4 (NNM 17353). — Stn 24, 1 (NNM 17355). — Stn 31, 2 (NNM 17354). — Stn 38, 1 (NNM 17351). — Stn 64, 20 (NNM 17345). — Stn 70, 7 (NNM 17346). — Stn 82, 20 (NNM 17347). — Stn 84, 4 (NNM 17364).

MORTENSEN'S JAVA-S.A. EXPEDITION: stn 5, 82 (ZMUC). — Stn 6, 3 (ZMUC). — Stn 8, 6 (ZMUC).

CORINDON 2: stn 292, 1 (MNHN).

SNELLIUS 2: stn 4.228, 1 (NNM 17363). — Stn 4.234, 4 (NNM 17361).

TYPE LOCALITY. — Bohol near Pandanon, Philippines, 55 m.

DIAGNOSIS. — Corallum unattached, straight to slightly curved, and compressed, the elliptical calice having a GCD:LCD range of 1.15-1.55. Corallum edges sharp and slightly keeled, small buds asexually generating from the edges. Once a bud detaches, a small irregularity may persist on thecal edge of parent. Because predominant mode of reproduction appears to be by asexual budding, the base of most specimens is usually an open fracture about 1 mm in diameter, revealing the 6 protosepta. Most specimens small, rarely over 10-11 mm in GCD, but ZIBROWIUS (1985) reported a specimen 20 mm in GCD, and another listed above (SIPHILEXP stn 78-T14) measures 14.2 x 21.6 mm in calicular diameter and 33.1 mm in height. Septa hexamerally arranged in 4 cycles in a Pourtalès plan, only larger specimens (GCD>19 mm) having pairs of S₅, the largest specimen having 88 septa. S₁₋₂ independent, slightly exsert, and relatively narrow, with smooth inner edges. Remaining septal cycles have lacinate inner edges. Columella well developed and elongate, flat on top, and fused to lower, inner edges of the S₁₋₂.

REMARKS. — Few specimens have been collected with attached buds, the buds apparently detaching at a relatively small size.

This species has been found to host the petraroid ascothoracidan *Zibrowia auriculata* Grygier, 1985, the gall of which causes the columella to become larger and more porous than normal (ZIBROWIUS & GRYGIER, 1985). *B. carinata* is more fully described and illustrated by ZIBROWIUS (1985).

DISTRIBUTION. — *Philippines*: Visayan Sea; Bohol Sea; Sulu Sea (Basilan and Sulu Archipelago); 33-84 m. *Indonesia*: Makassar Strait; Pleistocene of Talaud (UMBGROVE, 1938); Banda Sea (Banda and Kai Islands); Flores Sea (Selayar Island); Bali Strait; Sunda Strait, Java Sea; 45-100 m. *Elsewhere*: tropical Indo-West Pacific, including Somalia, northern Indian Ocean, and Chesterfield Islands; 55-95 m.

Balanophyllia stimpsonii (Verrill, 1865)

Eupsammia stimpsonii Verrill, 1865: 150.

Eupsammia stimpsoniana Verrill, 1866: 29, pl. 2, figs 3, 3a.

Rhodopsammia socialis Semper, 1872: 260-261, pl. 20, figs 1-4. — FAUSTINO, 1927: 229, pl. 75, figs 9-12.

Rhodopsammia affinis Semper, 1872: 261-262, pl. 19, figs 7a-b.

Rhodopsammia incerta Semper, 1872: 264, pl. 19, figs 8a-b. — FAUSTINO, 1927: 231, pl. 75, figs 3-4.

Leptopsammia conica van der Horst, 1922: 68-69, pl. 8, figs 14-15.

Balanophyllia affinis - FAUSTINO, 1927: 228-232, pl. 75, figs 1-2. — VAN DER HORST, 1922: 62.

Balanophyllia stimpsonii - ZIBROWIUS, 1985: 234-235, figs 1-14 (synonymy). — CAIRNS & KELLER, 1993: 274.

MATERIAL EXAMINED. — **Philippines.** "*Albatross*": stn 5133, 17 (USNM 97561). — Stn 5137, 1 (USNM 97562). — Stn 5143, 2 (USNM 97563). — Stn 5156, 1 (USNM 97564). — Stn 5164, 12 (USNM 97565).

MUSORSTOM 2: stn 9, 1 (MNHN).

Indonesia. DEKI: stn 10, 1 (NNM 17375). — Stn 14, 2 (NNM 17376). — Stn 18, 10 (NNM 17377). — Stn 30, 1 (ZMA Coel. 5479). — Stn 64, 4 (NNM 17369). — Stn 68, 1 (NNM 17368). — Stn 82, 100+ (NNM 17370). — Stn 84, 1 (NNM 17389). — Stn 100, 1 (NNM 17372).

MORTENSEN'S JAVA-S.A. EXPEDITION: stn 5, 14 (ZMUC). — Stn 8, 2 (ZMUC).

"*Te Vega*": stn 1-54, 12 (USNM 97566).

SNELLIUS 2: stn 4.228, 2 (NNM 17384). — Stn 4.232, 2 (NNM 17383). — Stn 4.234, 10 (NNM 17382). — Stn 4.235, 4 (NNM 17381).

TYPE LOCALITY. — "North China Sea" (depth not given).

DIAGNOSIS. — Corallum unattached, straight to slightly curved, and ceratoid. Calice circular to elliptical: GCD:LCD = 1.0-1.4. Thecal faces evenly rounded (corallum not highly compressed or keeled), bearing buds (some up to 20 mm in height), that originate randomly on theca. Tip of broken base 1.3-1.6 mm in diameter. Most specimens 9-10 mm in GCD, but ZIBROWIUS (1985) reported a specimen 15 mm in GCD. Septa hexamerally arranged in 4 complete cycles, only larger specimens having some pairs of S₅ (up to a total of 66 septa). S₁ largest septa: slightly exsert and broad, having smooth, vertical inner edges. S₂ about 3/4 width of an S₁, having smooth inner edges. S₃ only 1/4 width of an S₂, having dentate to lacinate inner edges, each pair bending toward their common S₂. S₄ rudimentary, each pair bending slightly toward their common S₃. Fossa deep; columella small, composed of several twisted laths.

REMARKS. — *Balanophyllia stimpsonii* differs from the other unattached western Pacific species, *B. carinata* (Semper, 1872) in having a less compressed corallum (*i.e.*, a lower GCD:LCD and no thecal keels); budding from the entire circumference of the corallum, not just from keeled thecal edges; and S₂ that are smaller than S₁. *B. stimpsonii* is more fully described and illustrated by ZIBROWIUS (1985).

Like *B. carinata*, *B. stimpsonii* is also known to be a host for the petraroid ascothoracidan genus *Zibrowia* Grygier, 1985, which produces a gall in the columella (ZIBROWIUS & GRYGIER, 1985).

DISTRIBUTION. — *Philippines*: Lubang Island; Bohol Sea; Sulu Sea (Mindanao and Sulu Archipelago); 18-70 m. *Indonesia*: Halmahera Sea (Gulf of Kau); Banda Sea (Kai Islands and southeastern Sulawesi); Flores Sea (Sumbawa and Selayar Island); Bali Strait; 35-75 m. *Elsewhere*: widespread throughout tropical Indo-West Pacific, from southwestern Indian Ocean to Chesterfield Islands; 18-95 m.

Balanophyllia desmophyllioides Vaughan, 1907

Figs 23 g-h

Balanophyllia desmophyllioides Vaughan, 1907: 149-150, pl. 45, fig. 1.

Balanophyllia desmophyllioides - CAIRNS, 1984: 26.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 1: stn 3, 1 (MNHN). — Stn 63, 1 (MNHN). — Stn 65, 5 (USNM 97568).

MUSORSTOM 2: stn 17, 1 (USNM 97569). — Stn 33, 10 (MNHN).

Indonesia. "Galathea": stn 488, 1 (ZMUC).

"Hakuho Maru": stn KH85-1-A2, 2 (USNM 97571).

CORINDON 2: stn 266, 2 (MNHN).

KARUBAR: stn 13, 1 (MNHN). — Stn 18, 3: 2 (MNHN), 1 (USNM 97570). — Stn 32, 2 (MNHN). — Stn 49, 1 (POLIPI).

TYPE LOCALITY. — "Albatross" stn 4061: 20°16'10"N, 155°53'20"W (Hawaii), 44-152 m.

DESCRIPTION. — Corallum elongate-conical to trochoid, the adult tending to become strongly compressed (GCD:LCD = 1.37-1.90) on a robust, cylindrical pedicel (PD:GCD = 0.24-0.39). Largest known specimen (MUSORSTOM 1 stn 3) 18.1 x 35.1 mm in calicular diameter and 42.0 mm in height, with a pedicel diameter of 11.0 mm. Profile of thecal face highly arched. Costae of lower corallum well defined by deep, narrow intercostal striae, but costal definition less clear in upper corallum, the theca being highly porous and granular in texture. No epitheca.

Septa hexamerally arranged in 5 cycles, the 5th complete at a GCD of 15-19 mm. S₁₋₃ of mature specimens independent, slightly exsert (about 2.2 mm), and quite thick and porous at their upper edges. Inner edges of S₁₋₃ smooth in upper 1/2 of fossa, changing to coarsely dentate in lower 1/2 of fossa. Dentition regular, each rectangular tooth about 0.3 mm wide. S₄ smallest septa, about 1.3 mm exsert, 0.6 mm thick, having a smooth inner margin that attenuates about 1/2 distance down fossa. S₅ and S₄ equally exsert and thick, a pair of S₅ fusing

before each S₄ high in fossa and extending to the columella as 1 septum. Lower inner edge of combined S₅ dentate like the S₁₋₃. Fossa deep and spacious. Columella small in relation to size of corallum, composed of a narrow (about 1.7 mm wide), elongate field of many, small (0.15 mm diameter) papillae that are weakly swirled in a clockwise vortex. Columella low, but discrete and slightly convex.

REMARKS. — *Balanophyllia desmophyllioides* is distinguished from other species by its highly arched calice; its coarsely dentate S₁₋₃ and S₅; and the fusion of each pair of S₅ high in the calice before their common S₄. Some of the specimens reported above are much larger than the holotype and subsequently reported specimens (CAIRNS, 1984), the holotype being only 15.0 mm in GCD and somewhat irregular in shape.

In our opinion, the species name was originally incorrectly formed, being derived from the root *Desmophyllum*, and thus should be *desmophylloides*. However, according to the ICZN (Article 32dii) the original spelling cannot be changed.

DISTRIBUTION. — *Philippines*: Lubang Island and Verde Island Passage, Luzon; 122-194 m. *Indonesia*: Makassar Strait; Banda Sea (Kai Islands); Arafura Sea (east of Tanimbar Islands); Flores Sea (southwestern Sulawesi); Bali Strait; 95-393 m. *Elsewhere*: Hawaiian Islands; 101-658 m.

Balanophyllia cornu Moseley, 1881

Figs 24 d-f

Balanophyllia cornu Moseley, 1881: 192-193, pl. 12, figs 11-15. — ALCOCK, 1902c: 41. — CAIRNS, 1994: 82-83, pl. 35, figs f-i (synonymy).

Not *Balanophyllia cornu* Sokolow, 1894: 88-91 (junior primary homonym).

Not *Balanophyllia cornu* - CAIRNS, 1984: 26 (= ? *B. gigas* Moseley, 1881).

MATERIAL EXAMINED. — **Philippines**. "*Albatross*": stn 5110, 5 (USNM 97573). — Stn 5268, 1 (USNM 97573). — Stn 5280, 3 (USNM 97574). — Stn 5281, 1 (USNM M230138). — Stn 5367, 1 (USNM 97575). — Stn 5391, 16 (USNM 97576). — Stn 5392, 100+ (USNM 97577). — Stn 5393, 1 (USNM 97578).

MUSORSTOM 1: stn 3, 3 (USNM 97579). — Stn 14, 1 (MNHN). — Stn 61, 1 (MNHN). — Stn 63, 2 (USNM 97580).

MUSORSTOM 2: stn 15, 4 (USNM 97582). — Stn 32, 7 (MNHN). — Stn 68, 1 (MNHN).

