Description

Corallum (anthocyathus) a laterally compressed cylinder, up to 4.5 × 2.8 mm in calicular diameter and 6.9 mm tall. One pair of broad, triangular, downward-projecting thecal spines up to 1.3 mm long occurs slightly above basal scar on lateral thecal edges. Spines formed by union and extension of pairs of thecal edge costae (Fig. 14e). Costae equal in width (0.18-0.20 mm) and smooth, separated by narrow (35-40 μm), relatively shallow intercostal furrows. Costae alternate in position with septa. Anthocyclus known from only one specimen, a syntype from east of the North Neptunes. It is poorly preserved (Fig. 14e) but appears to be a short, triangular, cuneiform base without thecal ornamentation.

Septa hexamerally arranged in three cycles, sometimes with seven septa of the fourth cycle (24-26 septa). S₂₃ exsert, approximately 0.17 and 0.13 mm, respectively, and thick, their outer edges separated from the theca by a narrow notch. S₂, much less exsert and thinner. Inner edges of all septa sinuous, becoming progressively more sinuous in higher cycle septa. A single crown of 10 fascicular pali present before S₂₃, the two principal septa linking pali. Fossa moderately deep. Upper edges of pali terminate approximately 0.25 mm below calicular edge. Columella elongate, composed of several twisted papillae interconnected among themselves and to inner edges of pali.

Discussion

Dennant (1906) based Sphenothrochus emarciatus var. perexiguus upon nine Recent specimens from South Australia, distinguishing it from typical S. emarciatus of the Victorian Miocene by its higher GCD:LCD, 18 vs 5.2-6.6 for the fossil form. Cairns (1889a) treated I. perexiguus as a separate species, but now, after having seen additional syntypes (six of nine) and topotypic fossil specimens of I. emarciatus, finds no reason to consider them distinct. Three other species pertain to this genus: I. australis (Duncan, 1865); I. kikutii (Yabe & Eguchi, 1941); and an undescribed species (specimens in AM) known from off Lady Musgrave Island, Queensland (150 m).

Material Examined (all collected by JV)
South Australia: E of North Neptune Is, 45 fms (=82 m), SAM H609(2)/USNM 85701(1), RMNH 18060(1); off Cape Jaffa, 90 fms (=174 m), SAM H610(1), and 130 fms (=238 m), RMNH 18059(1) (all syntypes of Sphenothrochus emarciatus var. perexiguus).

Distribution

Continental shelf of South Australia; east of North Neptune Is and off the South-East; 82-238 m; Victoria (Miocene).

Dunocyathus Tenison-Woods, 1878

35. Dunocyathus parasiticus Tenison-Woods, 1878
(Figs 13e, f, 14a, d, Map 15)


Dunocyathus sp., Wells, 1958: 263.


Description

Corallum (anthocyathus) tympanoid, up to 6.3 mm in circular calicular diameter and 4.5 mm tall. Base flat to slightly concave and thin, often showing a circular depression corresponding to its attachment to anthocyclus. Costae alternate distinctly in position with septa, sometimes forming sinuous or bifurcate near basal edge; costae lacking from horizontal base. Costae rectangular in cross section, approximately 0.25 mm wide and 0.10 mm tall, covered with tall, cylindrical granules of variable diameter (e.g., 16-32 μm in diameter). Upper edge of each costa projects slightly above calicular edge. Intercostal areas, those strips of theca directly overlying the septa, about 0.20 mm wide and flat (but not smooth), consisting of a very fine crystalline structure. Anthocyclus invariably embedded in a small bryozoan colony (Colocorythrella spp., Fig. 13e). Anthocyclus trochoid in shape, up to 3 mm tall, with a 2.3 mm calicular diameter and a short, cylindrical pedicle of about 0.8 mm in diameter. An anthocyclus with an intact anthocyclus in the process of transverse division has not yet been found.

Septa hexamerally arranged in three complete cycles (24 septa), even in anthocyclus stage. S₂ highly exsert, and have moderately sinuous inner edges, each bordered internally by a tall, slender palus about 0.35 mm tall and 0.16 mm wide. S₃ slightly less exsert, with much more sinuous inner edges, and much larger paliform lobes. P₂ up to 0.70 mm tall and 0.33 mm wide and project well above calicular edge but less so than the exsert S₂₃, S₂, about three-quarters width of S₂, and have moderately sinuous inner edges and no pali. All septa bearing 8-10 vertical, radiating ridges on their septal faces (Fig. 13f). Fossa quite shallow, filled with exsert septa and pali and a circular, papillose columnella that reaches almost to calicular edge level.

Discussion

Wells (1958) was the first to realize that D. parasiticus was the anthocyclus stage of Deltothyrus rotaformis. Dunocyathus is one of two turbulinid genera having an alternation of costae and septa (the other being Idiotrochus).

Material Examined (all South Australian specimens collected by JV)
South Australia: 35 Nm (=64 km) SW of Neptune
Guynia annulata Duncan, 1872: 32, pl. 1, figs 1-8; Cairns, 1979: 164, 165, pl. 32, figs 1-3 (synonymy); Cairns, 1989a: 42, pl. 21f, 22a-e. 
Pyrophylla inflata Hickson, 1910: 1-7, figs 1-4.

Description (South Australian specimens)
Corallum straight to slightly scolecoid and cylindrical, expanding very gradually from base to calice. Largest specimen examined (SAM H62) 8.6 mm long and 1.3 mm in calicular diameter. Original or subsequent attachment of corallum unknown; basal portions of all coralla missing. Epitheca bearing two sets of ridges: transverse circumferential ridges on average 0.20 mm apart, and a longitudinal set of eight large (C₁) and eight small (C₂), alternating, corresponding to the 16 septa. The intersections of these ridges form a grid-like pattern of rectangles, with a prominent granule up to 0.1 mm tall usually occurring at each intersection. Within each rectangle is a chalky white thecal spot, which corresponds to an equal-sized, shallow depression on inside of corallum. These spots and depressions do not penetrate the theca of a living specimen, but, in long-dead specimens these areas are the first to erode, resulting in circular pores.

Septa octamerally arranged in two size-classes: eight primary and eight secondary septa. Primary septa nonexsert and with highly sinuous, vertical inner edges.
Primaries 0.15-0.20 mm wide and quite thick (0.06-0.10 mm), increasingly so lower in corallum. Secondary septa much smaller, their thin upper edges recessed as much as 1.0 mm from calicular edge and thus difficult to see in an intact corallum. Secondaries about 0.1 mm wide, only 0.01-0.02 mm thick, and slightly sinusous. Septal face granules apparently lacking. Fossa shallow. Columella a single, twisted lamella or trefoil ribbon 0.17-0.20 mm in width.

Discussion

Guynea is a monotypic genus, distinguished from other guyniid genera by having only one columella lath, no pali, and a total septal complement of 12-16 septa (Cairns 1989a). It is among the smallest of scleractinian corals.

Material Examined (all collected by JV)

South Australia: 'Sta. 9' (?Spencer Gulf), SAM H620(20)/USNM 85700(2); Cape Jaffa, 90 fms (=164 m), SAM H621(1), 150 fms (=238 m), SAM H622(1).

Distribution

South Australia: off Cape Jaffa; ? Spencer Gulf; 164 m, 238 m. Atlantic Ocean, Persian Gulf, Indonesia, Philippines, New Caledonia, Hawaiian Islands; 28-653 m; Dominican Republic (Miocene).

Although G. annulata is widespread with an almost cosmopolitan distribution, this is the first record of the species (and the genus) from Australian waters.

Stenocyathus Pourtalès, 1871

37. Stenocyathus vermiformis (Pourtalès, 1868) (Figs 14b, c)

Coenocyathus vermiformis Pourtalès, 1868: 133.
Stenocyathus decamera Ralph & Squires, 1962: 11, 12, pl. 4, figs 2-6.
Stenocyathus vermiformis: Cairns, 1979: 168-170, pl. 32, figs 8-10, pl. 33, figs 1, 2 (synonymy); Cairns, 1982: 52, pl. 16, figs 8-11 (map); Veron, 1986: 609, fig.

Description (Victorian and Tasmanian specimens)

Corallum scoleoid, shaped as a gradually expanding cylinder: largest specimen (NMV F57163) 5.0 mm in calicular diameter, 2.4 mm in broken basal diameter, and 14.7 mm long. Coralla firmly attached by broad, stereome-reinforced pedicel. Wall epipitheca, bearing numerous fine circumferential ridges. Theca also marked by 24 longitudinal rows of chalky white thecal spots, each row aligned with an interseptal space. Spots circular, about 0.25 mm in diameter, and separated from adjacent spots in the same row by an equal or greater distance than their diameter.

Septa hexamerally arranged in three systems (24 septa). S4, largest of septa, their very sinusous inner edges extending 0.5-0.6 distance to columella. S3, about three-quarters width of S4, also having highly sinuous inner margins. Each S3 bordered internally by a large, thick palus, equal in width and sinusosity to the S4, it borders. P2, separated from S3, by deep, narrow notches. S2 equal to or slightly wider than S3, and equal in thickness, but, because their inner edges are only slightly sinusous, they appear thinner. All septa nonexsert, the calicular theca projecting up to 0.5 mm beyond outer septal edges as a thin, nonseptate rim. Septal and palar faces bear large, triangular granules. Fossa moderately deep, containing a fascicular columella consisting of one twisted lath. Upper margin of columellar elements considerably lower than palar edges.

Discussion

Stenocyathus vermiformis is the only Recent species of the genus (Cairns 1979). It is easily distinguished from the only other guyniid known from Australia, G. annulata, by its hexameral symmetry, P2, and much larger corallum.

Material Examined

Victoria: 'Franklin' Stn Slope 27, 1500 m, NMV F57163(1)/USNM 85729(1).

Tasmania: 'Franklin' Stn Slope 47, 455 m, NMV F57175(1).

Distribution

Australia: eastern Victoria, eastern Tasmania, New South Wales and southern Great Barrier Reef (Veron 1986: 609); 455 m, 1500 m. Atlantic Ocean, Subantarctic, New Zealand (Cairns 1982); 80-1 229 m.

Family FLABELLIDAE Bourne, 1905

Flabellum Lesson, 1831

38. Flabellum (Flabellum) australae Moseley, 1881 (Figs 15a-c, f, Map 16)


Flabellum pavoninum typical: Hoffmeister, 1933: 2-5 (in part: specimen no. 3); Shepherd & Veron, 1982: 177, fig. 4.54i.

Flabellum pavoninum var. distinctum: Hoffmeister, 1933: 5-7 (in part: specimen no. II).

