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THE DEVONIAN CORAL FAUNA OF THE POINT HIBBS LIMESTONE, TASMANIA

By

J. S. JELL AND D. HILL

University of Queensland

(With six plates and two text figures)

ABSTRACT

Of the fourteen species (six new) assigned to eight rugosan and five tabulatan genera, identified in the coral fauna of the Point Hibbs Limestone of the west coast of Tasmania, eleven are systematically examined and illustrated. The genus *Endophyllum* is discussed in relation to *Sinospongophyllum* and *Tabulophyllum*. The microstructure of Silurian and Devonian cystimorphs is considered. The age indicated by the coral fauna is within the range Siegenian to Lower Couvinian and is possibly Emsian.

Only three of the species of corals from the Point Hibbs Limestone of the west coast of Tasmania have been described previously (Hill, 1942b). With few exceptions the new material on which this study is based was collected and kindly loaned to us by Maxwell R. Banks of the Geology Department, University of Tasmania. The catalogue numbers of these specimens are prefixed by UTGD. A few specimens housed in the Queen Victoria Museum of Launceston were loaned to us by the Director, Mr W. F. Ellis; these are indicated by QVM. Specimens from the collections of the Australian Museum, Sydney, National Museum of Victoria, Melbourne and the University of Queensland, Brisbane are prefixed by AM, NMV and UQ respectively. Paratypes are not cited by number in the text, but are identified as such on their museum labels.

The location of the Point Hibbs Limestone is shown on text-figure 1, redrawn from the Geological Map of Point Hibbs (Geology of Tasmania one inch series—University of Tasmania Geology Department 3375) by M. R. Banks assisted by N. Ahmad and R. J. Ford, and published in 1970. Point Hibbs has geographical co-ordinates 145° 15′ E 42° 37′ S.

The coral fauna contains: *Pseudamplexus princeps?* (Etheridge), *Martinophyllum approximans* (Chapman), *Gurievskiella abyssus* sp. nov., *Disphyllum repansum* sp. nov., *Endophyllum banksi* sp. nov., *Tryplasma* spp., *Rhizophyllum enorme* Etheridge, *Plasmophyllum* (*Plasmophyllum*) *tasmaniense* sp. nov., *Favosites goldfussi* d'Orbigny, *F. careyi* sp. nov., *Squameofavosites bryani* (Jones), *S. bryani* var. *ramosus* var. nov., *Cladopora* sp., *Thecostegites ejuncidus* sp. nov. and *Aulopora* sp.

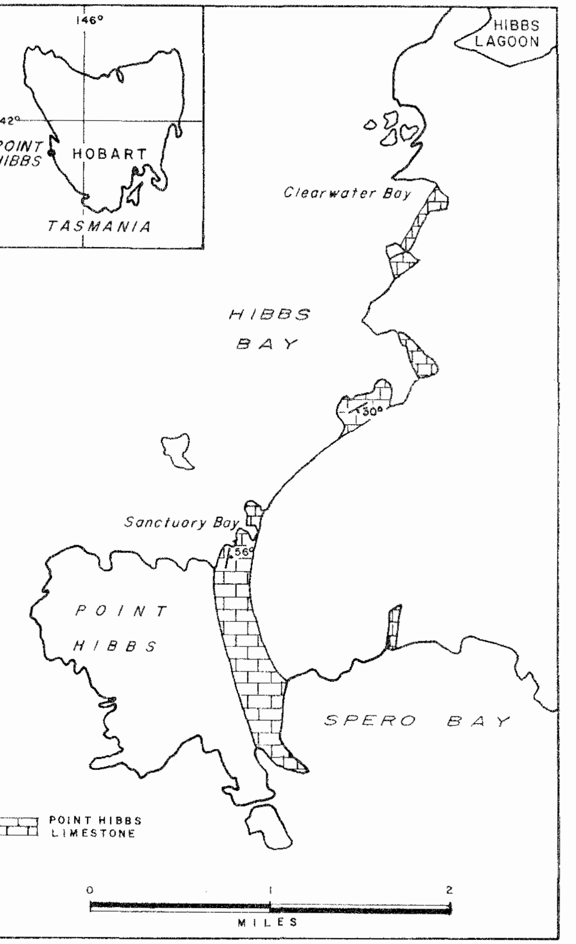


FIG. 1.—Map showing the distribution of the Point Hibbs Limestone, west coast of Tasmania.