MUSORSTOM 3: stn 88, 7 (MNHN). — Stn 96, 1 (MNHN). — Stn 100, 1 (MNHN). — Stn 102, 4 (MNHN). — Stn 105, 5 (MNHN). — Stn 108, 6: 1 (MNHN), 5 (USNM 97584). — Stn 120, 1 (USNM 97585). — Stn 126, 1 (USNM 97586). — Stn 133, 1 (USNM 97587).

Indonesia. "*Challenger*": stn 192, 4 syntypes (BMNH 1880.11.25.143).

"*Siboga*": stn 297, 1 (ZMA 5482).

DEKI: stn 7, 2 (ZMA Coel. 5484). — Stn 48, 4 (NNM 17332). — Stn 49, 30 (NNM 17532).

MORTENSEN'S JAVA-S.A. EXPEDITION: stn 15, 1 (ZMUC).

"*Galathea*": stn 500, 8 (ZMUC).

"*Hakuho Maru*": stn KH72-1-28, 2 (USNM 97590). — Stn KH85-1-A2, 1 (USNM 97591).

KARUBAR: stn 7, 5 (POLIPI). — Stn 16, 1 (USNM 97588). — Stn 18, 4 (MNHN). — Stn 61, 3 (MNHN).

TYPE LOCALITY. — "*Challenger*" stn 192: 5°49'15"S, 132°14'15"E (Kai Islands, Banda Sea), 256 m.

DESCRIPTION. — Corallum elongate-conical, with a slightly compressed calice (GCD:LCD = 1.1-1.3). Two growth forms occur: one having a straight, firmly attached (PD:GCD = 0.32-0.46) corallum, characteristic of the type series; the other a curved (ceratoid), usually free corallum (PD:GCD = 0.12-0.21). The straight form has a broadly encrusting base, whereas the curved form is either unattached or attached to a small object, such as a small gastropod shell. The differences in growth form may simply be the result of the kind of substratum available on which to settle, the costal and calicular characteristics being otherwise the same. Largest straight form (MUSORSTOM 3 stn 105) 19.5 x 23.1 mm in calicular diameter and 34.6 mm in height, with a pedicel diameter of 7.9 mm; largest specimen of ceratoid form ("*Albatross*" stn 5313) 22.9 x 27.5 mm in calicular diameter and 36.9 mm in height, with a pedicel diameter of 4.5 mm. Costae flat, 0.5-0.7 mm in width, and well defined by deep, narrow (about 0.1 mm) intercostal striae. Costae a reticulum covered by small, irregularly-shaped granules. Lateral faces of costae also bear small granules that project into intercostal striae. Usually no epitheca, but when present, restricted to lower pedicel.

Septa hexamerally arranged in up to 5 cycles: the 3rd (24 septa) complete at a GCD of about 8 mm; the 4th (48 septa) at 11-12 mm GCD; half of the 5th cycle (72 septa) at a GCD of 15-19 mm; and a full 5th cycle (96 septa) at about 24 mm GCD. S_{1-2} essentially the same size, only slightly exsert, having smooth, vertical inner edges that extend to the columella. S_3 about 2/3 width of S_{1-2} , also having smooth inner edges, which do not reach the columella. In a corallum with 72 septa, which is the most common complement, the quarter-systems adjacent to each S_2 contain only 1 S_4 , whereas the quarter-systems adjacent to the S_1 contain 3 septa: 1 S_4 and a pair of S_5 . S_4 adjacent to S_2 are approximately the same size as the S_5 adjacent to S_1 in the same half-system, the inner edges of these 2 septa fusing near the columella. Inner edges of higher cycle septa also smooth. Fossa of moderate depth, containing a well-developed, convex (discrete), elongate columella composed of many short lamellar elements swirled in a clockwise direction. In some specimens the inner edges of the 4 lateral S_1 constrict the elongate columella into 3 connected nodes.

DISTRIBUTION. — *Philippines*: Lubang Island; Verde Island Passage; Samar Sea; Sulu Sea (Semirara Islands); 185-368 m. *Indonesia*: Banda Sea (Kai Islands); Arafura Sea (east and southeast of Tanimbar Islands); Timor Sea (south of Leti Islands and southwestern Timor); Flores Sea (southwestern Sulawesi); Bali Strait; 196-520 m. *Elsewhere*: South China Sea (north of Pratas Islands); Formosa Strait; Japan (Honshu and Kyushu); 60-274 m.

Balanophyllia gemma (Moseley, 1881)

Figs 24 g-i

Thecopsammia gemma Moseley, 1881: 195, pl. 15, figs 8a-b.

Balanophyllia (Thecopsammia) gemma - ALCOCK, 1902c: 42. — FAUSTINO, 1927: 223-224, pl. 73, figs 5-7.

Balanophyllia sp. - VAN DER HORST, 1922: 64 (in part: 1 of 3 specimens from "Siboga" stn 95).

Not *Balanophyllia gemma* - VAN DER HORST, 1926: 50, pl. 3, figs 12-13. — CAIRNS & KELLER, 1993: 221 (= *Balanophyllia* sp.).

MATERIAL EXAMINED. — **Philippines**. "Challenger": stn 201, holotype (BMNH 1880.11.25.147).

"Siboga": stn 95, 1 (ZMA Coel. 1166a).

"Albatross": stn 5135, 3 (USNM 97592).

MUSORSTOM 2: stn 33, 3 (USNM 97593).

Indonesia. DEKI: stn 46, 1 (NNM 17612). — Stn 59, 2 (NNM 17335).

KARUBAR: stn 49, 2 (POLIPI). — Stn 50, 8 (MNHN).

TYPE LOCALITY. — "Challenger" stn 201: 7°03'N, 121°48'E (Sulu Sea, off Zamboanga Peninsula), 187 m.

DESCRIPTION. — Corallum cylindrical, straight, and firmly attached through a thick pedicel (PD:GCD = 0.70-0.75) and slightly expansive base. Largest known specimen ("Albatross" stn 5135) 8.7 x 9.6 mm in calicular diameter and 17.4 mm in height. A thick transversely corrugated epitheca extends to within 2-5 mm of calicular edge. Costae equal in width (0.5-0.6 mm), flat, and highly porous, each costa uniformly covered with small spines. Intercostal striae thin (0.05-0.10 mm), straight, and shallow.

Septa hexamerally arranged in 4 complete cycles, all 48 septa equally nonexsert, having smooth inner edges. S_{1-2} equal in width, extending to columella. S_3 about 1/2 width of S_{1-2} . S_4 that are adjacent to S_1 fuse to that S_1 at calicular edge, their inner edges extending to the columella. Conversely, S_4 that are adjacent to S_2 also fuse to that S_2 , each S_4 bending toward the other S_4 within its half-system, but not fusing with it and not quite reaching the columella. Fossa shallow. Columella a discrete, elongate structure composed of short lamellae swirled in a clockwise direction.

REMARKS. — *Balanophyllia gemma* resembles a small, firmly attached specimen of *B. cornu* Moseley, 1881, but can be distinguished by its well-developed epitheca, shallow fossa, and nonexsert septa.

DISTRIBUTION. — *Philippines*: Verde Island Passage; Sulu Sea (Zamboanga Peninsula, Mindanao; Sulu Archipelago); Basilan Strait; 137-294 m. *Indonesia*: Banda Sea (Kai Islands); Arafura Sea (southeast of Tanimbar Islands); Timor Sea (southwestern Timor); 185-522 m.

Balanophyllia parvula Moseley, 1881

Figs 23 i, 24 a

Balanophyllia parvula Moseley, 1881: 194-195, pl. 15, figs 9, 9a. — ALCOCK, 1902c: 41. — FAUSTINO, 1927: 234, pl. 73, figs 3-4.

MATERIAL EXAMINED. — **Philippines.** "Challenger": stn 201, 2 syntypes (BMNH).

MUSORSTOM 2: stn 32, 1 (MNHN).

MUSORSTOM 3: stn 108, 6 (MNHN).

Indonesia. "Siboga": stn 251, 1 (NNM 22429).

DEKI: stn 46, 1 (NNM 17334).

KARUBAR: stn 18, 1 (MNHN). — Stn 49, 9: 4 (MNHN), 5 (USNM 97596).

South China Sea. "Albatross": stn 5310, 1 (USNM 97594).

TYPE LOCALITY. — "Challenger" stn 201: 7°03'N, 121°48'E (Sulu Sea, off Zamboanga Peninsula), 187 m.

DESCRIPTION. — Corallum elongate-conical and straight, having a slightly compressed calice (GCD:LCD = 1.14-1.23) and attached by a robust pedicel (PD:GCD = 0.32-0.49). Largest known specimen (KARUBAR stn 49) 10.9 x 13.4 mm in calicular diameter and 18.4 mm in height, with a pedicel diameter of 4.4 mm. Costae quite porous and well defined by narrow intercostal striae; however, lower 1/4 to 1/3 of corallum covered by a thin epitheca.

Septa hexamerally arranged in 4 complete cycles in a strongly developed Pourtalès plan. S₁ highly exsert (up to 3.0 mm), remarkably thick (up to 1.6 mm at calicular edge), having smooth, vertical inner edges that attain the columella. S₂ less exsert (up to 2.0 mm), only about 1/2 thickness of S₁, and about 3/4 width of S₁. Inner edges of S₂ also entire but do not quite attain the columella. S₃ rudimentary, only about 0.7 mm exsert, 0.4 mm in thickness, and about 1/4 width of an S₂. S₄ dimorphic in size: those adjacent to S₁ highly exsert (up to 2.8 mm), fused to adjacent S₁ in robust triangular lancets; S₄ adjacent to S₂ slightly less exsert (up to 1.2 mm), also fused to adjacent S₂ but in less prominent lancets. Pairs of S₄ unite before their common S₃ high in fossa and extend to the columella, sometimes fusing with inner edges of other S₄ within their system near the columella. Inner edges of S₄ lacinate, bearing tall, regularly spaced teeth up to 0.6 mm tall. Fossa deep; columella rudimentary.

REMARKS. — *Balanophyllia parvula* is distinguished from other Indo-West Pacific congeners by its remarkably thick and exsert S₁, which contribute to form tall, triangular calicular lancets. It is also distinguished in having a strongly developed Pourtalès plan, lacinate S₄, and a rudimentary columella.

MOSELEY (1881) reported 3 specimens (syntypes) from "Challenger" stn 201 in his original description of *Balanophyllia parvula*, 2 juveniles and 1 adult, the adult of GCD 8.0 mm being the figured specimen. Both juveniles were present at the BMNH in 1994, but the adult specimen could not be found. Judging from MOSELEY's figure, *B. parvula* is a distinctive species represented by additional specimens reported above, but the 2 smaller juvenile (GCD 4.4 and 4.8 mm) syntypes appear to be a different species, perhaps founder corallites of a *Rhizopsammia*. Because of the possibility of 2 species being represented in MOSELEY's type-series, the large figured specimen is designated as the lectotype, even though it could not be found in 1994. ALCOCK (1902c) reported 1 specimen of *B. parvula* from "Siboga" stn 251. A specimen at the NNM from this station fits MOSELEY's figured *B. parvula*, but another *Balanophyllia* (species indet.) is also known from that station (ZMA).

DISTRIBUTION. — **Philippines:** Verde Island Passage; Sulu Sea (Zamboanga Peninsula); 192-195 m. **Indonesia:** Banda Sea (Kai Islands); Arafura Sea (southeast of Tanimbar Islands); 206-300 m. **Elsewhere:** South China Sea (north of Pratas Islands); 183 m.

Balanophyllia crassiseptum sp. nov.

Figs 25 a-c

MATERIAL EXAMINED/TYPES. — **Philippines.** MUSORSTOM 1: stn 32, 3 paratypes (MNHN).

Indonesia. DEKI: stn 7, 1 paratype (ZMA). — Stn 63, 1 paratype (NNM 17333).

KARUBAR: stn 49, 74 paratypes: 27 (MNHN), 3 (POLIPI), 44 (USNM 97654). — Stn 50, holotype (MNHN) and 32 paratypes (MNHN).

TYPE LOCALITY. — KARUBAR stn 50: 7°59'09"S, 133°01'56"E (Arafura Sea southeast of Tanimbar Islands), 184-185 m.

ETYMOLOGY. — The species name *crassiseptum* (Latin *crassus*, thick + *septum*, literally fence or bar), alludes to the thick septa of this species. The name is treated as a noun in apposition.