Description

Corallum triangular, highly compressed (GCD:LCD = 2.2-3.0), and very dense. Angle of thecal edges variable, ranging from 70-127°, inclination of lateral faces low, 29-39°. Largest specimen examined (USNM 78510) 72.6 x 26.6 mm in calicular diameter
and 58.4 mm tall, although most specimens examined from South Australia were considerably smaller; many were juveniles only 5-8 mm in GCD that were still attached to the substrate. Thecal edge crests up to 1.8 mm, formed by successive evolutions of thecal edges during rapid growth stages. Lateral thecal edges long in relation to height of corallum, with an LEL:H of 0.64-0.82 and a relatively high GCD:H of 1.14-1.38. Thecal faces rough in texture, each bearing 8-12 coarse, rounded costae, which are intersected by numerous, closely spaced, fine, transverse striae. Theca pigmented with reddish brown stripes corresponding to C_{1-3}. Pedicel circular in cross section, 1.8-2.5 mm in diameter, and 3.5-5.5 mm tall.

Septa hexamernally arranged in six cycles, the fifth complete at a GCD of about 25-27 mm, the sixth (192 septa) complete at a GCD of about 57 mm, according to the formula: S_{1-4} > S_5 > S_6. Additional pairs of S_7 present in larger specimens, particularly in lateral half-systems (up to 284 septa). Upper calicular edges of S_{1-4} attenuate, but lower in fossa expanding into wide septa, their lower, highly sinuous inner edges creating a deep, narrow fossa. S_5 about half width of S_{1-4} and with relatively straight inner edges that do not attain the columella. S_6 variable in size depending on size of corallum, but usually one-third to one-half width of S_5. Pairs of S_7 rudimentary, if present extending only several mm down theca. Septal faces relatively smooth, covered with small, pointed granules. Columella elongate, about 1.0-1.5 mm wide, composed of the fusion of lower, inner edges of S_{1-4}.

Discussion

Among the Indo-West Pacific species of Flabellum (Flabellum) (see Cairns 1989b), F. australis is clearly most similar to F. pavoninum, the two species being similar in corallum shape and density, thecal colour, and number and symmetry of septa. F. australis differs in having a more compressed corallum (i.e., a lower face angle and correspondingly higher GCD:LCD), smaller thecal edge crests (those of F. pavoninum are 2.5-3.8 mm tall), and a larger pedicel (that of F. pavoninum is only 1.1-1.5 mm in diameter).

Many of Hoffmeister's (1933) F. pavoninum distinctum and six specimens of his typical F. pavoninum were examined. The two specimens deposited at the USNM pertaining to these two varieties are both F. australis; a cursory examination of the remaining specimens, which are deposited at the AM, revealed a mixture of Flabellum species.

Material Examined

South Australia: off Cape Jaffa, 90 fms (=165 m), SAM H625(12), 120 fms (=220 m), NMV F56968(1),
130 fms (=238 m), SAM H626(6), 300 fms (=549 m), SAM H627(2), all JV; off Beachport, 100 fms (=183 m), SAM H628(1), over 100 fms, SAM H636(2), 110 fms (=201 m), SAM H629(12), NMV F56969(3), 150 fms (=275 m), SAM H630(2), all JV.

**Victoria:** 38°25'S, 148°02'E, EGSS 25 ii.1971, NMV F56789(1), 56799(1); E of Lakes Entrance, 26 v.1959, NMV F56794(3)/USNM 85725(1); 'Soela' Stn 33, 442 m, SAM H631(1); 'Soela' Stn 26, 436 m, SAM H632(1).

**Eastern Bass Strait:** 'Umitaka Maru' Stn 1, 120 m, TM K1126(1); 'Soela' Stn 22, 92 m, SAM H634(1), 637(1).

**Tasmania:** SSE of Tasman Head, Bruny I., 90-94 fms (=165-172 m), i.1970, TM K426(4); 'Soela' Stn 64, 82 m, SAM H633(2).

**New South Wales:** off Cronulla, 65-105 m, USNM 78510(42); HMS 'Challenger' Stn 163, off Twofold Bay, 120 fms (=220 m) (data contradictory, see under *Crispatotrochus inornatus*), BMNH 1880.II.25.81 (2 syntypes of *F. australis*); 'south-east coast of Australia', 'Endeavour', USNM 85704(1) (ex AM El273, pt. *F. pavoninum* typical No. 3 of Hoffmeister 1933) and USNM 85703(1) (ex AM El273, pt. *F. pavoninum distinctum* No. 11 of Hoffmeister 1933).

### Distribution
South-eastern Australia: continental shelf and slope from off south-eastern South Australia to Tasmania and New South Wales; 65-549 m.

#### 39. *Flabellum (F.) transversale* Moseley, 1881
(Figs 15d, e, Map 17)

*Flabellum transversale* Moseley, 1881: 174, pl. 6, figs 6, 6a (*F. elongatum* in caption to plate).

*Not Flabellum transversale:* Thomson & Rennet, 1931: 41 (=*F. impensum*); Yabe & Eguchi, 1942a: 99 (=*Truncatoflabellum* sp.).

### Description
Corallum flabellate, having rounded thecal edges and a relatively low range of thecal edge angle: 40°-50°. Largest specimen examined (NMV F56891) 26.8 x 14.6 mm in calicular diameter and 32.3 mm tall, only slightly larger than the holotype, which measures 25.5 x 13.9 mm in calicular diameter and 32.5 mm tall. Pedicel diameter 2.3-2.7 mm. Corallum dense; theca
often heavily encrusted. Calicular edge smooth (not serrate) and only slightly arched.

Septa hexamerally arranged in five cycles according to the formula $S_{1,3} > S_{5}, S_{2};$ however, pairs of $S_{5}$ are often missing in lateral half-systems. For example, the holotype lacks four pairs of $S_{5},$ resulting in 88 septa; the largest specimen lacks one pair of $S_{5},$ resulting in 94 septa; but some smaller specimens of 18-19 mm GCD have a full complement of 96 septa. $S_{1,3}$ equal in size and by far the largest septa, consisting of low, finely dentate ridges for upper 2-3 mm near calicular edge, but becoming wide septa lower in fossa, their lower, inner edges reaching the colurnella. $S_{2}$ one-third to one-half width of $S_{1,3};$ $S_{5}$ rudimentary, septa of neither cycle attaining the colurnella. Colurnella a rudimentary fusion of lower, inner edges of $S_{1,3}.$

Discussion

Flabellum transversale is remarkably similar to Rhizorochus tuberculatus (Tenison-Woods, 1879), especially to large specimens such as the largest from Tasmania (TM K421). Nonetheless, $F. \text{ transversale}$ is distinguished by lacking rootlets, and by its hexameral symmetry, more compressed and generally larger corallum, and more closely spaced septa.

Among the 28 Recent species attributed to the subgenus Flabellum (Flabellum) by Cairns (1989a), four others are known from the Australian/New Zealand region: $F. \text{ australis}$ (above), $F. \text{ angiosomum}$ Folkson, 1919; $F. \text{ knosi}$ Ralph & Squires, 1962; and $F. \text{ gracile}$ (Studer, 1877). The first three differ from $F. \text{ transversale}$ in having highly compressed corallum with correspondingly high GCD:LCD and edge angles; the corallum of $F. \text{ transversale}$ is almost campanulate, having a relatively low GCD:LCD ratio and low edge angle. And although $F. \text{ gracile}$ is not laterally compressed, its corallum is more fragile, has fewer septa, and is shaped differently from that of $F. \text{ transversale}.$

Material Examined

Victoria: HMS "Challenger" Stn 162, 39°0' S, 146°37' E, Bass Strait near Wilson's Promontory, 38 fms (=70 m), BMNH 1880.11.25.84, holotype of $F. \text{ transversale}$; 'Kimbla' Stns K7/73-53, 55 m, NVM F56910(1), K7/73-55, 57 m, NVM F56893(1), K7/73-62, 66 m, USNM 85722(1) (ex NVM F56899), K7/73-65, 69 m, NVM F56962(2), K7/73-66, 68 m, NVM F56904(1), K7/73-67, 68 m, NVM F56888(1), K7/73-69, 64 m, NVM F56897(1), K7/73-70, 64 m, NVM F56896(1), K7/73-71, 60 m, NVM F56891(1) (all in vicinity of Wilson's Promontory), K7/73-17, 101 m, NVM F56902(2).

Distribution

Continental shelf of south-eastern Australia: Victoria (mostly in the vicinity of Wilson's Promontory); 55-101 m.

40. Flabellum (Ulocyathus) tuthilli Hoffmeister, 1933 (Figs 16a-c, Map 17)

Flabellum tuthilli Hoffmeister, 1933: 7, 8, pl. 1, figs 3-5; Cairns, 1989a: 54.

Description

Corallum campanulate but laterally compressed, resulting in an elliptical calice with a GCD:LCD of 1.3-1.5. Angle of thecal edges changes with height; basally it is high (139°-152°), but 4.6 mm above base the edges turn upward, the thecal edge angle being reduced to 42°-80°. At point of thecal edge inflection there is a small crest 1.7-2.0 mm high, above which the thecal edges are usually rounded, not acute or further curled. Inclination of rounded thecal faces 49°-61°. Largest specimen known (holotype) 44 × 32 mm in calicular diameter and 28.5 mm tall. Corallum fragile; calicular edges often damaged. Theca white, often porcellaneous, rarely with any developed costae. Calicular edge only very slightly scalloped, the theca rising to an apex about 0.5 mm high at every primary septum and about 0.3 mm high at every secondary and tertiary septum; quaternary septa do not have corresponding apices. Pedicle elliptical in cross section, the greater axis aligned with the principal costae: 1.7-2.2 × 2.5-2.7 mm in diameter and 1.5-2.0 mm tall. Septa octamerally arranged in a variable number of cycles, or stages of cycles, which roughly correlate to GCD. Specimens less than 32 mm GCD often have 64 septa arranged in three size-classes (16:16:32); 35-38 mm GCD, 96 septa, arranged in four size-classes (16:16:32:32), the 32 quaternary septa occurring as pairs flanking secondary (not tertiary) septa; 36-43 mm GCD, 128 septa (16:16:32:64, a full four cycles); and specimens over 43 mm GCD with additional quinary septa up to a total of 144 septa. Primary septa slightly exerted and symmetrically paired across fossa, their sinuous, vertical edges fusing in centre of fossa. Degree of septal edge sinuosity appears to be a function of proximity of opposing septal inner edges: the more closely they approach, the more sinuous they are, the inner edges sometimes forming a short lamella oriented perpendicular to sepal edge. Secondary septa about three-quarters width of primaries, slightly sinuous, and attain the calome in deep fossa. Tertiary septa about half width of secondaries and do not merge with colurnella. Quaternary septa often rudimentary, only extending several mm down thecal face. Septal faces covered with prominent, pointed granules. Fossa deep and narrow (1.2-1.5 mm wide), containing a rudimentary colurnella consisting of a solid fusion of lower, inner edges of primary and secondary septa.