AGE

Banks (*in* Talent & Banks, 1968) after a preliminary study of the entire fauna, suggested an Emsian or Eifelian age, most likely late Emsian. Philip & Pedder (1968), after a preliminary study of corals and conodonts, correlated the Point Hibbs fauna with that of the Coopers Creek Formation and the Lilydale Limestone of Victoria, and considered it Lower Siegenian.

The Point Hibbs Limestone shares two coral species with the Coopers Creek Limestone of Victoria, which is considered Lower Siegenian mainly on evidence from conodonts by Philip & Pedder (1968) and Upper Siegenian (Talent, 1965, p. 183) or Lower Emsian (Talent *in* Talent & Banks, 1968, table 1) mainly on the regional stratigraphic and brachiopod evidence. These species are *Martinophyllum approximans* (Chapman) and *Squameofavosites bryani* (Jones). The latter ranges in Victoria up to the Murrindal Beds of the Buchan district which Philip & Pedder (1968) consider Emsian and which Hill (1950) and Talent (*in* Talent & Banks, 1968) consider Couvinian. The only known overseas occurrence of *Martinophyllum* is in the undifferentiated 'Eifelian' of the eastern slopes of the Urals. *Squameofavosites* entered in the Ludlovian or Skalian of Podolia, was very common in Europe and Asia during the Lower Devonian and became extinct within the Couvinian. *Rhizophyllum enorme* Etheridge occurs elsewhere in Australia in the Siegenian? to Emsian Garra Beds (Strusz, 1968) of New South Wales and Mt Etna Limestone of Queensland, which Hill (1942a) considered Coblenzian (Emsian) but which Philip & Pedder (1968) regard as within the range Upper Siegenian to top of Emsian or perhaps Eifelian. In the U.S.S.R., *R. enorme* (or closely similar species) is illustrated from the Krekov and Maly Bachat Beds (Siegenian to Emsian) of the Salair, and from rocks of similar age in south Fergana and the northern Urals. In the U.S.A. a specimen compared to *R. enorme* is illustrated from the Gedinnian or Siegenian of Nevada. *Favosites goldfussi* has a long range, Lower and Middle Devonian in Eurasia and Australia. *Endophyllum banksi* sp. nov. is reasonably similar to the Couvinian or Givetian *E. yunnanense* Mansuy from China and the Givetian and Frasnian? *E. abditum* Edwards & Haime from Devon. The range of *Endophyllum* overseas is Salairka Beds ('Upper Emsian, Lower Eifelian' of the Salair) to the Frasnian. Our new species of *Gurievskiella, Disphyllum, Plasmophyllum* (*Plasmophyllum*), *Favosites* and *Thecostegites* are not very similar to other described species of these genera. *Gurievskiella* ranges in Victoria from the Coopers Creek Formation to the Emsian (Philip & Pedder, 1968) or possibly early Couvinian (Hill, 1950) Buchan Caves Limestone, and in the U.S.S.R. from the Maly Bachat Beds of the Salair ('Lower Emsian') to the 'Eifelian' of the Urals, and in China, in the Middle Devonian. *Disphyllum* and *Thecostegites* range throughout the Devonian, *Thecostegites* entering in the late Lower Ludlow in the Grebeni horizon of the Polar Urals (Dubatolov, *et al.*, 1968). *Plasmophyllum* (*Plasmophyllum*) ranges throughout the Lower and Middle Devonian. *Tryplasma* is predominantly Silurian and *Pseudamplexus* predominantly Lower Devonian, but each occurs sparsely in the Couvinian. *Cladopora* sp. and *Aulopora* sp. are not significant of age.

It seems to us, therefore, that the age of the Point Hibbs Limestone lies within the range Siegenian to Lower Couvinian, and that an Emsian age is possible.

SYSTEMATIC DESCRIPTIONS

Order RUGOSA Edwards & Haime, 1850

Suborder **Streptelasmatina** Wedekind, 1927

Superfamily *ZAPHRENTICAE* Edwards & Haime, 1850

Family MYCOPHYLLIDAE Hill, 1940

Genus **PSEUDAMPLEXUS** Weissermel, 1897

Pseudamplexus princeps? (Etheridge), 1907

Plate 1, fig. 1

Part of a large cylindrical corallite UTGD 52066 is doubtfully identified as *Pseudamplexus princeps* (Etheridge), 1907.