DESCRIPTION. — Corallum elongate-conical, straight, and compressed (GCD:LCD = 1.15-1.45). Pedicel robust: PD:GCD = 0.45-0.55. Largest known specimen (holotype) 10.2 x 14.8 mm in calicular diameter, 17.0 mm in height, and 8.2 mm in pedicel diameter. Costae flat and porous, of variable width, and separated by thin intercostal striae that sharply mark the costal boundaries. A thin epitheca covers basal 20-50% of corallum, which is usually highly encrusted. Corallum white to light purple, the latter colour caused by an endolithic microorganism.

Septa hexamerally arranged in 4 complete cycles. S₁ remarkably thick, as much as 1.5 mm at calicular edge. S₁ quite exsert (up to 2.3 mm), porous, having a smooth inner edge that attains the columella. S₂ also quite thick (up to 0.9 mm) but only 1/2 as much as the S₁. S₂ up to 1.3 mm exsert, also porous, their inner edges also attaining the columella. S₃₋₄ 0.5-0.6 mm thick. S₃ rudimentary. S₄ adjacent to S₁ more exsert than S₂, but S₄ adjacent to S₂ are as exsert as S₃. Inner edges of S₄ finely dentate. Fossa shallow, containing a well-developed, discrete papillose columella.

REMARKS. — *Balanophyllia crassiseptum* is very similar to *B. parvula* Moseley, 1881, both species having very thick S₁₋₂ and sometimes are found at the same stations. *B. crassiseptum* differs in having a larger columella, less dentate inner edges of S₄, and S₂ that extend completely to the columella, not only 1/2 that distance as in *B. parvula*.

The corallum of the holotype is bored by an acrothoracidan cirripede (Fig. 25 c) (see GRYGIER & NEWMAN, 1985).

DISTRIBUTION. — *Philippines*: Lubang Island; 183-193 m. *Indonesia*: Banda Sea (Kai Islands); Arafura Sea (southeast of Tanimbar Islands); 185-250 m.

Balanophyllia rediviva Moseley, 1881

Figs 25 d-f

Balanophyllia rediviva Moseley, 1881: 193-194, pl. 15, figs 10-12. — VAN DER HORST, 1922: 59.
? *Balanophyllia rediviva* UMBROVE, 1938: 273.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1: stn 3, 1 (MNHN). — Stn 57, 1 (MNHN).

MUSORSTOM 2: stn 33, 6 (MNHN).

MUSORSTOM 3: stn 117, 3 (USNM 97598).

Indonesia. "Challenger": stn 192, syntypes (BMNH 1880.11.25.145).

CORINDON 2: stn 248, 1 (MNHN).

KARUBAR: stn 22, 1 (MNHN).

TYPE LOCALITY. — "Challenger" stn 192: 5°49'15"S, 132°14'15"E (Kai Islands, Banda Sea), 256 m.

DESCRIPTION. — Largest known corallum (KARUBAR stn 22) cylindrical, elongate and slightly bent: 8.3 x 9.5 mm in calicular diameter and 71 mm in length, having 3 episodes of rejuvenescence. Epitheca extends to within 9-10 mm of calicular edge, but most of theca worn and covered with foraminifera and serpulid tubes. Theca highly porous. C₁₋₃ thin (about 0.3 mm) and slightly ridged, whereas C₄ are much broader (about 0.7 mm) and flat.

Septa hexamerally arranged in 4 complete cycles. S₁ highly exsert (2.1 mm), having smooth inner edges that extend to columella. S₂ much less exsert (0.7 mm), about 4/5 width of an S₁, also having entire inner edges. S₃ little exsert (0.3 mm), only about 1/3 width of an S₂, having entire inner edges. S₄ adjacent to S₁ highly exsert (about 1.3 mm), at the calicular edge strongly fused to adjacent S₁ in triangular lancets. S₄ adjacent to S₂ considerably less exsert (0.3 mm) than those adjacent to S₁, the inner edges of each pair of S₄ within a half-system fusing before its common S₃ near the columella. Inner edges of S₄ regularly dentate. Fossa of moderate depth, containing a discrete, elongate, spongy columella that is sometimes constricted by the lower, inner edges of the 4 lateral S₁.

REMARKS. — *Balanophyllia rediviva* is similar to *B. laysanensis* Vaughan, 1907, in calicular features, but can be distinguished by its elongate, cylindrical corallum; slightly ridged C₁₋₃; and dentate S₄.

Only 3 of MOSELEY's 4 syntypes could be located at the BMNH in 1994: the specimen illustrated as MOSELEY's (1881) pl. 15, figs 10a-b is the only well-preserved corallum and is here designated as the lectotype.

DISTRIBUTION. — *Philippines*: Lubang Island; Verde Island Passage; Mindoro Strait; 97-183 m. *Indonesia*: Makassar Strait; Banda Sea (Kai Islands); 90-235 m. ? Holocene of Talaud Islands (UMBROVE, 1938).

Balanophyllia gigas Moseley, 1881

Balanophyllia gigas Moseley, 1881: 193. — VAN DER HORST, 1922: 58-59, pl. 8, fig. 22. — CAIRNS, 1994: 83, pl. 35, figs j-1 (synonymy); 1995: 119-120, pl. 40, figs f-h (synonymy).

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 2: stn 1, 1 (MNHN). — Stn 27, 1 (USNM 97600).

Indonesia. DEKI: stn 50, 1 (NNM).

KARUBAR: stn 13, 1 (POLIPI).

TYPE LOCALITY. — Japan (depth not given).

DIAGNOSIS. — Corallum ceratoid, often bent (up to 90°), and quite large. Largest Indonesian specimen (VAN DER HORST, 1922) 30 x 24 mm in calicular diameter, but some New Zealand specimens (CAIRNS, 1995) are larger still. Pedicel robust: PD:GCD = 0.30-0.57. Basal 1/2 to 2/3 of theca epithecate and usually covered with encrusting organisms. Costae flat, quite porous, and equal in width. Septa hexamerally arranged in 5 cycles in a Pourtalès plan, the 5th cycle rarely complete. S₁₋₂ are 2-4 mm exsert, along with adjacent higher cycle septa forming 12 triangular calicular lancets. S₃ about 3/4 width of S₁₋₂, the septa of all 3 cycles being independent, smooth-edged, and reaching the columella; S₄₋₅ have lacinate inner edges. Fossa deep. Columella discrete, composed of short, swirled lamellar elements.

REMARKS. — This species is characterised by attaining a large size (up to 79 mm in height and 33 mm in calicular diameter), having epitheca, and usually having a bent corallum. It is more fully described and illustrated by CAIRNS (1994, 1995).

DISTRIBUTION. — *Philippines*: Lubang Island; Verde Island Passage; 100-188 m. *Indonesia*: Banda Sea (Kai Islands); 90-393 m. *Elsewhere*: Japan (Honshu and Kyushu); Hawaiian Islands; New Zealand; 90-640 m.

Balanophyllia serrata sp. nov.

Figs 24 b-c

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 1: stn 27, 2 paratypes (USNM 97601). — Stn 63, 1 paratype (MNHN). — Stn 65, 4 paratypes (USNM 97602). — Stn 69, holotype (MNHN).

MUSORSTOM 3: stn 108, 1 paratype (MNHN).

TYPE LOCALITY. — MUSORSTOM 1 stn 69: 13°58.8'N, 120°17.3'E (north of Lubang Island, Philippines), 187-199 m.

ETYMOLOGY. — The species name (Latin *serratus*, toothed like a saw) refers to the jagged calicular edge of this species.

DESCRIPTION. — Corallum large, elongate-conical to trochoid, straight, and slightly flared distally. Largest specimen (the holotype) 34.1 x 27.1 mm in calicular diameter and 45 mm in height, with a pedicel diameter of 17.3 mm. Pedicel robust: PD:GCD = 0.27-0.51; base encrusting. Calice elliptical: GCD:LCD = 1.17-1.37. Costae 0.7-0.9 mm wide, flat, and covered with small spines arranged 3 or 4 across the width of each costa. Intercostal striae thin (0.2 mm) and deep, contributing to a highly porous theca. No epitheca, but lower pedicel of large specimens covered with a solid stereome, obscuring the porous nature of the theca. No encrusting organisms noted on stereome.

Septa hexamerally arranged in 5 cycles, a specimen of 27 mm GCD having a complete 5th cycle, but the largest specimen of 34 mm GCD with only 88 septa (4 pairs of S₅ not formed). S₁₋₂ highly exsert: S₁ 4.0-5.5 mm exsert, S₂ 3-4 mm exsert. Both S₁ and S₂ are independent septa, quite thick at the calicular edge (up to 1.9 mm), having smooth inner edges that extend inward to the columella. S₃ much less exsert, about 3/4 width of the S₁₋₂, not reaching the columella. S₄ approximately 1/2 width of an S₃. S₅ adjacent to lower order septa highly exsert, fusing at the calicular margin to their adjacent lower order septa, and forming calicular lancets. Lower, inner edges of the 2 S₅ within each half-system that are adjacent to S₁₋₂ meet and fuse near columella. Conversely, the 2 S₅ within each half-system that are adjacent to S₃ are the smallest septa (less wide than an S₄) and little exsert, their inner edges bending toward and often fusing to adjacent S₄. S₅ usually porous near the theca, having coarsely dentate inner edges. Fossa of moderate depth. Columella rudimentary, elongate, and constricted by lower, inner edges of lateral S₁. Columella discrete, composed of short lamellae.

REMARKS. — This species has a large corallum and septal arrangement similar to that of *B. gigas* Moseley, 1881. It differs in having no epitheca, a slightly flared calice with more highly exsert S₁₋₂, and a straight corallum.

DISTRIBUTION. — *Philippines*: north of Lubang Island; 190-194 m.

***Balanophyllia generatrix* sp. nov.**

Figs 25 g-i, 26 a-b

MATERIAL EXAMINED/TYPES. — **Philippines**. "*Siboga*": stn 102, 1 corallum, paratype (ZMA Coel. 5483).

"*Albatross*": stn 5543, 1 quasicolony, paratype (USNM 97603).

Indonesia. "*Siboga*": stn 41, 1 quasicolony (ZMA Coel. 5538) and several isolated corallites (ZMA Coel. 5489), paratypes.

DEKI: stn 12, 1 quasicolony, paratype (NNM). — Stn 58, 2 quasicolonies, paratypes (ZMA Coel. 5493).

KARUBAR: stn 16, 1 quasicolony, paratype (MNHN). — Stn 82, 1 quasicolony (holotype, MNHN) and 1 additional quasicolony and several isolated coralla, paratypes (USNM 97604).

TYPE LOCALITY. — KARUBAR stn 82: 9°30'00"S, 131°02'41"E (Arafura Sea south of Tanimbar Islands), 215-218 m.

ETYMOLOGY. — The species name (*generatrix*, Latin for "the one that produces offspring") was the unpublished museum (ZMA) name used by VAN DER HORST, who believed the species to be truly colonial. In fact, the quasicolony results from contiguous independent planular settlement.

DESCRIPTION. — Corallum elongate-conical, usually occurring in a quasicolonial structure, *i.e.*, individual planulae settle close to one another, usually on the theca of an older or dead conspecific corallum, not as the result of budding. The central individual may release the planulae that eventually colonize its theca, but in no case does a corallum appear to bud from the theca of another living corallum. The bases of closely adjacent coralla often

coalesce (fuse) appearing as though they have a common basal coenosteum, but this is not due to coloniality. The holotype is such a quasicolony consisting of a dead central corallum 20.1 x 33.7 mm in calicular diameter and 56 mm in height, on which 28 individual coralla have settled, one as tall as 45 mm. Coralla may attain a height of 70 mm ("*Siboga*" specimens) but never bud additional coralla. The calice is circular to elliptical in cross section (GCD:LCD = 1.1-1.95), the more elliptical calices characteristic of larger coralla. Pedicel robust, the PD:GCD being about 0.33. Costae poorly defined, most of the porous theca covered with a fine spination; no epitheca.

Septa hexamerally arranged in 5 full cycles, passing through the 4 cycle stage at a GCD of 6-9 mm. S₁₋₂ equal in size, only very slightly exsert (about 1 mm), having finely dentate lower, inner edges. S₃ similar to S₁₋₂, also being independent, but their inner edges do not reach quite as far into the fossa as the S₁₋₂. S₄ rudimentary. Pairs of S₅ fuse fairly high in the fossa, having coarsely dentate inner edges that extend as far toward the columella as do those of the S₁₋₂. Fossa quite deep, containing an elongate, discrete columella composed of many very small papillae.