Discussion

Cairns (1989a) subdivided the subgenus Flabellum (Ulocyathus) into three morphological groups, one of
which (containing *F. tuthilli* and five other species) is characterized by having campanulate coralla. *F. tuthilli* is distinguished from the other five species in this group by having octameral rather than hexameral symmetry. *F. tuthilli* is more similar to *F. hoffmeisteri* sp. nov., with which it is compared in the Discussion of that species.

**Material Examined**

**South Australia:** Great Australian Bight, 129°28’ E, 250-450 fms (=458-824 m), ‘Endeavour’, USNM 68230(1) (ex AM GI2284), USNM 68231(1) (ex AM GI2282) (paratypes no. 9 and 7 respectively of *F. tuthilli*).

**Tasmania:** ‘Soela’ Stn 40, 550 m, SAM H638(1); ‘Soela’ Stn 45, 520 m, SAM H639(2); ‘Soela’ Stn 51, 520 m, SAM H640(1), 641(14)/USNM 85708(3).

**Distribution**

Australia: Great Australian Bight and Southern Ocean west to Western Australia (126°45.5’ E), east to 46.5 km west of northern Tasmania; 348-824 m.

**41. Flabellum (Ulocythus) hoffmeisteri** sp. nov. (Figs I0d-f, Map 18)

*Flabellum japonicum:* Hoffmeister, 1933: 7, pl. 1, figs 1, 2; Cairns, 1989a: 56, 57, pl. 29j, k.

**Description**

Corallum campanulate but laterally compressed, having an elliptical calice with a GCD:LCD of 1.50-1.75. Thecal edges straight to slightly carinate (up to 2.7 mm) from base to several mm below calicular edge, at which point the edges lack crests and decrease slightly in edge angle. Angle of carinate thecal edges 85°-105°. Inclination of thecal faces 50°-60°. Largest specimen examined (paratype from ‘Soela’-27) 58.7 × 39.2 mm in calicular diameter and 42.7 mm tall. Corallum robust and dense in structure. Theca white, but sectioned by broad, radiating, reddish-brown stripes corresponding to 16 primary costae. Adjacent upper, outer edges of primary septa also characteristically dark brown in colour. Basalmost 80% of theca often worn or encrusted; usually only upper
5-8 mm of theca near calicular edge porcellaneous and well preserved. Calicular edge scalloped, the theca rising to an apex about 1.5 mm high at every primary septum and about 0.3 mm high at every secondary and tertiary septum. Pedicel elliptical in cross section: 1.8-2.0 × 2.3-2.7 mm in diameter and relatively short (about 1.5 mm).

Septa octametrically arranged in four size-classes. Specimens of approximately 41 mm GCMD have 96 septa, arranged 16:16:32:32, the 32 quaternary septa occurring in pairs flanking the secondary (not the tertiary) septa, as in *F. tuthilli*. With increasing GCMD, additional quaternary septa are added to vacant spaces between primary and tertiary septa, up to 118 septa in largest specimen. Septal morphology as in *F. tuthilli*. Fossa deep and narrow (about 2.6 mm wide), containing a rudimentary columella consisting of the solid fusion of the lower, inner edges of primary and secondary septa.

**Discussion**

*Flabellum hoffmeisteri* is very similar to *F. tuthilli* but differs consistently in several characters. It differs in shape, having relatively straight thecal edges that are crested for most of their length. The thecal edges of *F. tuthilli* change in angle slightly above the base and are crested only near the pedicle. This difference in shape results in a higher GCD:LCD for *F. hoffmeisteri*. Secondly, the calicular apices corresponding to the primary septa of *F. hoffmeisteri* are much higher than those of *F. tuthilli*. Thirdly, the primary costae and septa of *F. hoffmeisteri* are pigmented, whereas the entire corallum of *F. tuthilli* is white. Finally, the corallum of *F. hoffmeisteri* is heavy and dense, that of *F. tuthilli* light and delicate.

*Flabellum hoffmeisteri* differs from *F. japonicum* in having a different septal symmetry, a more compressed corallum, lower calicular apices, and a more robust corallum (Cairns 1989a).

**Etymology**

Named in honour of John Edward Hoffmeister, author of the report on deep-sea corals collected by the F.L.S. 'Endeavour' off New South Wales, Victoria, South Australia, and Tasmania.

**Material Examined**

*Holotype*

**Victoria**: 'Soela' Stn 27, 452 m, SAM H642(1).

*Paratypes*

**Victoria**: 'Soela' Stn 26, 436 m, SAM H644(1); 'Soela' Stn 27, 452 m, SAM H643(31)/USNM 85707(4); 'Kimbla' Stn K7/73-10, 328 m, NMV F56800(2); 'Soela' Stn 28, 636 m, SAM H645(1); Gabo I. to Cape Everett Ground, ca 200 fms (=ca 366 m), USNM 82021(1) (ex AM E5557) (*F. japonicum* of Hoffmeister 1933); 'Soela' Stn 1-85-42, 400-452 m, NMV F56801(1); 'Soela' Stn 2-84-69, 472-478 m, NMV F56782(8); 'Halcyon' Stn 1, 550 m, NMV F56796(1).

**Eastern Bass Strait**: 'Soela' Stn 2-84-73, 444-474 m, NMV F56783(7); 'Soela' Stn 2-84-66, 448-480 m, NMV F56784(3); 'Soela' Stn 21 (1984), 432 m, SAM H648(3); 'Soela' Stn 19, 660 m, SAM H647(1); 'Soela' Stn 16 (1984), 476 m, SAM H646(7); 'Kimbla' Stn K7/73-41, 421 m, NMV F56790(4).

**Tasmania**: 'Soela' Stn 5-84-69, 432-460 m, NMV F56828(1); 'Soela' Stn 84-87, 506 m, NMV F56781(12)/USNM 85727(2); 'Soela' Stn 51, 520 m, SAM H649(1); 'Soela' Stn 2-84-81, 510-526 m, NMV F56970(3).

**Distribution**

South-eastern Australia: Continental slope from east of Gabo I., Victoria, southwards into Tasmanian waters and west to off western Victoria (38°50'5" S, 141°46' E); mainly 328-660 m, with one record at 110 m off Cape Pillar, Tasmania (Hoffmeister 1933).

**Placotrochides** Alcock, 1902

**42. Placotrochides scaphula** Alcock, 1902 (Figs 15h, i, Map 14)

**Placotrochides scaphula** Alcock, 1902: 34, pl. 4, figs 32, 32a; Cairns, 1989a: 78, 79, pls 40I, 41a-e (synonymy).

**Description** (Victorian specimens)

Corallum (anthocyathus) a laterally compressed cylinder with rounded, parallel thecal edges. Larger specimen 4.8 × 3.3 mm in calicular diameter (GCD:LCD = 1.45), 6.75 mm tall, and 5.0 × 3.3 mm in basal scar diameter. Epitheca thin, composed of wide (0.5 mm), flat costae, separated by very narrow (about 50 μm), shallow intercostal striae. Rows of chevron-shaped growth lines occur on each costa, the apices of the chevrons corresponding to the intercostal striae. Anthocaulus unknown.

Twenty-eight septa occur in larger of two specimens, arranged in three cycles: II:II:6. Eleven primary septa slightly exert and have straight inner edges that attain the columella. Secondary septa variable in width: those in lateral sectors almost as large as primaries and reach the columella, but those in or near end sectors only about half width of primaries and do not reach columella. Three pairs of very rudimentary tertiary septa occur in three of the four end sectors. Septal faces bear tiny, pointed granules. Columella large and trabecular, occupying about one-third of LCD.

**Discussion**

The larger of the Victorian specimens appears to be immature, as judged by its apparently incomplete septal complement and smaller corallum compared with the specimens reported by Cairns (1989a) from the Philippines.
**Material Examined**

**Victoria:** ‘Franklin’ Stn Slope 33, 930 m, NMV F57173(2).

**Distribution**

Continental slope of south-eastern Australia: south of Point Hincks, eastern Victoria; 930 m, Philippines; 476-1628 m (Cairns 1989a: 79).

This is the first report of the genus from Australian waters.

**Rhizotrochus** Milne Edwards & Haime, 1848

43. **Rhizotrochus tuberculatus** (Tenison-Woods, 1879), comb. nov.

(Figs 16g-i)

*Vasillium tuberculatum* Tenison-Woods, 1879: 93, pl. 10, figs 3a, b.


*Rhizotrochus radiatus* Dennant, 1904: 2, 3; Howchin, 1909: 244; Cairns, 1989a: 79 (new synonymy).

*Monomyces radiatus*: Squires, 1966: 172, pl. 1, figs 1, 2; Shepherd & Veron, 1982: 177, fig. 4.54f.

**Description**

Corallum campanulate but laterally compressed, resulting in an elliptical calice having a GCD:LCD of 1.4-1.8. Largest specimen known (TM K421) 26.3 x 19.3 mm in calicular diameter and 30.9 mm tall; however, populations more typically 10-15 mm in GCD. Pedicel stout, 2.0-2.7 mm in diameter and equally tall. Corallum further stabilized by a ring of six adventitious rootlets, each corresponding to an S₁. Rootlets round to elliptical in cross section, initially hollow but secondarily filled in with calcium carbonate, about 1.6 mm in greater diameter. Eventually, the rootlets attain the substrate and help stabilize the corallum; however, it is common to find the delicate rootlets broken off, revealing only scars of attachment. The ring of six rootlets occurs in the theca 4-6 mm above the base; however, in approximately one-third of the specimens examined, an additional pair of rootlets is present at a height of about 8.0 mm, occurring on the lateral thecal edges aligned with the principal S₁.

Septa hexamerally arranged in four cycles (S₁ > S₂ > S₃ > S₄) in small specimens (e.g., GCD ≤ 11 mm); but, with increase in calicular size, some S₁, accelerate in size equivalent to that of S₂ and generate accompanying flankling septa. Thus, if the four end half-system S₃ accelerate, the symmetry becomes 16:16:32 (64 septa), and if all six S₃ accelerate, the symmetry is 18:18:36 (72 septa), the latter complement being the most common and characteristic corallae 15-17 mm in GCD. The largest specimen of GCD 26.3 mm from Tasmania (TM K421) has 18 primary septa and an additional five pairs of quaternary septa for a total of 82 septa, and Dennant (1904) reported a symmetry of 20:20:40 (80 septa) for a specimen of 19 mm GCD. Primary septa nonexsert (in fact, attenuate near calicular edge), and have straight, vertical inner edges that are symmetrically arranged across the fossa, such that the primary septa can be easily counted in pairs. Secondary septa much smaller, about one-quarter width of primaries; tertiary septa rudimentary, approximately one-quarter size of secondaries. Fossa deep and elongate. Columella composed of a diffuse fusion of lower, inner edges of primary septa.

**Discussion**

Cairns (1989a) discussed *Rhizotrochus* and its five species in the context of his revision of the Philippine ahermatype. SDC now believes *R. levendis* Gardiner, 1899, to be a valid species, and *R. radiatus* a junior synonym of *R. tuberculatus*. Although the type was not examined, the original description and figures of *Vasillium tuberculatum* are perfectly consistent with a small, hexamerally symmetrical specimen of *Rhizotrochus radiatus* Dennant, 1904. Furthermore, the type-localities of both species are the same.

In the following year, Tenison-Woods (1880) described another species from Bass Strait, *Flabellum tubuliferum*, which, from its original description, must also be a young *R. tuberculatus*.

**Material Examined**

**Western Australia:** Cape Leeuwin, WAM 12090 (1); Augusta, WAM 358-79(1); Point d’Entrecasteaux, WAM 28/33-43(6); Hopetoun, WAM 419-86(1); Ellenbrook, JV, SAM H651(2).

**South Australia:** West Franklin I., ‘rockpools & shallows’, WZ, PA 26.1.1983, SAM H652(1); Pearson I., intertidal, SS 26vi.1973, SAM H653(1); near Partney Shoal, 10-25’ (=3-76 m), WZ, KGH 22.1.1986, SAM H654(1); Kirkby I., 20-30’ (=6-19.2 m), NH, KGH 31.1.1986, SAM H655(1); Osmanli Reef, off Point Tinline, Kangaroo I., 10-20’ (=3-6 m), WZ, KGH 25.1.1989, SAM H723(3); Point Ellen, Vivonne Bay, Kangaroo I., 8-25’ (=2.4-7.6m), WZ, KGH 26.1.1989, SAM H724(2); Gulf St Vincent, 20 fms (=37 m), JV, SAM H656(8); Newland Head, 20 fms (=37 m), JV, SAM H657(2); Encounter Bay, 20 fms (=37 m), JV, SAM H658(2); lagoon just E of Margaret Brook Reef Lighthouse, off Cape Jaffa, 20-28’ (=6-1.85 m), WZ, KGH, LH 18.ii.1989, SAM H725(1); off Beachport, 40 fms (=73 m), JV, SAM H659(3); Neene Valley, 7’ (=2.1 m), NH 10.1.1981, SAM H661(2); no locality, JV, SAM H660(21)/USNM 85712(4).

**Victoria:** Pope’s Eye, Port Phillip, NMV F56785(5), USNM 82094, 82095(7) (*R. radiatus of Squires 1966*); Ocean Beach, Point Nepean, 10’ (=3 m), NMV F56786(3) (Squires 1966).

**Tasmania:** NE of Hunter I., 28 fms (=51 m), NS 13v.1981, TM K101(5); 7Nm (=12.8 km) NE of Burnie, 43 m, NWAPS Stn 9, 2.ii.1970, TM K421(1).
Distribution
Southern Australia: continental shelf from Cape Leeuwin, Western Australia, east to Port Phillip Bay, Victoria and north-western Tasmania; 0-73 m.

Suborder Dendrophylliina Vaughan & Wells, 1943
Family DENDROPHYLLIIDAE Gray, 1847

**Balanophyllia** S. Wood, 1844

44. **Balanophyllia bairdiana** Milne Edwards & Haime, 1848
(Figs 17a-c)

**Balanophyllia bairdiana** Milne Edwards & Haime, 1848b: 87; Milne Edwards & Haime, 1857: 103; Moseley, 1881: 190-192, pl. 12, figs 4-7; Wells, 1964: 109; Shepherd & Veron, 1982: 178, fig. 4.55a, pl. 20. 1; Veron, 1986: 586, 587, figs 1-5.

(?)**Homophyllia incrustans** Dennant, 1906: 161, pl. 6, figs 3a, b; Howchin, 1909: 247.
(?)**Heteropsammia elliptica** Tenison-Woods, 1878: 339-340, pl. 6, figs 3a, b.

**Description**
Corallum conical but strongly compressed in larger specimens, resulting in an elliptical calice having a GCD:LCD ratio up to 1.75:2.0. Smaller coralla less compressed, having almost circular calices. Thecal edges rounded. Corallum firmly attached by a thick pedicle about half GCD in size. Largest specimen examined (Challenger Stn 162) 28.4 x 13.7 mm in calicular diameter and 32.3 mm tall; however, the holotype of Milne Edwards & Haime (1848b) was stated to be 40 mm tall. Theca thick (about 1.5 mm) and porous, covered by numerous longitudinal rows of fine teeth; in large specimens distinct costae and intercostal striae are not apparent. Basal one to two-thirds of theca covered by a thin, transversely corrugated epitheca.

Septa hexamerally arranged in five complete cycles. Small specimens, such as those reported by Shepherd & Veron (1982), have only four cycles of septa (48 septa), whereas large specimens, such as the one reported by Moseley (1881), have a partial sixth cycle of septa, occurring as pairs of **S**₃ in the four end half-systems (108 septa). **S**₂, equal in size, slightly exerted, and quite narrow (0.2 mm wide), independent but not quite attaining the col umella. Inner edges of **S**₂, vertical, straight, and entire; septal faces not porous. **S**₂ also independent and nonporous, with entire inner edges, and about two-thirds width of **S**₁. Remaining septa arranged according to Pourtales Plan. **S**₃ small, about 0.8 mm wide, and slightly porous, with dentate to laciniate inner edges. **S**₄ adjacent to **S**₃, in its quarter-system, forming a single lamella before the **S**₄, which extends to the col umella. Pairs of fused **S**₄ lamellae within each half-system curve toward each other, but do not quite meet in a position before the **S**₄. Fossa deep, elongate, and broad: approximately one-third width of calice. Columella elongate and spongy, approximately 2.5 mm wide.

**Discussion**
The holotype and only known specimen of **Homophyllia incrustans** Dennant, 1906, is apparently lost, but its original description and illustrations indicate that it was a juvenile ('spat') of a larger species, perhaps a **Balanophyllia** or **Culcita**. Both genera are known to be epithecal at this early stage of development. A preference for an identification with **Balanophyllia** is based on the apparent Pourtales Plan of the holotype. Likewise, although the type has not been examined, the original description and figures of **Heteropsammia elliptica** Tenison-Woods, 1878, are indistinguishable from **B. bairdiana**.

**Material Examined**

**Victoria**: Cape Woolamai, Phillip I., 24-31 m, 26.i.1970, NMV F56812(1), 'apricot colour when alive'; The Pinnacles, 1 Nm (=1.8 km) off Cape Woolamai, 15.xi.1970, NMV F56813(1); 'Kimbla' Stns K7/73-65, 69 m, NMV F56898(3), F56906(1), K7/73-66, 68 m, NMV F56901(3), K7/73-67, 67 m, NMV F56890(1), K7/73-68, 68 m, NMV F56803(4), K7/73-69, 64 m, NMV F56905(5), K7/73-71, 60 m, NMV F56907(3) (all from W and SW of Wilson's Promontory); HMS 'Challenger' Stn 162, near Wilson's Promontory, 38 fms (=70 m), BMNH 1880.11.25.139 (Moseley 1881); E of Lakes Entrance, 26.v.1959, NMV S6795(2); 'Kimbla' Stn K7/73-24, NMV F56830(4); S side of Gabo I., 25 m, 16.ii.1973, NMV F56822(2)/USNM 85724(3), 25 m, 17.ii.1973, NMV F56802(3), 23 m, 16.ii.1973, NMV 56806(3); Gabo I., no date, SAM H662(6), 'orange colour'.

**Eastern Bass Strait**: Erith I., Kent Group, v.1974, NMV F56820(1).

**Tasmania**: Burnie, NWAPS, 26.i.1970, TM K423(1); 8 Nm (=14.6 km) NE of Burnie, NWAPS, 45 m, 2.ii.1970, TM K422(1); 'Hai-Kung' Stn 1, 68 m, NMV F56797(1).

**New South Wales**: Port Jackson, BMNH 1973.12.2(1).

**Queensland**: Thomas I., USNM 85711(6).

**Distribution**
Continental shelf of south-eastern and eastern Australia: north-western Tasmania, Bass Strait, Victoria (west to Phillip I.), New South Wales, and Queensland north to Thomas I., 23-70 m. Also? Gulf St Vincent, South Australia (type-locality of **Homophyllia incrustans** Dennant).
45. *Balanophyllia dentata* Tenison-Woods, 1879
(Figs 17d-g)

*Balanophyllia dentata* Tenison-Woods, 1879: 98, 99, pl. 10, figs 1, 1a.

*Balanophyllia dilatata* Dennant, 1904: 10, pl. 1, figs 2a, b.

**Description** (holotype)

Corallum ceratoid, 9.0 × 7.5 mm in calicular diameter, 14.5 mm tall, and attached by a robust pedicel 5.1 mm in greater diameter. Specimen dead when collected and therefore somewhat deteriorated. Thin epitheca extends almost to calicular edge, heavily encrusted with bryozoans and serpulids; costae obscure. Septa hexamerally arranged in four complete cycles: S₁₂ equal in size, the S₃₄ arranged in the Pourtalès Plan. S₁₂ moderately exsert (1 mm), with thick upper edges and thin, entire inner edges. S₁₂ not broad, extending only about 0.4 distance to epitheca in upper calice. S₃ smallest and least exsert septa, having regularly dentate to laciniate inner edges. S₁₂ about half as exsert as S₁₂, meeting in pairs before S₁ in each half-system and extending slightly farther into columella than S₁₂. Inner edges of S₁₂ also regularly dentate to laciniate, like the S₁. Fossa deep. Columella an elliptical, spongy mass attached to lower, inner edges of S₁₂.°

**Discussion**

In addition to the holotype, two previously unreported specimens from off Port Jackson (BMNH 1883.11.29.71,72) were also examined. The larger of the two (13.2 × 7.0 mm in calicular diameter), has an elongate calice and 84 septa, including an almost complete fifth cycle. The smaller (10.6 × 7.0 mm in calicular diameter), also with an elongate calice, has 56 septa. The distribution of *B. dentata* thus overlaps that of *B. bairdiana* and the larger specimens of *B. dentata* resemble *B. bairdiana* in shape and septal number. *B. dentata* is nonetheless distinguished by the finely laciniate inner edges of its higher cycle septa (i.e., S₃₄), its relatively narrow S₁₂, and smaller adult corallum.