REMARKS. — *Balanophyllia generatrix* is similar to *B. gigas* Moseley, 1881, both having large coralla and 5 cycles of septa, but *B. generatrix* is distinguished by its quasicolonial habit, very deep fossa, finer columella, and coarse dentition of the S₅.

One quasicolony from "*Siboga*" stn 41 and 2 from DEKI stn 58 were found with VAN DER HORST labels reading *Dendrophyllia generatrix*, the specimen from the "*Siboga*" station labelled as the "type", the others as a "cotype". Independently, specimens from the "*Albatross*" and KARUBAR expeditions had been segregated by the first author as an unidentified species. VAN DER HORST's unpublished manuscript name is adopted for it herein. It is understandable that VAN DER HORST considered this species to be a colony resulting from budding and thus called it a *Dendrophyllia*, but for reasons explained in the species description it is here described as a *Balanophyllia*.

DISTRIBUTION. — *Philippines*: Bohol Sea; Sulu Archipelago; 296-535 m. *Indonesia*: Banda Sea (Kai Islands); Arafura Sea (south of Tanimbar Islands); Flores Sea; 96-385 m.

Balanophyllia imperialis Saville Kent, 1871

Figs 26 c-f

Balanophyllia imperialis Saville Kent, 1871: 284, pl. 23, figs 5a-b. — VAN DER HORST, 1922: 60-61 (in part: "*Siboga*" stn 153, pl. 8, fig. 25). — FAUSTINO, 1927: 224. — ZOU, 1988: 78, pl. 3, figs 1-14, pl. 4, figs 2a, 6a, 10a, 12a. ? *Balanophyllia imperialis* - HARRISON & POOLE, 1909: 905-906, pl. 86, figs 5a-c. — UMBGROVE, 1938: 272. *Balanophyllia* sp. - ZIBROWIUS & GRYGIER, 1985: 128, fig. 37.

MATERIAL EXAMINED. — **Philippines**. "*Albatross*": stn 5133, 1 (USNM 97605). — Stn 5146, 4 (USNM 97606). — Stn 5174, 1 (USNM 97607).

MUSORSTOM 3: stn 142, 5 (MNHN).

Indonesia. "*Te Vega*": stn 1-54, 7 (USNM 97609).

"*Hakuho Maru*": stn KH72-1-30, 8 (USNM 97608).

CORINDON 2: stn 248, 1 (MNHN).

South China Sea. Holotype (BMNH 1984.4.27.3).

TYPE LOCALITY. — Singapore, South China Sea (depth not given).

DESCRIPTION. — Corallum elongate-conical, straight to slightly curved, and attached by a slender pedicel: PD:GCD = 0.09-0.18. Calice elliptical: GCD:LCD = 1.27-1.49. Largest known specimen (the holotype) 22.6 x 33.7 mm in calicular diameter and 40.7 mm in height, with a pedicel diameter of 3.3 mm. Costae well defined by narrow, porous intercostal striae; C₅ usually slightly wider than C₁₋₄. Costae slightly convex and covered with small spines. Usually no epitheca.

Septa hexamerally arranged in 5 cycles, but 5th cycle occasionally incomplete by a few to several pairs of S₅, even in large coralla. S₁₋₂ independent, having smooth inner edges. S₁ about 2.1 mm exsert, S₂ about 1.5 mm exsert, neither forming calicular lancets. Septa arranged in a Pourtalès plan, the inner edges of S₃ smooth, those of

the S₄₋₅ lacinate. Fossa deep, containing a discrete, elongate, robust (up to 2.8 mm in width) columella consisting of tightly fused lamellar elements swirled in a clockwise direction.

REMARKS. — The large size (GCD > 30 mm) and septal number of *B. imperialis* invites comparison with 2 other species that have large coralla: *B. gigas* Moseley, 1881 and *B. serrata* sp. nov. *B. imperialis* differs in having a much narrower pedicel and in lacking calicular lancets. It is also characterised by having a very deep fossa and a robust columella.

DISTRIBUTION. — *Philippines*: Visayan Sea; Sulu Sea (Zamboanga Peninsula and Sulu Archipelago); 27-70 m. *Indonesia*: Makassar Strait; Halmahera Sea; Timor Sea; 55-170 m; ? Holocene of Talaud Islands (UMBROVE, 1938). *Elsewhere*: South China Sea (Singapore); ? Mergui Archipelago; 18-38 m.

Genus *ENDOPACHYS* H. Milne Edwards & Haime, 1848

Endopachys grayi H. Milne Edwards & Haime, 1848

Endopachys grayi H. Milne Edwards & Haime, 1848b: 82-83, pl. 1, figs 2, 2a. — SEMPER, 1872: 267. — VAN DER HORST, 1922: 68. — FAUSTINO, 1927: 240-241, pl. 77, figs 1-2. — UMBROVE, 1950: 648-650, pl. 82, figs 1-10, pl. 83, fig. 7. — ZIBROWIUS & GRYGIER, 1985: 128, figs 39-42. — ZOU *et al.*, 1988: 195. — CAIRNS, 1991: 24-25, pl. 10, figs i-j, pl. 11, figs a-b; 1994: 84-85, pl. 36, figs e, h, pl. 37, fig. i (synonymy); 1995: 121-122, pl. 41, figs c-h (synonymy). — CAIRNS & KELLER, 1993: 276.

Endopachys weberi Alcock, 1902a: 109-110 [new synonym].

Endopachys sp. - VAN DER HORST, 1922: 68, pl. 8, fig. 4 (same specimen as ALCOCK's *E. weberi*).

MATERIAL EXAMINED. — *Philippines*. "Albatross": stn 5133, 6 (USNM 97610). — Stn 5268, 1 (USNM 97611). — Stn 5357, 1 (USNM 97612). — Stn 5593, 1 (USNM 97613).

MUSORSTOM 1: stn 57, 2 (USNM 97614).

MUSORSTOM 2: stn 29, 1 (MNHN).

MUSORSTOM 3: stn 102, 1 (MNHN). — Stn 131, 3 (MNHN).

Indonesia. "Siboga": stn 51, 1 (holotype of *E. weberi*, ZMA Coel. 7734).

DEKI: stn 49, 2 (NNM 22714). — Unnumbered station, Ambon, 25-100 m, 3 (NNM 22715-17).

MORTENSEN'S JAVA-S.A. EXPEDITION: stn 5, 6 (ZMUC). — Stn 6, 4 (ZMUC). — Stn 8, 1 (ZMUC).

KARUBAR: stn 2, 1 (USNM 97616).

TYPE LOCALITY. — Unknown.

DIAGNOSIS. — Attached young stage rarely observed (holotype of *E. weberi*). Species best known from the unattached flabellate corallum, which results from budding. Corallum triangular in face view, the edge angle (exclusive of lateral crests) 50°-80° and the face angle changing from a narrow 15°-28° basally to a more open 42°-57° distally. Largest known specimen 38.9 mm in GCD and 34 mm in height (CAIRNS & KELLER, 1993); largest Philippine corallum (MUSORSTOM 2 stn 29) 12.3 x 16.9 mm in calicular diameter and 15.2 mm in height. Edge crests delicate, about 0.5 mm in thickness and up to 4 mm in height, occasionally bearing 1 or more small buds. Costae and intercostal spaces not well defined; costae unridged. Septa hexamerally arranged in 5 cycles in a Pourtalès plan. S₁₋₂ up to 2.5 mm exsert. Pairs of S₅ within each quarter-system fuse before their common S₄, bearing a paliform lobe at this junction. Fossa deep; columella elongate, nondiscrete, and spongy.

REMARKS. — The face angle of *E. grayi* is low initially and broadens with height, whereas that of *E. bulbosa* is high as a juvenile and decreases with height. Other difference between the only two Recent species in this genus are given in the Remarks of *E. bulbosa*. A more complete description and illustrations of *E. grayi* are found in CAIRNS (1991, 1994, 1995).

DISTRIBUTION. — *Philippines*: Lubang Island; Verde Island Passage; Sulu Sea (west of Panay, Zamboanga Peninsula, and Balabac Island); 70-192 m. *Indonesia*: Halmahera Sea; Banda Sea (Kai and Ambon Islands); Bali Sea

(Bali Strait and Madura Bay); 50-245 m. *Elsewhere*: Malaysia (Celebes Sea off Sabah); common in tropical and warm temperate regions from southwest Indian Ocean to the Gulf of California, including South China Sea, Japan, New Zealand, and the Hawaiian Islands; 37-386 m.

Endopachys bulbosa sp. nov.

Figs 27 a-g

MATERIAL EXAMINED/TYPES. — **Indonesia**. KARUBAR: stn 62, holotype and 1 paratype (MNHN) and 1 paratype (USNM 97617). — Stn 67, 1 paratype (USNM 97618). — Stn 79, 1 paratype (MNHN).

TYPE LOCALITY. — KARUBAR stn 62: 9°02'10"S, 132°43'05"E (Arafura Sea southeast of Tanimbar Islands), 239-250 m.

ETYMOLOGY. — The species name (Latin *bulbosa*, bulbous or swollen) refers to the thick basal pads on the corallum base.

DESCRIPTION. — Corallum unattached, flabellate (GCD:LCD = 1.32-1.41), and massive, the largest specimen (the holotype) 33.7 x 45.7 mm in calicular diameter and 38.5 mm in height. Shape of corallum varies characteristically with age, the theca of lower 1/3 to 1/2 of a large corallum being exceptionally thick (up to 4 mm) and having an edge angle of 142°-155° and a face angle of 90°-104°. However, 10-14 mm above base the theca thins to about 1 mm, the edge angle decreases to 50°-55°, and the face angle to 40°-45°. Edge costae crested as high as 7 mm, being 1.5 mm thick on lower corallum. All 12 C₁₋₂ highly ridged (up to 1.7 mm) in upper corallum, but flat and very broad in region of basal thickening, the C₁ being as much as 8 mm wide, the C₂ as much as 1.5 mm wide. C₃₋₄ of thickened region only 0.3-0.5 mm wide; C₃₋₅ of upper theca poorly defined. Asexual budding not observed in type series.

Septa hexamerally arranged in 5 cycles. S₁₋₂ highly exsert (up to 5 mm), with thick (2 mm) upper edges and straight inner edges that attain the columella. S₃ not exsert, about 2/3 width of an S₁₋₂, their inner edges extending almost to columella. S₄ rudimentary, each S₄ flanked by a pair of S₅ that fuse before the S₄ and extend to the columella as 1 septum where each fuses with the other S₅ within its half-system. No paliform lobes. Fossa of moderate depth. Columella an elongate, discrete structure composed of many short lamellae swirled in a clockwise direction.

REMARKS. — The massive basal thecal thickening of this species is solid, not the exterior of an overly enlarged internal cavity, and thus has the effect of weighting the corallum as though with ballast, which might facilitate an upright or near-upright posture for the corallum. This basal thickening is not a characteristic of all larger coralla of *Endopachys*, since large coralla of *E. grayi* H. Milne Edwards & Haime, 1848, of GCD 40 mm do not have it. *E. bulbosa* also differs from *E. grayi* in having: well-defined, ridged C₁₋₂; much more exsert S₁₋₂; a larger discrete, convex columella; and in lacking paliform lobes. *E. maclurii* (Lea, 1833), known from the Eocene of southeastern U.S., has 6 strongly produced C₁, but nothing resembling the basal thickening of *E. bulbosa*.

DISTRIBUTION. — *Indonesia*: Arafura Sea (south and southeast of Tanimbar Islands); 233-251 m.

Genus *LEPTOPSAMMIA* H. Milne Edwards & Haime, 1848

Leptopsammia stokesiana H. Milne Edwards & Haime, 1848

Figs 26 g-i

Leptopsammia stokesiana H. Milne Edwards & Haime, 1848b: 90, pl. 1, figs 4, 4a. — VAN DER HORST, 1922: 68, pl. 8, fig. 5. — FAUSTINO, 1927: 242, pl. 77, figs 3-4.

Balanophyllia stokesiana - SEARLES, 1956: 25, pl. 42, fig. c.

MATERIAL EXAMINED. — **Philippines.** MORTENSEN'S PACIFIC EXPEDITION: Jolo Island, Sulu Archipelago, 46 m, 19 March 1914, 1 (NNM). Holotype, (BMNH 1855.12.27.1).