Although the type was not examined, the original description and figures of *B. dilatata* Dennant, 1904, agree with the holotype of *B. dentata*. Points of similarity include: an encrusted theca, 48 septa, dentate higher cycle septa, and, coincidentally, about the same calicular diameter (i.e., 9 × 7 mm) as the type. The types of both species were collected from 'southern Australia'.

**Material Examined**

'Southern Australia', holotype of *B. dentata*, Macleay Museum; off Port Jackson, New South Wales, BMNH 1883.11.29.71,72(2).

**Distribution**

Australia: Port Phillip Bay, Victoria (probable type-locality of *B. dilatata*); Port Jackson, New South Wales; depth-range unknown.

46. *Notophyllia recta* Dennant, 1906
(Figs 17h, 18a, d)

*Notophyllia recta* Dennant, 1906: 163 (in part: pl. 5, figs 4a, b; not specimens from Cape Jaffa); Howchin, 1909: 248 (in part: not specimens from Cape Jaffa); Boschma, 1952: 239-245 (in part: pl. 1, figs 4-8, 13, 17, 21-26).

**Description**

Corallum (anthocyathus) cuneiform, almost rectangular in lateral view, with parallel to only slightly divergent, rounded thecal edges. Largest specimen examined (USNM 83013) 5.4 × 2.9 mm in calicular diameter and 5.3 mm tall. Calice elliptical, GCD: LCD 1.8:1.9. Base even more compressed (pinched) than thecal faces; basal scar as large as calicular diameter. Theca white and porous, uniformly covered by small spines not segregated into costae. Epitheca lacking. An throcaulus unknown.

Septa decamerally arranged in two or three cycles, depending on corallum size: 10:10, in specimens of 2-4 mm GCD; 10:10:8, in larger specimens of approximately 5 mm GCD. Primary septa slightly exsert and extend about two-thirds distance to columella in upper calice; however, extreme lower, inner edges do fuse with columella. Secondary septa of lateral sectors slightly less exsert and about three-quarters width of primaries, their lower, inner edges also merging with the columella deep in fossa. Secondary septa in four end-sectors rudimentary, only about 0.3 mm wide. Tertiary septa, which occur only as pairs in four end sectors of larger coralla, of about equal width to secondary septa in those sectors and usually fuse to those secondary septa deep within fossa. Inner edges of all septa straight. Fossa shallow, containing an elongate, thin, lamellur columella, joined by the lower, inner edges of the primary and secondary septa low in fossa.

**Discussion**

Although Dennant's (1906) type material could not be found, it is reasonable to assume that the two much larger worm specimens from off Cape Jaffa, 238 m, pertain to *N. etheridgii*, not *N. recta*.

Dennant's original description cited 26 septa per calice; however, his illustration clearly shows 28 septa, the latter number being more consistent with the symmetry of the species and all subsequently examined specimens.
Five species of *Notophyllia* have been described: *N. semivestita*, *N. gracilis*, and *N. aperta*, all described by Dennant (1899b) from the Miocene of Victoria, and the Recent *N. recta* Dennant, 1906 and *N. etheridgi* Hoffmeister, 1933. A sixth, undescribed species occurs off Western Australia (specimens in SAM). The two Recent described species are distinguished from the three fossil species by their decameral rather than hexameral symmetry. Based on a series of 39 specimens of *Notophyllia* collected from three localities off southern New South Wales and Victoria, Boschma (1952) concluded that *N. etheridgi* was a junior synonym of *N. recta*, simply representing the larger adult stage, with more septa in total but fewer major septa. We disagree with this conclusion, believing them to be two distinct species. *N. recta* differs in having a consistently smaller corallum, virtually parallel thecal edges, fewer septa (28 vs 48), and much larger secondary septa. The lower, inner septal edges of *N. recta* fuse with the columella deep in the fossa, whereas those of *N. etheridgi* do not.

**Material Examined**

**Western Australia:** King George Sound, 22-28 fms (=40-51 m), JV, SAM H665(l).

**South Australia:** 32 Nm (=58.5 km) SSW of St Francis L., 35 fms (=64 m), AM GI2672(2).

**Eastern Bass Strait:** ‘Kimbla’ Stn 79-K-1-35, 110 m, NMV F56884(4)/USNM 85752(1); ‘Soela’ Stn 22, 92 m, SAM H719(1).

**New South Wales:** ‘Kapala’ Stn 78-27-01, 264 m, USNM 83013(2).

**Distribution**

Continental shelf of southern and south-eastern Australia: King George Sound, Western Australia, Great Australian Bight, South Australia, and eastern Bass Strait north to Eden, New South Wales; 40-174 m; continental slope: New South Wales off Broken Bay, 264 m, and at 32 km north-east of Port Jackson, 458 m.

**47. Notophyllia etheridgi** Hoffmeister, 1933

(Figs 18b, c)


*Notophyllia etheridgi* Hoffmeister, 1933: 13, 14, pl. 4, figs 1-3.

**Description**

Corallum (anthocyathus) cuneiform, with straight thecal edges, a straight, tapered corallum base, and relatively lamellar thecal faces. Edge angle about 35°; face angle about 15°, producing an elliptical calice having a GCD:LCD of 2.0-2.5. Largest specimen known 12.5 × 6 mm in calicular diameter and 13.5 mm in height, with a base width of 4.0 mm. Theca white and minutely porous, covered by numerous, closely spaced, longitudinal rows of small granules. Granular rows, taken individually or in groups, do not correspond to septa. Epitheca absent. Anthocaulus unknown.

Septa decameral arranged in four cycles, the fourth often incomplete, often resulting in 48 septa: 10:10:20:8. Primary septa narrow (about 1.5 mm wide) and only slightly exsert, with straight, vertical inner edges that fuse to columella. Remaining septa much smaller, all approximately the same size (0.4 mm wide), except for the secondary septa of the 4 end-sectors, which are larger (approximately 1.1 mm wide). The four pairs of quaternary septa are developed only adjacent to tertiary septa in the end half-sectors. Fossa deep, elongate, and spacious. Columella a thin lamella of approximately same thickness as a primary septum.

**Discussion**

*Notophyllia etheridgi* is distinguished from its congeners by its highly compressed corallum and large number of septa. It is compared with *N. recta* in the Discussion of that species.

Although not apparent from the 10 specimens examined, it is probable from examination of representatives of the other four described species of *Notophyllia* that young specimens of all *Notophyllia* undergo transverse fission, evidenced by a straight, V-shaped scar across the base of each specimen. When the bases of *N. etheridgi* are examined closely, the characteristic pinched thecal faces can be seen, indicative of transverse division. The generic diagnosis should thus be amended to reflect this mode of asexual reproduction, common in many other atherhypolytic coral genera (Cairns 1989c). All of the specimens described heretofore are thus considered to be the terminal, free anthocyathus stage of the asexual division process.

**Material Examined**

**Eastern Bass Strait:** ‘Kimbla’ Stn 79-K-1-38, 73 m, NMV F56886(2)/USNM 85723(l).

**New South Wales:** off Eden, 20-24 fms (=37-44 m), ‘Endeavour’, USNM 68229(2) (ex AM E5537; paratypes of *N. etheridgi*).

**Distribution**

Australia: south-eastern continental shelf: eastern Bass Strait north to off Eden, New South Wales; 37-174 m; off Cape Jaffa, South Australia, 238 m (Dennant 1906).

**Enallopsammia** Michelotti, 1871

**48. Enallopsammia rostrata** (Fourtale, 1878)

(Figs 18e-1, Map 19)
Amphihelia rostrata Poultales, 1878: 204, pl. 1, figs 4, 5.

Enallopsammia rostrata: Cairns, 1979: 186-188, pl. 37, figs 2, 3, 6; Cairns, 1982: 57, pl. 18, figs 1-4 (synonymy); Cairns, 1984: 27-28.

Description

Corallum flabellate and massive, the largest Australian specimen examined 16 cm tall and 4.3 cm in basal branch diameter. Branching frequent and extratentacular; branch anastomosis common. Dead coralla often create niches for other corals, bryozoan, sponges, gastropods, crustaceans, and serpulids. Coenosteum covered by longitudinal costae of equal width, separated by deep, narrow intercostal striae, giving branches a distinctive striate appearance.

Calices 5-6 mm in diameter, occurring only on one face of corallum, uniserially on distal branches. Calices circular to teardrop-shaped, the elongation caused by a prominent adcauline to lateral costoseptate rostrum formed by the enlargement of five or six septocostae. Septa hexameral arranged in three to four cycles (24-36 septa). \( S_{1/2} \) equal in size and extend to the columella. \( S_{3} \) slightly shorter, pairs of \( S_{3} \) in each half-system fusing to adjacent \( S_{2} \) near columella. Pairs of \( S_{4} \), if present, also merge to adjacent \( S_{3} \), but higher in fossa. Columella circular, papillose to spongy.

Discussion

Enallopsammia rostrata is the only species in its genus to have unifacial corallites and rostrate calices, although rostra are not always present (Cairns 1984).

Material Examined

South Australia: ‘Longva III’ Stn 49, 909 m, SAM H717(1).

Victoria: ‘Derwent Venture’ Stn 2, 732-1 098 m, USNM 85730(1) (ex NMV F57077); ‘Kimba’ Stns K7/73-5, 823 m, NMV F57155(1).

Eastern Bass Strait: K7/73-42, 640 m, NMV F57180/USNM 85732(1).

Tasmania: ‘Soela’ Stn 16 (1987), 1 090-1 150 m, TM K125(1); FRV ‘Challenger’ Stn 2, 960 m, TM K1124(1).

Cascade Plateau: ‘Labrador’ Stn 2, 1 050-1 100 m, SAM H729(1).

Distribution

Australia: southern and south-eastern continental slope from South Australia (133°48' E) east to eastern Tasmania, the Cascade Plateau and the eastern approaches to Bass Strait; 640-1 150 m. Cosmopolitan except for eastern Pacific and off continental Antarctica: 229-2 165 m.