Strait of Malacca. Malacca, depth unknown, BELCHER collection, 1 (BMNH 1842.11.28.10).

TYPE LOCALITY. — Philippines (depth not given).

DESCRIPTION (Philippine specimen). — Corallum elongate-conical, straight, and firmly attached by a broad pedicel: 7.3 x 9.1 mm in calicular diameter, 13.0 mm in height, and 4.6 mm in pedicel diameter. Porous theca covered with low, rounded, granular costae; no epitheca. Septa hexamerally arranged in 5 cycles, the 5th incomplete (a total of 54 septa): $S_{1-2} > S_3 > S_4 > S_5$. S_{1-2} nonexsert, having straight, smooth, vertical inner edges that attain the columella. S_3 about 3/4 width of S_{1-2} , having straight, finely dentate inner edges. S_4 about 1/3 width of S_3 , having lacinate inner edges. S_5 rudimentary. Columella discrete, composed of several tightly-fused and twisted elements.

REMARKS. — Only 5 specimens of this species are known: the holotype (BMNH 1855.12.27.1, GCD = 10 mm), a specimen reported by VAN DER HORST (1922) deposited at the ZMA (GCD = 17.6 mm), one reported by SEARLE (1956) deposited at the USNM (78603), and the 2 specimens noted above. All 5 specimens are remarkably similar in morphology.

DISTRIBUTION. — *Philippines*: Sulu Archipelago; 46 m. *Indonesia*: Flores Sea (Sumbawa); 69 m. *Elsewhere*: Malacca; depth unknown.

Leptosammia crassa van der Horst, 1922

Figs 27 h-i

Leptosammia crassa van der Horst, 1922: 69, pl. 8, figs 11-12.

MATERIAL EXAMINED. — **Philippines.** "Albatross": stn 5130, 1 (USNM 97621).

Indonesia. "Siboga": stn 258, holotype (ZMA Coel. 8462).

TYPE LOCALITY. — "Siboga" stn 258: 5°26.6'S, 132°32.4'E (Kai Islands, Banda Sea), 22 m.

DIAGNOSIS (specimen from "Albatross" stn 5130). — Corallum 10.3 x 8.6 mm in calicular diameter, 9.7 mm in height, and 4.2 mm in pedicel diameter. Costae not well-defined. Porous theca 0.7 mm thick; no epitheca. Septa hexamerally arranged in 4 cycles according to formula: $S_{1-2} > S_3 >> S_4$. S_{1-2} nonexsert, having straight, vertical, smooth inner edges. S_3 2/3 width of S_{1-2} , having lacinate inner edges. S_4 rudimentary, having lacinate inner edges that do not fuse with adjacent septa. Fossa of moderate depth, containing a small elongate columella composed of several twisted elements.

REMARKS. — The "Albatross" specimen was compared directly to the holotype (ZMA Coel. 8462) and considered to be conspecific despite several differences. The "Albatross" specimen is slightly smaller, has thinner theca, and has fewer septa, the holotype having a septal complement of: 15:15:30 (60 septa), which is thought to be an aberration of a hexamer plan. Most other characters are the same.

Leptosammia crassa differs from *L. poculum* (Alcock, 1902) (Figs 28 a-b), in having indistinct costae (the C_{1-2} of *L. poculum* are slightly raised) and in having a stouter corallum. *L. stokesiana* H. Milne Edwards & Haime, 1848, appears to differ from *L. crassa* in having some S_5 and a costate theca. However, so few specimens of *Leptosammia* are known from the Indo-Pacific that a clear distinction among species is wanting.

DISTRIBUTION. — *Philippines*: Sulu Sea (Zamboanga Peninsula); 187 m. *Indonesia*: Banda Sea (Kai Islands); 22 m.

Genus *ENDOPSAMMIA* H. Milne Edwards & Haime, 1848*Endopsammia philippensis* H. Milne Edwards & Haime, 1848

Figs 28 c-e

- Endopsammia philippensis* H. Milne Edwards & Haime, 1848b: 91, pl. 1, figs 5, 5a; 1860: 108. — FAUSTINO, 1927: 243-244, pl. 77, figs 5-6. — PILLAI & SCHEER, 1976: 71-72.
Thecopsammia regularis Gardiner, 1899: 169-170, pl. 19, fig. 8.
Balanophyllia regularis - VAN DER HORST, 1922: 63; 1926: 50, pl. 3, figs 10-11.
Endopsammia philippinensis (sic) - WELLS, 1964: 118, pl. 2, figs 12-13. — CAIRNS, 1991: 26. — CAIRNS & KELLER, 1993: 221.

MATERIAL EXAMINED. — **Philippines.** Holotype, BMNH 1855.12.27.25.

Indonesia. DEKI: unnumbered station, Damar Besar Island, Jakarta Bay, 4 (NNM 17518). — Unnumbered station, Nyamuk Kecil Island, Jakarta Bay, 4 (NNM 17519). — Unnumbered station, Nuhucut Island, Kai Islands, 2-3 m, 5 (NNM 17520). — Unnumbered station, Sebesi Island, Lampung, Sumatra, Sunda Strait, 33 (NNM 17521).

SNELLIUS 1: Potilyan Island, Pelokang, southwestern Sulawesi, 3 (NNM 17613).

SNELLIUS 2: stn 4.070, 2 (NNM 17517).

Papua New Guinea: "Alpha Helix": stn M26, 1 (USNM 86818). — Stn M48, 2 (USNM 80018). — Stn M59, 1 (USNM 88322).

Australia: Heron Island, Queensland, intertidal, 2 (USNM 83006).

TYPE LOCALITY. — Philippines (depth not given).

DESCRIPTION. — Corallum subcylindrical and relatively small, the largest known specimen (USNM 83006) 8.4 x 9.3 mm in calicular diameter and 7.7 mm in height. Calice only slightly elliptical (GCD:LCD = 1.05-1.15); pedicel robust (PD:GCD = 0.68-0.77). Lower 3/4 of corallum usually covered with a thin epitheca, which is often encrusted by algae or foraminifera. Theca near calicular edge highly porous and usually not costate.

Septa hexamerally arranged in 4 cycles but pairs of S₄ often missing in smaller specimens. S₁ about 0.8 mm exsert, having a smooth upper edge, which is dentate adjacent to columella. S₂ less exsert, 1/2 to 2/3 width of an S₁, having slightly coarser inner edge dentition. S₃ almost as wide as S₂, having coarse to lacinate inner edges, each pair of S₃ within a half-system bending toward its common S₂ and forming a loose fusion with that septum adjacent to columella. S₄ rudimentary, usually represented by only a row of tall spines that project from inner theca. Fossa shallow to moderate in depth. Columella a well-developed, elliptical, spongy mass; nondiscrete, often with a slightly concave upper surface.

REMARKS. — H. MILNE EDWARDS & HAIME (1848b) undoubtedly intended to name this species *philippinensis* (for the Philippine Islands), not *philippensis* (for Philippe), but according to the ICZN (Article 32cii), the original spelling cannot be changed.

DISTRIBUTION. — *Philippines*: unspecified locality and depth (H. MILNE EDWARDS & HAIME, 1848b). *Indonesia*: Banda Sea (Kai Islands); Flores Sea (Lintah Strait and Pelokang Island); Java Sea (Jakarta Bay); 2-10 m. *Elsewhere*: tropical Indian Ocean; Loyalty Islands (Lifu); Queensland; Papua New Guinea (Bismarck, Solomon, and Coral Seas); 0-73 m.

Genus *RHIZOPSAMMIA* Verrill, 1870*Rhizopsammia verrilli* van der Horst, 1922

Figs 28 f-g

- Rhizopsammia verrilli* van der Horst, 1922: 64-65, pl. 8, figs 1-2. — ?WELLS, 1983: 241-242. — CAIRNS, 1991: 25, pl. 11, figs C-E (synonymy).

Dendrophyllia gracilis - CAIRNS, 1991: 23 (in part: USNM 78535). [Not *Dendrophyllia gracilis* H. Milne Edwards & Haime, 1848].

MATERIAL EXAMINED. — **Philippines:** Cocos Island, 18 km east of Zamboanga, 6 m, 4 colonies (USNM 78534). **Indonesia.** SNELLIUS 1: unnumbered station, Binongko, Tukangbesi Islands, 6-10 m, 7 March 1930, 1 colony (NNM 22749).

West Pacific: Ngell Channel, Palau, 9 m, 3 colonies (USNM 78636).

TYPE LOCALITY. — "*Siboga*" stns 220 and 282: Indonesia, 54-278 m.

DIAGNOSIS. — Colony reptoid, most corallites well separated from one another but interconnected by costate stolons semi-circular in cross section, up to 6 mm in width, 1-3 stolons issuing from base of each attached corallite. Additional corallites also bud from theca of erect corallites. Corallites up to 45 mm in height and 9 mm in GCD. Costae equal and well defined; intercostal spaces highly porous. Septa hexamerally arranged in 5 cycles, the 5th cycle always incomplete. S₁₋₂ independent; septa arranged in a well-developed Pourtalès plan. Inner edges of highest cycle septa lacinate. Fossa deep; columella discrete and spongy.

REMARKS. — The distinctive basal stolons distinguish this genus from other dendrophylliid genera, and the large size of the corallites distinguish *R. verrilli* from the other Indonesian species, *R. minuta* van der Horst, 1922 and *R. nuda* van der Horst, 1926. It differs from the central Pacific *R. chamissoi* Wells, 1954, in having larger corallites with more septa. Previously reported specimens of *R. verrilli* had not been known to have corallites budding from the theca of other corallites, which led CAIRNS (1991) to identify at least one colony as *Dendrophyllia gracilis*, the latter species having budding from both corallite edges as well as a common basal coenosteum.

As VAN DER HORST (1922) cautioned, a corallite of *R. verrilli* broken from its base could easily be mistaken for a species of *Balanophyllia* or a *Cladopsammia*. Thus, complete coralla are required for accurate identification. A more complete description of this species is given by CAIRNS (1991).

DISTRIBUTION. — **Philippines:** Sulu Sea (Zamboanga); 6 m. **Indonesia:** Banda Sea (Timor and Tukangbesi Islands); 5-278 m. **Elsewhere:** Gulf of Thailand; Palau; Galápagos Islands; Cocos Island (eastern Pacific); 6-20 m.

Rhizopsammia nuda van der Horst, 1926

Rhizopsammia nuda van der Horst, 1926: 50-51, pl. 2, figs 10-12.

Rhizopsammia (?) *minuta*- GARDINER & WAUGH, 1939: 241. [Not *Rhizopsammia minuta* van der Horst, 1922].

MATERIAL EXAMINED. — **Philippines.** Marigondon Cave, Mactan Island, Cebu, 25-30 m, 1 colony (NNM 17526).

Indonesia. DEKI: stn 74, 1 colony (NNM 17503, 22779). — Stn 104, many corallites (NNM 17504, 22780).

SNELLIUS 2: stn 4.100, 2 corallites (NNM 17511). — Stn 4.105, 1 colony (NNM 22783).

TYPE LOCALITY. — Singapore, South China Sea (depth not given).

DIAGNOSIS. — Colony reptoid, corallites united basally by thin (2.0-2.5 mm wide), flat stolons. Corallites elongate-conical, up to 10 mm in height and 5 mm in GCD. Calice elliptical. Theca porous; no epitheca. Septa hexamerally arranged in 4 cycles in a Pourtalès plan. Inner edges of S₁₋₂ dentate. No paliform lobes; columella spongy.

REMARKS. — *Rhizopsammia nuda* is similar to *R. minuta* van der Horst, 1922 (Fig. 28 h), the only apparent difference being that the corallites of *R. nuda* are about twice as tall as those of *R. minuta*. Although VAN DER HORST described both species, he did not compare them. A syntype of *R. nuda* is deposited at the ZMA (Coel. 5525) and 3 more colonies labelled as syntypes are deposited at the BMNH (1939.7.20.852, 853, and 855). This accounts for 4 of the 5 colonies mentioned in the original description.

DISTRIBUTION. — *Philippines*: Mactan Island, Cebu; 25-30 m. *Indonesia*: Lindah Strait (between Flores and Sumbawa); Java Sea (Sunda Strait); 30-105 m. *Elsewhere*: Singapore (type locality, 9-22 m); Tanzania; 113-220 m (GARDINER & WAUGH, 1939).

Genus *EGUCHIPSAMMIA* Cairns, 1994

Eguchipsammia gaditana (Duncan, 1873)

Balanophyllia gaditana Duncan, 1873: 333.

Balanophyllia fistula - VAN DER HORST, 1922: 59 (in part, "*Siboga*": stn 310). [Not *Balanophyllia fistula* Alcock, 1902].

Dendrophyllia gaditana - CAIRNS, 1979: 181-182, pl. 36, figs 5-10 (synonymy). — ZIBROWIUS, 1980: 176-178, pl. 89, figs A-N (synonymy). — CAIRNS & KELLER, 1993: 279-280.

Eguchipsammia gaditana - CAIRNS, 1994: 85-86, pl. 37, figs d-f, h; 1995: 122-123, pl. 42, figs a-c.

MATERIAL EXAMINED. — **Philippines**. "*Albatross*": stn 5249, 4 branches (USNM 97622).

Indonesia. "*Siboga*": stn 310, 1 (ZMA).

DEKI: stn 73, 4 (NNM 22750).

KARUBAR: stn 18, 10 branches (MNHN).

TYPE LOCALITY. — "*Porcupine*" stn 29: 36°20'20"N, 6°47'W (Ibero-Moroccan Gulf), 417 m.

DIAGNOSIS. — Corallum consists of an elongate, cylindrical axial corallite from which secondary corallites bud at right angle. Axial corallite unattached to substratum and often irregularly bent. Although some coralla achieve a length of 53 mm (CAIRNS, 1994) and a GCD of 5.5 mm (ZIBROWIUS, 1980), the specimens reported above are smaller, the longest only 15 mm and the calicular diameter ranging from 2-3 mm. Theca usually covered with a thin epitheca giving lower corallum a porcellanous texture. Septa arranged in 3-4 cycles (depending on calicular diameter) in a Pourtalès plan. S₁ independent; each pair of S₃ fuse before its common S₂ high in the fossa. Columella a small, nondiscrete, concave, spongy mass.

REMARKS. — *Eguchipsammia gaditana* is described and figured in greater detail by ZIBROWIUS (1980) and CAIRNS (1979, 1994, 1995). It is compared to *E. wellsi* in the account of that species.

DISTRIBUTION. — *Philippines*: Davao Gulf; 42 m. *Indonesia*: Banda Sea (Kai Islands); Flores Sea (Sumbawa); Java Sea (Sunda Strait); 30-212 m. *Elsewhere*: widespread in tropical and temperate regions of world oceans, except for eastern Pacific, but including north of New Zealand and Japan; 57-988 m.

Eguchipsammia wellsi (Eguchi, 1968)

Dendrophyllia (Alcockia) wellsi Eguchi, 1968: C63-64.

Eguchipsammia wellsi - CAIRNS, 1994: 86-87, pl. 37, figs a-c, g (synonymy).

MATERIAL EXAMINED. — **Philippines**. "*Albatross*": stn 5248, 5 (USNM 97624). — Stn 5249, 2 (USNM 97625). — Stn 5357, 2 (USNM 97626).

MUSORSTOM 3: stn 137, 3 (MNHN). — Stn 142, 1 (MNHN).

TYPE LOCALITY. — "*Soyo Maru*" stn 210: 33°29'N, 135°28'E (Kii Peninsula, Honshu, Japan), 165 m.

DIAGNOSIS. — Corallum similar in shape to that of *E. gaditana*. Largest specimen reported herein ("*Albatross*" stn 5248) 44 mm in length and 4.3 mm in GCD, which is typical for the species. Theca costate; no epitheca. Septa hexamerally arranged in 3-4 cycles (up to 36 septa) in a Pourtalès plan. Inner edges of S₃₋₄ smooth. Columella a discrete, convex structure composed of numerous small lamellae.

REMARKS. — Although similar to *E. gaditana* (Duncan, 1873) in corallum shape, *E. wellsii* differs in having a discrete, convex columella; having smooth inner septal edges that do fuse among themselves at a lower level in the fossa; and in lacking epitheca. The species is more fully described and illustrated by CAIRNS (1994).

DISTRIBUTION. — *Philippines*: Sibuyan Sea; Visayan Sea; Davao Gulf; Sulu Sea (Balabac Island); 32-124 m. *Elsewhere*: Japan (Honshu, Kyushu, and northern Ryukyu Islands); 110-196 m.

Genus *CLADOPSAMMIA* Lacaze-Duthiers, 1897

Cladopsammia echinata Cairns, 1984

Fig. 29 d

Cladopsammia echinata Cairns, 1984: 26-27, pl. 5, figs F-G.

MATERIAL EXAMINED. — **Indonesia**. KARUBAR: stn 86, 2 colonies: 1 (MNHN), 1 (USNM 97628).

TYPE LOCALITY. — SANGO 2 stn 4: 21°48'N, 160°09.1'W (Hawaiian Islands), 298-408 m.

DIAGNOSIS. — Corallum irregularly and densely branched, resulting in a bushy clump of corallites. The attachments of the colonies reported above are missing, all corallites budding from the theca of parent corallites and occasionally merging with one another. Larger KARUBAR colony reported above 8 cm in height, 9 cm across, and 5 cm deep, consisting of about 120 corallites. Corallites elongate-conical to subcylindrical, and elliptical in cross section, ranging from 3.2 to 8.4 mm in GCD. C₁₋₂ ridged near calice; otherwise theca uniformly covered with small (0.15 mm height), slender, pointed spines, which are particularly well developed near pedicel and bases of corallites. Septa hexamerally arranged in 4 complete cycles in a Pourtalès plan, the S₁₋₂ independent. Paliform lobes absent. Columella spongy and relatively small.

REMARKS. — Species previously known only from the Hawaiian Islands; original description more detailed.

DISTRIBUTION. — *Indonesia*: Arafura Sea (south of Tanimbar Islands); 222-226 m. *Elsewhere*: Hawaiian Islands (Kauai, Nihoa, and Brooks Banks); 295-470 m.

Genus *DENDROPHYLLIA* Blainville, 1830

Dendrophyllia sp. cf. *D. ijimai* Yabe & Eguchi, 1934b

Fig. 29 e

Dendrophyllia minuscula - VAN DER HORST, 1922: 51-52, pl. 8, fig. 30. [Not *Dendrophyllia minuscula* Bourne, 1905].
Dendrophyllia sp. - ZIBROWIUS & GRYGIER, 1985: 123, 126, figs 22-23.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 2: stn 33, 1 branch (MNHN).

MUSORSTOM 3: stn 117, 2 branches (MNHN).

Indonesia. "Siboga": stn 49a, 1 (ZMA Coel. 5407, *D. minuscula* of VAN DER HORST, 1922).

KARUBAR: stn 30, 6 colonies: 3 (MNHN), 3 (USNM 97629).

Tasman Sea. "Tangaroa": stn Q47, 3 colonies (USNM 94236).

DESCRIPTION. — Coralla relatively small (up to 90 mm in height), consisting of a continuous, vertical, slender (pedicel diameter 8 mm), founder axial corallite from which a variable number of secondary corallites bud at right angle around circumference. Short tertiary buds occasionally form from the secondaries. Largest Indonesian

colony (KARUBAR stn 30) 8 cm in height, bearing 16 corallites, the axial corallite tapering from 6.1 mm in basal diameter to 3.4 mm distally. Corallites slightly elliptical in cross section and 3.2-5.8 mm in GCD, the axial calices usually being the largest. Costae well developed, about 0.35 mm wide, and slightly convex; theca porous near calicular edge.

Septa hexamerally arranged in 4 cycles, the 4th cycle complete usually only in axial corallites; other corallites have 36-42 septa, pairs of S₄ often missing from various half-systems. S₁ exsert (up to 0.7 mm), having smooth lower, inner edges that reach the columella. S₂ not exsert, 3/4 width of an S₁, also having smooth inner edges. S₃ small, each flanked by a pair of S₄ that meet, fusing before inner edge of their common S₃ and extend as 1 septum to the columella. Inner edges of all septa entire, not lacinate or dentate. Fossa of moderate depth, containing a large discrete columella composed of tightly fused, swirled lamellae.

REMARKS. — This species belongs to a group (see CAIRNS, 1994) of about 5 species within the genus *Dendrophyllia* characterised by having arborescent colonies with most budding occurring perpendicularly from a central axial corallite: *D. ramea* (Linnaeus, 1758); *D. minuscula* Bourne, 1905; *D. indica* Pillai, 1967; *D. velata* Crossland, 1952; and *D. ijimai* Yabe & Eguchi, 1934. Its growth form, calicular diameter, and septal number is similar to *D. ijimai*, but because its corallites are uniformly 1-2 mm smaller in diameter and because the type of *D. ijimai* is not available for comparison, only a tentative identification is suggested.

DISTRIBUTION. — *Philippines*: Verde Island Passage; Mindoro Strait; 97-130 m. *Indonesia*: Banda Sea (Kai Islands); Flores Sea; 69-111 m. *Elsewhere*: Taupo Seamount, Tasman Sea; 135 m. *D. ijimai* is known from Japan and the western Indian Ocean; 10-366 m (CAIRNS & KELLER, 1993).

Dendrophyllia arbuscula van der Horst, 1922

Figs 29 a-c

Dendrophyllia micranthus - VAN DER HORST, 1922: 50 (in part: "Siboga" stn 277). [Not *Oculina micranthus* Ehrenberg, 1834].

Dendrophyllia arbuscula van der Horst, 1922: 53 (in part: "Siboga" stn 277; pl. 8, fig. 6). — EGUCHI, 1968: C55-56, pl. C21, figs 5, 13. — PILLAI & SCHEER, 1974: 462, fig. 7a. — BETTERTON, 1981: 242, figs 197-198. — CAIRNS, 1994: 90-91, pl. 38, figs i-l (synonymy); 1995: 125-126, pl. 43, figs e-f.

Dendrophyllia subcornigera Eguchi, 1968: C64, pl. C32, figs 3-4.

Dendrophyllia subcornigera cylindrica Eguchi, 1968: C64-65, pl. C32, figs 1-2.

Dendrophyllia horsti Gardiner & Waugh, 1939: 237-238, pl. 2, figs 5-6.

? *Dendrophyllia erecta* Nemenzo, 1960: 19, pl. 10, fig. 1.

Dendrophyllia sp. cf. *D. horsti* - CAIRNS & KELLER, 1993: 278, pl. 13, figs F, I.

Not *Dendrophyllia arbuscula* - SCHEER & PILLAI, 1974: 64.

MATERIAL EXAMINED. — **Philippines**. "Albatross": stn 5279, 6 colonies (USNM 97630). — Stn 5280, 2 colonies (USNM 97631).

MUSORSTOM 3: stn 131, 7 (MNHN).

Indonesia. "Siboga": stn 277, 1 (ZMA).

DEKI: stn 3, many colonies: (ZMA Coel. 7344), 2 (USNM 97633). — Stn 7, 2 colonies (NNM 22677). — Stn 24, 1 (NNM 22678).

KARUBAR: stn 86, 6 colonies: 2 (MNHN), 4 (USNM 97632).

TYPE LOCALITY. — "Siboga" stns 260 and 277: Banda Sea, 45-90 m.

DIAGNOSIS. — Corallum dendroid, attached by a thick base, which firmly anchors the primary axial corallite. A variable number of secondary corallites bud at right angle to the axial, and tertiary corallites may also be present. The early colony stage, represented by the axial and several secondary corallites, was described as *D. horsti* by GARDINER & WAUGH (1939), but the more fully developed colony containing secondary and tertiary branches was first illustrated by VAN DER HORST (1922: pl. 8, fig. 6) as the typical form. When secondary and tertiary corallites are elongate (up to 5 cm) a more open corallum results, described as *D. subcornigera cylindrica*

by EGUCHI (1968). The largest Philippine specimen ("*Albatross*" stn 5279) is a highly branched corallum (as illustrated by VAN DER HORST, 1922) 7 cm wide, 5.5 cm in height, and 13.4 mm in pedicel diameter, consisting of 20 corallites. Corallites elliptical in cross section: up to 12.2 mm in GCD. Costae broad (0.6-0.7 mm), flat, and quite porous, separated by narrow (0.1 mm), shallow intercostal striae. Edge zone extends only about 1 cm below calicular edge, below which the theca is usually encrusted. Septa hexamerally arranged in 4 cycles in a Pourtalès plan, the septa of the first 2 cycles independent and exsert. Fossa shallow, containing a well-developed, well-delimited, compact columella consisting of many small lamellae that are tightly fused together in a clockwise swirl. Columella massive, up to 3 mm in width, and often constricted into a central and 2 narrower lateral parts by the 4 lateral S_1 .