Although Cairns (1982) reported this species from the South Tasmanian Rise, the above records are the first from Australia proper.
TABLE 1. Scleractinian species recorded from South Australia, Victoria and Tasmania, with indications of extralimital distribution and depth-range.

<table>
<thead>
<tr>
<th>Species (* endemic to Australia)</th>
<th>Areas (see Key)</th>
<th>Depth (m)</th>
<th>Depth (m)</th>
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<tbody>
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<td>1</td>
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<tr>
<td>Fungiacyathus palfiverus</td>
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<td>*F. demanti</td>
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<td>Letepsumia formossissima</td>
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<td>*Coscinaraea marshae</td>
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<td>*C. mcnelli</td>
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<td>Pleiastrea versipora</td>
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<td>*Caryophyllia planilamellata</td>
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<td>C. sarsiae</td>
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<td>Stephanocyathus simeger</td>
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<tr>
<td>Deltochocys marginus</td>
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<tr>
<td>Solenosmilia variabilis</td>
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<tr>
<td>*Trematochus verconis</td>
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<td>*T. alternans</td>
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<td>*H. crumenatus</td>
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<td>Platychochus laevidatus</td>
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<td>*P. hastatus</td>
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<td>*Flabellum australe</td>
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<td>*F. versansel</td>
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<td>*F. tufilli</td>
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<tr>
<td>*F. hoffmeisteri</td>
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<td></td>
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<tr>
<td>Platychochus scaphula</td>
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<td>X</td>
<td></td>
</tr>
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<td>*Rhizotrochus tuberculatus</td>
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<td>X</td>
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<td>*Balanophyllia bairdiana</td>
<td>X</td>
<td>X</td>
<td></td>
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<td>*B. dentata</td>
<td>X</td>
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<td>*Notophyllia recta</td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>*N. etheridgi</td>
<td>X</td>
<td>X</td>
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<td>Enaloplesamia rostrata</td>
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Key to Table 1

1. Southern Western Australia
2. South Australia west of Eyre Peninsula
3. South Australia east of Eyre Peninsula
4. Victoria, Bass Strait and Tasmania
5. New South Wales
6. Queensland (including Great Barrier Reef and Torres Straits)
7. Indo-West Pacific (including Red Sea, Indian Ocean, Japan, Philippines, Indonesia)
8. Central to eastern Pacific
9. New Zealand
10. Atlantic Ocean
11. Subantarctic and Antarctic Regions (of Cairns 1982: 60, map 4)
ZOOGEOGRAHY

The zoogeography of the scleractinian corals of south-eastern Australia is poorly known. Vaughan & Wells (1943: 88) wrote: 'The waters off the southern and southeastern coasts of Australia from the Great Australian Bight through Bass Strait to the latitude of Brisbane ... have in depths from 18 to 915 meters, a distinctive [scleractinian] fauna of over 50 species of which only 14 are identical with species of other faunas' Squires (1961: 18) gave a list of 41 species recorded from the South Australian Shelf (southern Western Australia to New South Wales), observing that this fauna was not related to the coral faunas of temperate regions but was largely unique and autochthonous, which he attributed to 'a great many of the endemic genera having been autochthonous in the Tertiary of Victoria.

Below, we offer a preliminary analysis of the zoogeographic relations of the south-eastern Australian scleractinian fauna. Although our principal study covers only South Australian, Victorian and Tasmanian species, our findings agree with those of Vaughan & Wells (1943) and Squires (1961), that there is indeed pronounced endemism in the scleractinians of southern Australian waters.

**Endemic Species**

Of the 48 species listed from South Australia, Victoria and Tasmania (Table 1), 30 (62.5%) are known only from Australia. Whereas endemism appears pronounced, its degree varies with depth, being highest among those species occurring wholly or largely on the continental shelf and lowest among those occurring wholly or largely on the continental slope (Table 2).

Among the 30 Australian endemics found in South Australia, Victoria and Tasmania, one (Coscinarea marshae) is essentially Western Australian. Of the remaining 29, all occur in eastern South Australia (19) or Victoria/Tasmania (19) or in both regions, with 13 species occurring in western South Australia, 11 in southern Western Australia, 12 in New South Wales and two in Queensland. There thus seems to be a distinctive endemic scleractinian fauna concentrated in south-eastern Australia that becomes attenuated westwards and northwards. In New South Wales and Queensland this attenuation is accompanied by the appearance of other species, such as the 10 or so known only from the New South Wales shelf and the eight endemic to, or occurring, south to the south Queensland shelf (Tenison-Woods 1878, Wells 1964).

**Non-endemic Species**

Of the 48 species known from South Australia, Victoria and Tasmania, 18 (37.5%) occur beyond Australia. Seven of these are widespread (cosmopolitan), and all seven known from the Atlantic (those known also from the Arctic/Subantarctic are asterisked): Caryophyllia sarsiæ, *Desmophyllum cristagalli*, *Solenosmilia variabilis*, Pepon专心athus australiensis, *Guyia annulata*, *Stenosicyathus vermiformis*, and *Enallopsammia rostrata*. One species, Autocyathus recidivus, is additionally known only from the subantarctic Macquarie Ridge. Another species, Stephanocyathus platypus, is additionally known only from off New Zealand. The remaining nine species have broader distributions in the Indo-Pacific: Fungiacathys paliferus, Letepsmamia formosissima, Plesiastea versipora, Scolymia australis, Anthemiphyllia dentata, Stephanocyathus spiniger, Dellocyathus magnificus, Conotrucheus funiculumna and Placotriches scaphula.

Thus, of the non-endemic species, the largest group is the Indo-Pacific element (nine spp. or 50%), followed by the cosmopolitan element (seven spp., 38.9%), and the New Zealand and Subantarctic elements, with one species (5.5%) each. Of the 18 species, only two are in Australia confined to the continental shelf, the reef-forming *Plesiastea versipora* and *Scolymia australis*. These two shallow-water species are the only ones of the Indo-Pacific group in which the Indo-Pacific populations and those of southern Australia are known to be geographically continuous. In most others of the group there are extensive gaps in distribution between the Indo-Pacific and southern Australia, along both the western and eastern coast of Australia, gaps that further collecting may show to be unreal.

Wiedenmayer (1989), in a zoogeographical analysis of the sponge fauna of Bass Strait, found a strong affinity with that of the Indo-Pacific, a significant representation of cosmopolitan species (which he called the Tethyan element), a weak affinity with the New Zealand fauna and almost none with the Subantarctic-Antarctic faunas. Although the present study is not strictly comparable (for Wiedenmayer's samples were all from depths no greater than 79 m and from the Bass Strait region only), the relative degrees of zoogeographic affinity shown by the south-eastern Australian scleractinians are remarkably similar to Wiedenmayer's findings in the sponges, notably the significant cosmopolitan element and the virtually nonexistent links with New Zealand and the Subantarctic-Antarctic regions.

**TABLE 2. Relation of endemism to depth.**

<table>
<thead>
<tr>
<th></th>
<th>Wholly or mainly shelf</th>
<th>Shelf and slope extensively</th>
<th>Wholly or mainly slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endemic</td>
<td>20</td>
<td>6</td>
<td>4</td>
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<tr>
<td>Non-endemic</td>
<td>2</td>
<td>6</td>
<td>10</td>
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</table>
ACKNOWLEDGMENTS

We should like to thank the following for the kind loan of specimens used in this study: T. Stranks and T. A. Darragh (NMV), L. Marsh (WAM), A. Green (TM), M. Borel-Best (RMNH), S. Moore (BM), P. B. Berents and R. Springthorpe (AM), and S. Norrington (Macleay Museum).

We thank too S. A. Shepherd (South Australian Fisheries Department), J. E. N. Veron (Australian Institute of Marine Science, Townsville), C. Wallace (Queensland Museum, Townsville branch), J. W. Wells (Cornell University, Ithaca, N. Y.), W. Zeidler (South Australian Museum) and H. Zibrowius (Station Marine d'Endoume, Marseilles) for their helpful criticisms of a late draft, D. Lowery and D. Van Weenen for the typing, and L. Hobbs, J. Thurmer and K. Bowshall-Hill for help in preparing the maps.

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YABE, H. & EGUCHI, M. 1942a. Fossil and Recent Flabellum from Japan. Science Reports of the Tōhoku (Imperial) University (2) (Geology), 22(2): 87-103.
YABE, H. & EGUCHI, M. 1942b. Fossil and Recent simple corals from Japan. Science Reports of the Tōhoku (Imperial) University (2) (Geology), 22(2): 105-178.
Appendix 1

CHECKLIST OF THE RECENT SCLERACTINIA FROM SOUTH AUSTRALIA, VICTORIA AND TASMANIA

Order Scleractinia Bourne, 1900

Suborder Fungiina Verrill, 1865
Superfamily Fungicae Dana, 1846
Family Fungiacyathidae Chevalier, 1987
  Fungiacyathus (Fungiacyathus) paliferus (Alcock, 1902)
  Fungiacyathus (Bathyacis) dennanti Cairns & Parker, sp. nov.
Family Micrabaciidae Vaughan, 1905
  Letepsamnia formosissima (Moseley, 1881)
Superfamily Agariciidae Gray, 1847
Family Siderastreidae Vaughan & Wells, 1943
  Coscinaraea marshae Wells, 1962
  Coscinarea meneili Wells, 1962

Suborder Favina Vaughan & Wells, 1943
Superfamily Favicae Gregory, 1900
Family Faviidae Gregory, 1900
  Plesiastrea versipora (Lamarck, 1816)
Family Rhizangiidae d’Orbigny, 1851
  Culicia australiensis Hoffmeister, 1933
  Culicia hoffmeisteri Squires, 1966
  Astrangia atrata (Dennant, 1906), comb. nov.
Family Mussidae Ortmann, 1890
  Scolymia australis (Milne Edwards & Haime, 1849)
Family Anthemiphyllidae Vaughan, 1907
  Anthemiphyllia dentata (Alcock, 1902)

Suborder Caryophyllina Vaughan & Wells, 1943
Superfamily Caryophyllidae Dana, 1846
Family Caryophyllidae Dana, 1846
  Caryophyllia planilamelata Dennant, 1906
  Caryophyllia sarsiæae Zibrowius, 1974
  Crispatothecus inornatus Tenison-Woods, 1878
  Paracototroechus zeidleri Cairns & Parker, gen. et sp. nov.
  Conotroechus sp. cf. C. funicolumna (Alcock, 1902)
  Autolytus recidivus (Dennant, 1906)
  Paracototroechus viattatus Dennant, 1906
  Stephanocyathus (S.) platypus (Moseley, 1876)
  Stephanocyathus (S.) sp.
  Stephanocyathus (A.) spiniger (Marenzeller, 1888)
  Deltocyathus magnificus Moseley, 1876
  Desmophyllum cristagalli Milne Edwards & Haime, 1848
  Solenosmilia variabilis Duncan, 1873
  Family Turbinoliidae Milne Edwards & Haime, 1857
    Trematotrechus verconis Dennant, 1904
    Trematotrechus alternans Cairns & Parker, sp. nov.
    Holocotroechus scriptus Dennant, 1902
    Holocotroechus crunolatus Dennant, 1904
    Platytroechus laevigatus Cairns & Parker, sp. nov.
    Platytroechus hastatus Dennant, 1902
    Platytroechus parisepta Cairns & Parker, sp. nov.
    Australocyathus vincincinus (Dennant, 1904) gen. et comb. nov.
    Peponocyathus australiensis (Duncan, 1870)
    Idiotroechus emarciatus (Dennant, 1906)
    Dunocyclanthus parasiticus Tenison-Woods, 1878
Superfamily Flabellidaceae Bourne, 1905
Family Guyniidae Hickson, 1910
  Guynia annulata Duncan, 1872
  Stenocyathus veriformis (Pourtaléès, 1868)
Family Flabellidae Bourne, 1905
  Flabellum (Flabellum) australe Moseley, 1881
  Flabellum (Flabellum) transverse Moseley, 1881
  Flabellum (Ulocyathus) tahiili Hoffmeister, 1933
  Flabellum (Ulocyathus) hoffmeisteri Cairns & Parker, sp. nov.
  Placotroches scaphula Alcock, 1902
  Rhizotroechus tuberculatus (Tenison-Woods, 1879), comb. nov.

Suborder Dendrophyllina Vaughan & Wells, 1943
Family Dendrophyllidae Gray, 1847
  Balanophyllia bairdiana Milne Edwards & Haime, 1848
  Balanophyllia dentata Tenison-Woods, 1879
  Notophyllia recta Dennant, 1906
  Notophyllia etheridgi Hoffmeister, 1933
  Enallopsamnia rostrata (Pourtaléès, 1878)
Appendix 2

LIST OF COLLECTORS

AB, A. J. Bruce; AG, A. Gackle; AM, A. McGifford; BH, B. Hutchings; DW, D. Wheenan; EGSS, East Gippsland Scallop Survey; EH, E. Hanks; ES, E. Spano; FM, F. Moorhouse; FW, F. Wittwer; GN, G. Newton; HH, H. M. Hale; IK, I. C. Kowanko; IT, I. M. Thomas; JV, J. C. Verco; JW, J. Voorwinde; JW, J. Window; JWa, J. Watson; KGH, K. L. Gowlett-Holmes; KS, K. Sheard; LH, L. Hobbs; MC, M. Church; MK, M. Keough; NH, N. Holmes; NS, N. Smith; NWAPS, NW (Tasmanian) Acid Plant Survey; PA, P. Aerfeldt; PR, P. Reilly; RB, R. Bentley; RS, R. V. Southcott; SAFD, South Australian Fisheries Department; SS, S. A. Shepherd; TM, T. Morony; WR, W. Rumble; WZ, W. Zeidler.

Appendix 3

STATION-LIST OF VESSELS

(Station numbers in parentheses are not original, but have been invented for the purposes of the present paper)

<table>
<thead>
<tr>
<th>Station</th>
<th>Lat.°S</th>
<th>Long.°E</th>
<th>Depth(m)</th>
<th>Date</th>
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<tbody>
<tr>
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<td>125°31'</td>
<td>1011-1020</td>
<td>31.vii.1988</td>
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<td>(off Eaglehawk Neck, Tas.)</td>
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<td>1144</td>
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<tr>
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<td>144°25'</td>
<td>963</td>
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<td>128°05'</td>
<td>240</td>
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<tr>
<td>(2)</td>
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<td>180</td>
<td>16.i.1989</td>
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<td><strong>FV Derwent Venture</strong></td>
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<tr>
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<td>915-190</td>
<td>4-8.v.1986</td>
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<td>39°23'</td>
<td>143°00'</td>
<td>732-1098</td>
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<td>(3)</td>
<td>41°06'</td>
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<td>1098-1281</td>
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<tr>
<td><strong>RV Franklin</strong></td>
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</tr>
</tbody>
</table>