REMARKS. — VAN DER HORST's (1922, pl. 8, fig. 6) illustrated specimen from "*Siboga*" stn 277 (ZMA Coel. 5477) is a colony 80 mm in height bearing corallites 5-6 mm in GCD. One of the other 2 syntypes from "*Siboga*" stn 260 (ZMA Coel. 1254) is *Eguchipsammia fistula*. We therefore designate the specimen from "*Siboga*" stn 277 as the lectotype, the 2 from "*Siboga*" stn 260 as paralectotypes.

In their description of *D. horsti*, GARDINER & WAUGH (1939) noted its resemblance to *D. arbuscula*, assuming that their colonies were "genetic dwarfs" in comparison. The growth series represented in "*Albatross*" stn 5279 suggests that it is more likely that *D. horsti* simply represents the early growth stage of a larger colony.

Dendrophyllia arbuscula belongs to CAIRNS' (1994) "second group" of *Dendrophyllia* species, i.e., species having relatively small, bushy colonies with irregular branching from an axial corallite. The *horsti*-stage of this species is more fully described by CAIRNS (1994).

DISTRIBUTION. — *Philippines*: Lubang Island; Sulu Sea (west of Panay; ? Luminosa Island); 122-353 m. *Indonesia*: Banda Sea (Kai, Damar, and Barat Daya Islands); 45-245 m. *Elsewhere*: southwestern Indian Ocean to Strait of Malacca; northern New Zealand region (Norfolk and Kermadec Islands); Japan (Honshu, East China Sea); 40-259 m.

Dendrophyllia alcocki (Wells, 1954)

Sclerhelia alcocki Wells, 1954: 465-466, pl. 177, figs 1-2.

Dendrophyllia palita Squires & Keyes, 1967: 28-29, pl. 6, figs 9-10.

Dendrophyllia alcocki - ZIBROWIUS, 1974a: 570-573, figs 10-14. — CAIRNS, 1995: 126-127, pl. 43, figs g-i, pl. 44, figs a-b (synonymy).

MATERIAL EXAMINED. — *Indonesia*. "*Albatross*": stn 5586, 1 fragment (USNM 97635).

KARUBAR: stn 18, 2 fragments (MNHN).

South China Sea. "*Albatross*": stn 5311, 1 fragment (USNM 97634).

"*Hakuho Maru*": stn KH73-2-44-2, 1 branch (USNM 97636).

TYPE LOCALITY. — Bikini Atoll, Marshall Islands, 177-243 m.

DIAGNOSIS. — Uniplanar or arborescent colonies formed by regular, extratentacular, sympodial branching. Potential growth to at least a height of 11 cm (CAIRNS, 1995). Specimens reported above only small branch fragments, each about 1 cm in length comprising only 4 or 5 corallites, with calices 4-5 mm in diameter. Coenosteum dense and solid, slightly porous only near calicular edge. Theca covered with blunt spines that are usually aligned on branch axis. Septa hexamerally arranged in 3 complete cycles: $S_1 > S_2 \geq S_3$. Each pair of S_3 meets before its common S_2 to form a large palus (P_2). Columella spongy.

REMARKS. — According to the partial revision of the genus (CAIRNS, 1994), *D. alcocki* is one of at least 8 species in the "third group", characterised by having large, sympodially branched coralla. *D. alcocki* is more fully described and figured by CAIRNS (1995).

DISTRIBUTION. — *Indonesia*: Celebes Sea (Darvel Bay); Banda Sea (Kai Islands); 205-616 m. *Elsewhere*: Maldives; throughout New Zealand region; Tasman Sea; New Caledonia region; Solomon Islands; Marshall Islands; South China Sea (north of Pratas Islands); 118-570 m.

Genus *ENALLOPSAMMIA* Michelotti, 1871*Enallopsammia pusilla* (Alcock, 1902)

Fig. 29 f

Dendrophyllia (*Coenopsammia*) *pusilla* Alcock, 1902a: 113; 1902c: 44, pl. 5, figs 38, 38a.*Dendrophyllia* (*Coenopsammia*) *profunda* - ALCOCK, 1902c: 43. [Not *Diplohelina profunda* Pourtalès, 1867].*Coenopsammia profunda* - MARENZELLER, 1904a: 313-314, pl. 18, fig. 24. [Not *Diplohelina profunda* Pourtalès, 1867].*Enallopsammia marenzelleri* Zibrowius, 1973: 49-51 (in part: pl. 1, figs 1-7, only Indo-Pacific specimens, including holotype); 1980: 204-205 (in part: only Indo-Pacific specimens) [new synonym].*Enallopsammia* sp. cf. *E. marenzelleri* - CAIRNS, 1982: 57-58, pl. 18, figs 5-6; 1995: 128-129, pl. 44, figs g-h.

MATERIAL EXAMINED. — **Philippines.** "Siboga": stn 95, holotype and paratype of *D. pusilla* (ZMA Coel. 1196, 589, respectively).

"Hakuho Maru": stn KH72-1-20, 4 branches (USNM 97638).

Indonesia. "Siboga": stn 266, holotype and paratype of *E. marenzelleri* (ZMA Coel. 6902, 588, respectively).

DEKI: stn 1, 4 branches (ZMUC), 6 branches (NNM 22735). — Stn 12, 1 (NNM 22739). — Stn 59, 2 (BMNH 1939.7.20.316), 10 (NNM 22736, 22740). — Stn 61, 1 (NNM 22737).

SNELLIUS 2: Stn 4.144, 1 (NNM).

KARUBAR: stn 25, 7 colonies: 5 (MNHN), 1 (POLIPI), 1 (USNM 97640).

South China Sea: "Albatross": stn 5317, 3 branches (USNM 97637).

"Hakuho Maru": stn KH73-2-44-2, 8 branches: 6 (USNM 97639), 2 (ORI).

TYPE LOCALITY. — "Siboga" stn 95 (5°43.5'N, 119°40'E (Sulu Archipelago, Philippines), 522 m.

DESCRIPTION. — Extratentacular budding (and branching) occurs in an irregular manner leading to a massive, irregularly shaped colony with occasional branch anastomosis. Budding often sympodial on distal, small-diameter branches, but buds may occur on all branch faces, producing a 3-dimensional corallum. Largest known colony (KARUBAR stn 25) 160 mm in height and 290 mm in width, consisting of 7 main vertical branches originating from a common base 27 mm in diameter. Corallites slightly elliptical (GCD:LCD = 1.02-1.24), up to 4.7 mm in GCD, standing up to 3 mm above branch coenosteum. Costae convex and well developed over entire branch coenosteum. On small-diameter branches, costae about 0.3 mm wide, bearing only 1 costal spine across their width, and are flanked by deep, highly porous intercostal striae about 0.2 mm wide. On large-diameter branches, costae are broader (up to 0.6 mm), bear 2 or 3 small spines across their width, and are flanked by narrower (about 0.1 mm), less porous intercostal striae. Intercostal pores of large-diameter branches gradually filled in with stereome, resulting in a very dense corallum.

Septa hexamerally arranged in 3 cycles in an indistinct Pourtalès plan. All septa nonexsert. S₁ independent and quite narrow (about 0.5 mm), having smooth inner edges that reach the columella. S₂ equal to S₁ in size and shape. S₃ narrower than S₁₋₂, having dentate inner edges, each pair of S₃ within a system bending toward its common S₂ and fusing with that septum near the columella. Fossa deep and spacious. Columella a circular, concave, nondiscrete, spongy mass.

REMARKS. — *Enallopsammia pusilla* was described on the basis of what now appear to be 2 relatively short distal branches of a larger corallum - a total of 25 corallites (see ZIBROWIUS, 1973). Additional larger specimens are now available from near to the type locality ("Hakuho Maru" KH72-1-20) as well as near the type locality of *E. marenzelleri* (KARUBAR stn 25). These colonies strongly suggest that the holotype of *E. marenzelleri* is simply a larger, more robust colony of *E. pusilla*.

DISTRIBUTION. — **Philippines:** Sulu Sea (Sulu Archipelago); 514-522 m. **Indonesia:** Banda Sea (Kai and Selayar Islands); 325-730 m. **Elsewhere:** Macquarie Ridge; Nicobar Islands, Bay of Bengal; South China Sea (north of Pratas Island and southern Formosa Strait); 371-805 m.

Enallopsammia rostrata (Pourtalès, 1878)

Amphihelia rostrata Portalès, 1878: 204, pl. 1, figs 4-5.

Dendrophyllia (*Coenopsammia*) *amphelioides* Alcock, 1902a: 112-113; 1902c: 43-44, pl. 5, figs 37, 37a.

Anisopsammia rostrata - MARENZELLER, 1904a: 314-315, pl. 18, fig. 23.

Enallopsammia rostrata - ZIBROWIUS, 1973: 44-45, pl. 2, figs 14-15. — CAIRNS, 1982: 57, pl. 18, figs 1-4 (synonymy); 1994: 92-93, pl. 39, figs d-f; 1995: 127-128, pl. 44, figs c-f. — CAIRNS & PARKER, 1992: 52-53, pl. 18, figs e-i.

MATERIAL EXAMINED. — **Philippines**. "*Albatross*": stn 5428, 3 branches (USNM 97642). — Stn 5499, 5 branches (USNM 97643).

Indonesia. KARUBAR: stn 13, 7 branches: 3 (MNHN), 1 (POLIPI), 3 (USNM 97644).

TYPE LOCALITY. — "*Blake*" stn 2: 23°14'N, 82°25'W (Straits of Florida), 1472 m.

REMARKS. — *Enallopsammia rostrata* differs from *E. pusilla* in having unifacial corallites (*i.e.*, calices confined to one face of the corallum, anterior by convention), arranged uniserially on small-diameter branches. The corallites of most specimens of *E. rostrata* also bear a prominent septocostal rostrum; however, some specimens lack this structure, these referred to as the "*amphelioides*" form by CAIRNS (1982). Of the 3 lots reported above, specimens from "*Albatross*" stns 5428 and 5429 have septocostal rostra, whereas those from KARUBAR stn 13 do not. The rostrate specimens have small corallites (3 mm GCD), consistent with the "delicate" specimens reported by CAIRNS (1995) from New Zealand, whereas the nonrostrate specimens have massive coralla.

DISTRIBUTION. — *Philippines*: Sulu Sea (Palawan); Bohol Sea; 1013-2021 m. *Indonesia*: Halmahera Sea; Ceram Sea; Banda Sea (Kai Islands); 417-1633 m. *Elsewhere*: cosmopolitan, except for eastern Pacific and continental Antarctica; 110-2165 m.

Genus *TUBASTRAEA* Lesson, 1829*Tubastraea micranthus* (Ehrenberg, 1834)

Oculina micranthus Ehrenberg, 1834: 304.

Dendrophyllia nigrescens Dana, 1846: 387. — VAUGHAN, 1918: 143-144, pl. 60, figs 1, 1a. — SEARLES, 1956: 24, pl. 39A.

Coenopsammia viridis H. Milne Edwards & Haime, 1848b: 110.

Coenopsammia aequiserialis H. Milne Edwards & Haime, 1848b: 110-111. — SEMPER, 1872: 267.

Dendrophyllia micranthus - VAN DER HORST, 1922: 49-51 (in part: not "*Siboga*" stn 277, synonymy); 1926: 43-44, pl. 2, figs 6-7. — FAUSTINO, 1927: 218-220, pl. 72, figs 1-2. — NEMENZO, 1960: 16-17, pl. 8, fig. 2. — SCHEER & PILLAI, 1974: 63, pl. 29, fig. 3. — BETTERTON, 1981: 242, figs 199-200.

Dendrophyllia micranthus var. *grandis* Crossland, 1952: 173, pl. 55, fig. 1, pl. 56, fig. 1.

Tubastraea micranthus - ZIBROWIUS & GRYGIER, 1985: 130. — SCHUHMACHER, 1984: 94, figs 1a-b, 4.