**FRV Hai-Kung**

(1) 40°49.8' 146°31.3' 68 4.ii.1981

**FV Halcyon**

(1) 38°50' 141°46' 550 6.iii.1980

(2) 37°45' 139°41' 705, 677-714 24.x.1981

**FRV Kapala**

K75-09-03 29°52' 153°43' 502 10.x.1975

K75-09-08 29°26' 153°49' 457 12.x.1975

K76-24-01 33°42' 151°52' 457 20.xii.1976

K78-27-01 33°44' 151°48' 264 11.xii.1978

**HMAS Kimba**

K7/73-5 38°24.5' 149°25.5' 823 21.xi.1973

K7/73-7 38°17.3' 149°25' 640 21.xi.1973

K7/73-8 38°16' 149°26' 512 21.xi.1973

K7/73-10 38°05.6' 149°24.5' 328 21.xi.1973

K7/73-17 37°54.5' 149°03' 101 22.x.1973

K7/73-24 (off eastern Victoria) 38°27' 148°24.5' 183 20-26.xi.1973

K7/73-27 39°02.0' 148°36.5' 256 23.xi.1973

K7/73-37 39°44.5' 148°49' 421 24.x.1973

K7/73-41 39°45.3' 148°54' 640 24.x.1973

K7/73-42 39°32' 148°52' 201 24.x.1973

K7/73-46 39°32.5' 148°51.5' 274 24.x.1973

K7/73-47 39°10.9' 146°37.2' 55 25.xi.1973

K7/73-53 39°08.5' 146°49' 57 25.xi.1973

K7/73-55 39°03.5' 146°14.4' 49 26.xi.1973

K7/73-60 39°00.3' 146°05.9' 66 26.xi.1973

K7/73-65 39°10.1' 145°59.8' 69 26.xi.1973

K7/73-66 39°14.7' 146°00' 68 26.xi.1973

K7/73-67 39°14.6' 145°52.4' 68 26.xi.1973

K7/73-68 39°15' 145°45' 68 26.xi.1973

K7/73-69 39°18' 145°45' 64 26.xi.1973

K7/73-70 39°05.1' 145°45.6' 64 26.xi.1973

K7/73-71 39°00.2' 145°44.7' 60 26.xi.1973

79-K-1-33 39°40.3' 148°46.5' 293-329 27.iii.1979

79-K-1-34 39°38.7' 148°49.4' 770 27.iii.1979

79-K-1-35 39°28.4' 148°41.8' 110 28.iii.1979

79-K-1-38 39°22.4' 148°35.5' 73 29.iii.1979

80-K-5-47 39°03' 143°51' 86 7.x.1980

80-K-5-48 39°01.1' 143°49.2' 82 7.x.1980

**FV Labrador (KGH)**

(1) 44°00' 150°28' 740-1100 9.ii.1990

(2) 43°51' 150°22' 1050-1100 21.ii.1990

(3) 43°47' 150°29' 990-1150 25.ii.1990
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<th>Bearing 2</th>
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<th>Year 2</th>
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<td>909</td>
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<tr>
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<td>26°32'</td>
<td>153°45'</td>
<td>-</td>
<td>vii.1968</td>
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<tr>
<td></td>
<td>55</td>
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<td>FRV Sarda</td>
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<td>141°27.7'</td>
<td>150-156</td>
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FIGURE 1. a, b, Fungiacathus paliferus: a, specimen reported by Yabe & Eguchi (1942b) from station 412 off Japan, TIUS 58913, × 2.5; b, syntype from 'Siboga' 153, ZMA 1171, × 2.5. c, syntype of Fungiacathus beaumariensis, NMV P27131, × 8.4. d, e, g, Fungiacathus dennanti: d, e, holotype, 'Kimbla' 79-34, NMV F56882, calicular (× 4.5) and basal (× 4.3) views; g, a typical fragment of a paratype from 35 Nm (=64 km) SW of Neptune Is, 104 fms (=190 m), USNM 85676, 
(B. symmetria of Dennant 1906) × 19.1. f, h, syntype of Letepsammia formosissima from HMS 'Challenger' 192, BMNH 1880.11.25.155, both × 1.1. i, j, Coscinarea marthae: i, paratype, USNM 68364, detail of septal granulation, × 19; j, paratype, USNM 68363, chaliceriform corallum, × 0.43.
FIGURE 2. a, d, g, Culicia australiensis from Backstairs Passage, 17-22 fms (=31-40 m), USNM 85675: a, lateral view showing epithea, × 7.5; d, fractured calice revealing a laciniate S₁ before a broader S₂ in background, × 30; g, stereo view of calice showing relative sizes of septal cycles and columna, × 8.8. b, c, Coscinaraea mcneillii: b, colony from Frederick L., W.A., WAM 132-85, × 0.43; c, paratype, USNM 82549, calice and septocostae, × 12.9. e, f, Plesiastrea versipora: e, P. urvillei reported by Squires (1966), USNM 83004, × 0.34; f, off Franklin L., USNM 85672, calice, × 12. h, two syntypes of Culicia quinaria, Macleay Museum, × 5.
FIGURE 3. a-d, Calicia hoffmeisteri: a, off Kirkby L., SAM H413a, largest colony, × 0.76; b-d, toptype specimen from Pope's Eye, Victoria, USNM 53416, stereo view of calice (× 10.1), enlargement of columella and septal faces (× 20), and lateral view of epithecate corallum (×10.1). e-g, Astrangia atrata: e, colony from Bass Strait, SAM H445, × 1.7; f, g, from Backstairs Passage, 22 fms (=40 m), USNM 85673, calice (× 8.1) and detail of septal face dentition (×21).
FIGURE 4. a-d, Scolymia australis: a, c, specimens from Reevesby L., SAM H464, one having six calicular centres (× 0.9), the other one (× 1.0); b, east of Blyth L., SAM H471, corallum with two calicular centres joined by lamellar plates, × 1.2; d, Port Blanche, SAM H455, typical growth form with only one mouth, × 1.9. e, f, Anthemiphyllia dentata from 'Kimbla' 7/73-37, NMV FS7153, both × 1.9. g-i, Caryophyllia planilamellata: g, specimen from off Cape Jaffa, 300 fms (=549 m) having 18 pali, SAM HS05, × 2.0; h, i, C. clavus of Wells (1958), BANZARE 115, SAM HS16, × 1.75, × 1.4, respectively.
FIGURE 5. a, d, g, h. *Crispatorchus inornatus*: a, d. *Cyanthoceras cornu* of Hoffmeister (1933), AM E4657, lateral (× 2.2) and calicular (× 2.7) views; g. paralectotype of *Cyanthoceras cornu* Moseley (1881), HMS 'Challenger' 163, BMNH 1880.II.25.60, × 4.3; h, holotype of *C. inornatus*, Macleay Museum, × 4.7. b, c, e, f. *Caryophyllia sarsi*: b, e, 'Franklin' 33, NMV F57172, lateral (× 1.9) and calicular (× 2.5) views of specimen with 14 pali; c, f, 'Soela' 16 (1987), lateral (× 1.0) and calicular (× 1.5) views of a specimen with 13 pali, TM K120 i, *Puraconotrochus zeidleri*, holotype showing relatively well-developed pali, SAM H520, × 2.3.
FIGURE 6. a, b, paratype of *Paraconotrochus zeidleri* from ‘Soela’ 51, SAM H521, lateral and stereo calicular views of specimen lacking pali, both × 2.5. c, f, *Conotrochus* sp. cf. *C. funiculosa*, ‘Soela’ 33, SAM H525, calicular (× 2.2) and lateral (× 1.9) views of corallum. d, e, g, h, *Aulocyathus recidivus*: d, g, *Ceratotrechus typus* of Wells (1958), BANZARE 115, SAM H527, calicular (× 4.7) and lateral (× 2.5) views of same corallum; e, h, ‘Franklin’ 32, NMV F57169, calicular (× 5.2) and lateral (× 2.8) views of same corallum.
FIGURE 7. a-c, calicular, basal, and lateral views of *Stephanocyathus platypus*, 'Silent Victory' 5, SAM H530, × 0.64, × 0.66, × 0.82, respectively. d-f, calicular, basal, and lateral views of *Stephanocyathus* sp., 'Soela' 51, SAM H534, × 1.3, × 1.3, × 1.5, respectively. g-i, *Stephanocyathus spiniger*: g, i, *Odontocyathus sexradii* of Hoffmeister (1933), AM E3730 (now USNM 85318), calicular (× 1.2) and lateral (×1.5) views; h, *Stephanocyathus 'tatei*', Bird Rock Cliffs, Torquay, Victoria, Miocene, USNM 353577, × 2.0. j-l, *Deltocyathus magnificus*: j, l, calicular and basal views of holotype, BMNH, both × 1.3; k, 'Franklin' 27, NMV F57164, × 1.1.
FIGURE 8. a, *Deltocyathus magnificus*, 'Silent Victory' 3, SAM H540, corallum fragment showing cross section of a broken wall and a C, costoseptal face, $\times$ 14.5. b, c, *Desmophyllum cristagalli* reported by Hoffmeister (1933): b, AM E4660 (now USNM 85319), $\times$ 0.64; c, AM E5541 (now USNM 85320), $\times$ 1.05. d, e, *Solenosmilia variabilis*: d, 'Soela' Stn 00, TM KII27, bushy corallum, $\times$ 0.37; e, one of Hoffmeister's (1933) specimens from Great Australian Bight, AM GI2259 (now USNM 85682), $\times$ 0.72. f-h, paratypes of *Trematotrochus alternans*: f, off Beachport, 49 fms (=90 m), SAM H558, lateral view showing semiporous theca, $\times$ 15.5; g, h, Gulf St Vincent, 17 fms (=31 m), USNM 85688, oblique calicular ($\times$ 17) and stereo calicular ($\times$ 13.5) views.
FIGURE 9. a, e, Trematotrechus verconis, Beachport, 49 fms (=90 m), USNM 85684, lateral (×13.3) and stereo calicular (×16.1) views of same corallum. b, c, paratype of Trematotrechus alternans (paralectotype of Conocyathus compressus, AM G7024), ×7.6, ×9.1, respectively. d, f, g, Holocotrochus scriptus from Kangaroo L., 59 fms (=108 m), USNM 85687: edge (×29), calicular (×44), and stereo calicular (×28) views.
FIGURE 10. a, c, d, *Holothurin crenulatus* from Kangaroo I., 55 fms (=101 m), USNM 85692: stereo calicular (×29), lateral (×26), and edge (×28) views, the latter showing the broad edge sulcus. b, e-h, *Platyrochus laevigatus*: b, paratype from St Francis I., 15-20 fms (=27-37 m), (*P. compressa* of Dennant, 1904), SAM H570, corallum face with five costal trifurcations, × 4.9; c, f, h, paratype from Gulf St Vincent, USNM 85695: edge view (× 9.5), lateral view with only three costal trifurcations (× 8.6), and enlargement of one costal trifurcation (× 81); g, holotype from St Francis I., SAM H569, × 5.5.
FIGURE II. a-f, Platychochus hastatus: a, b, d, specimen from St Francis I., 35 fms (=64 m), USNM 85690: lateral view showing the typical two costal trifurcations (× 12.4), stereo calcular view (× 19.8), and an enlargement of the smooth, noncostate, basal section of corallum (× 59); c, USNM 85690 (data as above), smooth basal theca of a juvenile, × 28; e, f, syntypes of P. hastatus, NMV P27094, × 4.8, × 12.2, respectively. g, h, Platychochus airensis, holotype, NMV P27093, × 7.8, × 7.6, respectively.
FIGURE 12. a–d, *Platyrochus parisepta* a, c, d, paratype from Backstairs Passage, 22 fms (=40 m), USNM 85691: stereo calicular (×12.3), edge (×9.9), and lateral (×10.3) views; b, holotype, SAM H589, ×70. e–g, *Australocyathus vincentinus*, paratype from Gulf St Vincent, USNM 85699: various magnifications of granular costae and corallum base, ×50, ×14, and ×7.1, respectively.
FIGURE 13. a-b, calicular views of *Australocyathus vincentinus* from Gulf St Vincent, USNM 85699, × 6.9, × 17.3, respectively. c, d, *Peponocyathus australiensis*, MUSORSTOM 2-33, from the Philippines (see Cairns, 1989a), USNM 81836: lateral (× 12.7) and stereo calicular (× 10.2) views. e, f, *Dunocyathus parasiticus* from off Cape Jaffa, 90 fms (=165 m), USNM 85698: e, anthocaulus stage basally encrusted by bryozoans, × 14.2; f, stereo calicular view of anthocaulus, × 11.
FIGURE 14. a, d, Danocycatus parasiticus from Cape Jaffa, 165 m, USNM 85698, lateral views showing alternation of septa and costae, \( \times 16.1 \), \( \times 60 \), respectively. b, c, Stenocyathus vermiformis, 'Franklin' 27, NMV F5763, calicular (\( \times 8.4 \)) and lateral (\( \times 3.1 \)) views, the latter showing characteristic rows of thecal spots. e, f, Idiotrochus emarcicatus (syntypes of _I. e._ var. _pereiguis_ from E of Neptune Is, 45 fms (=82 m)); c, USNM 85701, anthocyathus showing edge crests and vestigial anthocaen, \( \times 19.8 \); f, RMNH18060 lateral view of well-developed anthocyathus, \( \times 76 \). g, h, Geynia annulata, 'Spencer Gulf, USNM 85700: lateral view showing irregular costae (\( \times 54 \)) and stereo calicular view of columnella and internal thecal cavities (\( \times 43 \)).
FIGURE 15. a-c, f, Flabellum australe: a, b, syntype from HMS 'Challenger' 163, BMNH 1880.11.25.81, calicular (× 0.85) and lateral (× 0.78) views; c, off Cape Jaffa, 90 fms (=165 m), SAM H625, × 1.4; f, off Cronulla, New South Wales, 65–105 m, USNM 78510, lateral view showing robust primary costae, × 0.77. d, e, g, Flabellum transversale: d, e, lateral and calicular views of holotype, HMS 'Challenger' 162, BMNH 1880.11.25.84, × 1.5, × 2.0, respectively; g, 'Kimbla' K7/73-71, NMV F56891, × 1.6. h, i, Placotrochides scaphula from 'Franklin' 33, NMV F57173: calicular (× 7.2) and lateral (× 6.5) views.
FIGURE 16: a–c, Flabellum tuthilli: a, c, 'Soela' 51, SAM H640, lateral (× 1.15) and oblique edge (× 1.2) views; b, paratype #7 from 'Endeavour', USNM 68231, calicular view, × 1.3. d–f, paratype of Flabellum hoffmeisteri from 'Soela' 27, SAM H643, lateral (× 0.96), calicular (× 1.15), and edge (× 1.4) views. g–i, Rhizotrechus tuberculatus: g, h, large specimen from off Burnie, north-west Tasmania, TM K421, lateral (× 1.5) and calicular (× 1.9) views; i, basal view of specimen from Gulf St Vincent, 20 fms (=37 m) showing 6 + 2 rootlets, SAM H656, × 2.9.
FIGURE 17. a-c, Balanophyllum bairdiana: a, b, off Gabo I., SAM H662, lateral and calicular views, both × 1.7; c, HMS 'Challenger' 162 (specimen reported by Moseley, 1881), BMNH 1880.11.25.139, × 1.8. d-g, Balanophyllia dentata: d, g, lateral (× 2.9) and calicular (× 5.5) views of holotype, Macleay Museum; e, f, lateral and calicular views of specimen from off Port Jackson, BMNH 1883.11.29.71, × 2.9, × 3.2, respectively. h, Notophyllia recta from 'Kimbla' 79-K-1-35, NMV F56884, stereo calicular view, × 12.2.
FIGURE 18. a, d, Notophyllia recta from 'Kimbla' 79-K-1-35, NMV F 56884, lateral view of anthocyathus showing basal scar (× 12.2) and oblique calicular view (× 12.9). b, c, paratype of Notophyllia etheridgei, 'Endeavour', USNM 68229, calicular (× 4.3) and lateral (× 3.8) views. e-i, Enallopsammia rostrata: e, f, calicular and acalicular faces of colony from south-east of Eaglehawk Neck, Tasmania, 960 m, TM KI224, both × 0.35; g-i, 'Soela' 16 (1987), TM KI092: g, acalicular face showing costal striae, × 0.51; h, i, enlargements of several rostrate calices, × 3.1, × 3.5, respectively.