Tubastrea micranthus - LATYPOV, 1990: 68, pl. 26, figs 1-2.

Tubastraea micrantha - CAIRNS & KELLER, 1993: 282.

Not *Dendrophyllia micranthus* - EGUCHI, 1968: C66 [= *Dendrophyllia ijimai* Yabe & Eguchi, 1934].

MATERIAL EXAMINED. — **Philippines**. "*Albatross*": stn 5554, 1 (USNM 97648).

SIPHILEXP: stn 78-CAC 189, 1 (USNM 97646).

Cocos Island, east of Zamboanga, 9 m, 1 colony (USNM 83685).

"Southern Philippines", depth unknown, 200+ branches (USNM 91088).

Indonesia. "*Siboga*": stn 240, 1 (ZMA Coel. 235).

DEKI: stn 4, 1 (ZMA Coel. 5450). — Stn 10, several colonies (NNM).

"*Alpha Helix*": stn 1769, 1 (USNM 78551). — Stn 79-M122, 3 (USNM 97647).

TYPE LOCALITY. — Unknown.

DESCRIPTION. — Corallum dendroid, but more or less uniplanar, achieved by profuse extratentacular budding from a relatively small number (2-8) of massive axial corallites. Coralla may attain a large size: *e.g.*, 1 m in height and 5 cm in basal diameter. Corallites of small-diameter distal branches generally occur only on branch edges, but on larger-diameter branches corallites more uniformly distributed on all branch faces. Corallites usually project upward at a 45° angle from axial branch and stand 5-7 mm above branch coenosteum. Corallites usually 6-8 mm in GCD, but NEMENZO (1960) reported giant calices 10-12 mm in GCD. Costae well defined, 0.4-0.5 mm in width, convex to ridged, bearing 1-3 low granules across their width at any point. Intercostal furrows long and continuous, 0.15-0.20 mm wide, and occasionally punctuated with circular pores about 0.3 mm in diameter that penetrate deeper into branch core. Branch porosity greatest in distal parts, the pores becoming infilled and thus more dense with age (SCHUHMACHER, 1984). Corallum white; live tissues a striking dark green or brown-black.

Septa hexamerally arranged in 3 cycles: $S_1 > S_2 >> S_3$. S_1 nonexsert, having straight inner edges that attain the columella. S_2 3/4 width of an S_1 , also having straight inner edges that attain the columella. S_3 usually rudimentary, represented by a very narrow dentate to lacinate lamella. Fossa deep, especially in axial corallites. Columella rudimentary, composed of a solid, elongate fusion of lower, inner edges of the S_{1-2} .

REMARKS. — *Tubastraea micranthus* is the only species in the genus to have a tree-like, dendroid growth form. Being a common, shallow-water species, it has received various names, including several alluding to its tissue colour.

As defined by SCHUHMACHER & ZIBROWIUS (1985), *T. micranthus* belongs to a unique ecological category among the Scleractinia, *i.e.*, azooxanthellate, yet constructional and hermatypic. In other words, although it lacks zooxanthellae, it produces large colonies that contribute to a reef structure. According to SCHUHMACHER (1984), *T. micranthus* does not grow as fast as other branching zooxanthellate corals, but because it reinforces its branch strength through secondary calcification, it remains competitive with other reef corals.

DISTRIBUTION. — *Philippines*: Negros and Bohol; Sulu Sea (Zamboanga Peninsula and Sulu Archipelago); 7-46 m. *Indonesia*: Molucca Sea (Halmahera); Banda Sea (Ambon, Banda, Kai, and Damar Islands); 0.5-60 m. *Elsewhere*: widespread in tropical Indo-West Pacific from southwestern Indian Ocean to Fiji (most corals referred to this species from Japan are *Dendrophyllia*); 0-50 m.

Tubastraea diaphana (Dana, 1846)

Dendrophyllia diaphana Dana, 1846: 389, pl. 27, fig. 3. — VAUGHAN, 1918: 144-145, pl. 60, figs 2-3.

Dendrophyllia aequiserialis - QUELCH, 1886: 147. [Not *Coenopsammia aequiserialis* H. Milne Edwards & Haime, 1848].

Dendrophyllia micranthus var. *fruticosa* Nemenzo, 1960: 17-18, pl. 9, fig. 1.

Tubastraea diaphana - SCHEER & PILLAI, 1983: 174, pl. 41, figs 1-4 (synonymy). — CAIRNS & KELLER, 1993: 284, pl. 13, fig. H.

Dendrophyllia sibogae van der Horst, 1922: 56-57, pl. 8, figs 18-19.

Tubastraea sp. - GUELLA *et al.*, 1988: 780.

MATERIAL EXAMINED. — **Philippines**. Santa Cruz, Zamboanga, 1 (USNM 78522).

Dumaran Passage, Palawan, 3 m, 6 colonies (USNM 80822), 4 colonies (BMNH 1987.12.23.1-4) mentioned by GUELLA *et al.*, 1988.

SIPHILEXP: stn 78SP-1-1, 5 (USNM 77162)

TYPE LOCALITY. — Singapore, South China Sea (depth not given).

DIAGNOSIS. — Colonies phaceloid, forming small, bushy clusters of corallites rarely more than 5 cm in height or width. Colony results from closely spaced budding from a broad base. Corallites 6-11 mm in GCD and up to 22 mm in length. Costae well defined, as in *T. micranthus*. Theca thin and quite porous, especially near calicular margin. Colour of tissue green-brown. Septa hexamerally arranged in up to 4 cycles, the 4th cycle rarely complete: $S_1 > S_2 >> S_3 > S_4$. S_1 nonexsert, rather narrow near calicular edge, having smooth inner edges. S_2 about 3/4 width of an S_1 , also having smooth inner edges. S_3 usually present but represented only as low dentate ridges.

In large coralla, traces of S₄ occur in some half-systems near calicular margin. Fossa deep and spacious; columella rudimentary.

REMARKS. — This species is more fully described and illustrated by VAUGHAN (1918) and NEMENZO (1960), by the latter as *T. micranthus* var. *fruticosa*.

DISTRIBUTION. — *Philippines*: west coast of Mindoro; Sulu Sea (Dumaran Passage, northeast Palawan; Zamboanga Peninsula); Negros; 1-5 m. *Indonesia*: Savu Sea; eastern Timor (VAN DER HORST, 1922); 27-54 m. *Elsewhere*: widespread throughout tropical Indo-West Pacific from southwestern Indian Ocean to Fiji and Samoa; 1-15 m.

Tabastraea coccinea Lesson, 1829

Tabastraea coccinea Lesson, 1829: 93. — WELLS, 1983: 243-244, pl. 18, figs 1-2 (synonymy). — CAIRNS, 1991: 26-27, pl. 12, figs c-e (synonymy); 1994: 93-94, pl. 39, figs g-i (synonymy). — CAIRNS & KELLER, 1993: 282-284. *Lobophyllia aurea* Quoy & Gaimard, 1833: 195, pl. 15, figs 7-11. *Coenopsammia willeyi* Gardiner, 1899: 359, pl. 34. *Dendrophyllia willeyi* - VAUGHAN, 1918: 143-144, pl. 60, figs 4, 4a. *Dendrophyllia aurea* - VAN DER HORST, 1926: 46-48 (in part: pl. 2, figs 2-4, 8-9). *Tabastraea aurea* - BOSCHMA, 1953: 111-118 (in part: pl. 10, figs 2, 6, pl. 11, figs 2, 4-6, pl. 12, figs 1-6). — SEARLES, 1956: 24, pl. 38B. — BETTERTON, 1981: 242-243, fig. 201. — SCHEER & PILLAI, 1983: 173-174, pl. 40, fig. 8. — SCHUHMACHER, 1984: 94-95. — LATYPOV, 1990: 65-66, pl. 27, fig. 4, pl. 32, fig. 5. ? *Dendrophyllia turbinata* Nemenzo, 1960: 18-19, pl. 9, fig. 2. *Tabastrea coccinea* - LATYPOV, 1990: 66-67, pl. 27, fig. 1, pl. 32, fig. 3.

MATERIAL EXAMINED. — **Philippines**. Santa Cruz, Zamboanga Peninsula, 4 colonies (USNM 83645, 83652, 83667).

SIPHILEXP: stn 78-CAC194, 3 colonies (USNM 97645).

Indonesia. "Siboga": stn 231, 1 (ZMA Coel. 586).

TYPE LOCALITY. — Bora Bora, Society Islands (depth not given).

DIAGNOSIS. — Corallum plocoid, forming spherical to mound-shaped colonies up to 10 cm in diameter. Most corallites originate from a common basal coenosteum, only rarely budding from the wall of another corallite. Corallites short and squat: 10-13 mm in GCD and rarely over 10 mm in height. Costae similar to those of *T. diaphana*. Tissue usually bright orange, but may also be yellow, pink, or purple. Septa hexamerally arranged in 4 cycles, the 4th usually incomplete: S₁>S₂>>S₃>S₄. Septal arrangement also similar to that of *T. diaphana*. Fossa of moderate depth, containing a rudimentary crispate columella. Endothecal dissepiments occasionally present.

REMARKS. — WELLS (1983) listed 18-19 junior synonymys of *T. coccinea* and recognised a total of 6 valid species in the genus. The synonymy given above is therefore incomplete but gives most of the Indonesian records. A more complete description of this species can be found in CAIRNS (1994).

Four species of *Tabastraea* occur in the Indonesian region, 3 of which have similar corallite characteristics but are distinguished by their colony size and shape: *T. micranthus*, large and arborescent; *T. diaphana*, small and phaceloid; and *T. coccinea*, medium-sized and plocoid. The 4th species, *T. faulkneri* Wells, 1982, is similar to *T. coccinea* in growth form but has very widely-spaced corallites that are sunken in thick coenosteum, and S₄ that pair before their common S₃. WELLS (1982) reported *T. faulkneri* from Pelau, the Banda Sea (Banda and Ambon Islands), Mindoro, and the Galápagos Islands at 3-8 m. According to WELLS (1983), only 2 other species of *Tabastraea* are valid: *T. tagusensis* Wells, 1982, and *T. floreana* Wells, 1982, both from the Galápagos Islands and distinguished by their septal characteristics (CAIRNS, 1991: table 4).

DISTRIBUTION. — *Philippines*: Mindoro and Zamboanga Peninsula, Mindanao; 3-6 m. *Indonesia*: Banda Sea (Kai and Ambon Islands); 40 m. *Elsewhere*: cosmopolitan in tropical shallow water, including warm temperate region of Japan; 1.5-110 m.

INCERTAE SEDIS

Figs 29 g-i

MATERIAL EXAMINED. — **Philippines.** "Albatross": stn 5179, 5 colony fragments, including SEM stub 813 (USNM 97651).

Indonesia. DEKI: unnumbered station near Banda, 3 June 1922, 30 m, 1 colony (ZMUC).

DESCRIPTION. — Small colonies formed by sparse intratentacular budding. Corallites sometimes budded in series, resulting in a unifacial arrangement or budded sympodially, resulting in a loose, bushy corallum with anastomosing branches. Calice circular: 2.1-3.3 mm in diameter. Corallum completely epithecate, only 60 μ m thick at calicular edge. Epitheca composed of narrow (20-45 μ m wide) horizontal bands that encircle the corallites. Septal symmetry and size classes not clearly defined: 20-24 septa per calice. Septa highly porous, the larger septa composed of 4 or 5 trabecular spines, having clavate, tuberculate tips about 0.12 mm in diameter. Most septa are connected to their adjacent septa by narrow synapticalae. Columella composed of 3 or 4 granular rods, each up to 0.17 mm in diameter.

REMARKS. — We can find no scleractinian family in which to convincingly place the species described above. Its epitheca and size are similar to those of *Culicia* (Rhizangiidae), but it differs in budding mode and septal construction. Its septal structure is similar to that of the Micrabaciidae, but it differs in having a solid epitheca and being colonial. Until more specimens are examined, we reserve judgment on the family affinities of this unusual coral.

DISTRIBUTION. — *Philippines*: Sibuyan Sea; 68 m. *Indonesia*: Banda Sea (off Banda Island); 30 m.

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The scanning electron photomicrographs were taken in the SEM Laboratory, NMNH. The Department of Photography of the NNM provided the negatives of the holotype of *Madrepora minutiseptum*.

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