Family PHILLIPSASTRAEIDAE C. F. Römer, 1883

Subfamily PARADISPHYLLINAE Jell, 1969

Genus **MARTINOPHYLLUM** Jell & Pedder, 1969

Type species, diagnosis, discussion and distribution: See Jell & Pedder (1969).

Martinophyllum approximans (Chapman, 1914

Plate 1, figs 10-13

Cyathophyllum approximans Chapman, 1914a, p. 304, pl. 47, figs 5, 6; 1914b, p. 129, fig. 69A.

Heliophyllum ?chillagoense (Etheridge); Hill, 1942b, p. 6, pl. 2, figs 3a, b.

Hexagonaria approximans (Chapman); Hill, 1954, p. 107, pl. 6, figs 3a, b; Philip, 1962, p. 177, pl. 24, figs 4, 8, 9, text-fig. 4a.

Hexagonaria aff. *approximans* (Chapman); Hill, 1954, p. 108, pl. 6, figs 4a, b.

Martinophyllum approximans (Chapman); Jell & Pedder, 1969, p. 738, pl. 96, fig. 5.

Martinophyllum sp. B. cf. *M. approximans* (Chapman); Jell & Pedder, 1969, p. 739, pl. 96, figs 6, 8.

Lectotype (chosen Hill, 1954, p. 107): NMV P1247 and thin sections P12896, P17902, P17903, P20521, P20522, and possibly P24052 from a limestone of the Coopers Creek Formation, Coopers Creek, near Walhalla, Victoria; Philip & Pedder (1968), mainly on evidence from conodonts, consider the age Lower Siegenian. Talent mainly on regional stratigraphic and brachiopod evidence, considers it Upper Siegenian (1965, p. 183) or Lower Emsian (*in* Talent & Banks, 1968, table 1).

Diagnosis: Medium to large *Martinophyllum* (corallite diameter 6 to 20 mm) with 30 to 50 long, thin or fusiform, smooth or carinate septa that may be retiform peripherally; dissepimentarium wide, commonly everted; tabularium narrow with elevated tabularial floors.

Description of Tasmanian material: The twenty-six coralla from Point Hibbs are cerioid, broadly conical with convex upper surfaces, the largest colony being 18 cm in diameter and 10 cm in height. On the calicular surface the corallites are outlined by their slightly elevated walls. The calicular platforms are flat or slightly everted but axially are steeply declined towards a deep flat-bottomed pit. The adult corallites vary from 8 to 18 mm in diameter (mean for all coralla is 11.6 mm). They are polygonal with straight or slightly crenulate walls in the mature parts of a corallum but in the younger stages where increase is rapid their walls are curved. Increase is peripheral and non-parricidal. Initially the septa of the parent and daughter corallites are continuous. A dividing wall is progressively inserted only after dissepiments are developed in the offsets; some offsets become walled off at diameters of 2 mm while others are still without a fully developed dividing wall at a diameter of 7.5 mm. The common wall between corallites is 0.15 to 0.3 mm thick.

The septa are radial and in two orders with sixteen to twenty-five in each (commonly twenty at diameters of 11 to 12 mm). The major septa may extend to the axis but are commonly evenly withdrawn leaving an axial space up to 3 mm in width. The minor septa do not project beyond the dissepimentarium. The septa of both orders are commonly thin or slightly fusiform, smooth, and straight but some are strongly dilated in the inner dissepimentarium becoming strongly fusiform while others are carinate and in the outer dissepimentarium may become retiform. The carinae are of the zig-zag type and generally short. In the tabularium the major septa are thin or rarely thickened (UTGD 52003) straight or flexuose and occasionally carinate; in forms with a wide axial space the septa may be represented by discrete spines axially. The trabeculae are fanned over the inner dissepimentarium becoming vertical or slightly inclined upwards and outwards at the periphery.

The tabularium is narrow, 4 to 5 mm in diameter. The tabularial floors are arched. In forms in which the major septa are withdrawn from the axis, the tabulae are complete and mesa-shaped, often sagged axially. In others with the major septa extending to the axis a periaxial series of flat tabellae and an axial series of convex tabellae inclined upwards to the axis are developed.

The broad dissepimentarium is composed of numerous, small, globose dissepiments commonly differentiated vertically into alternating zones of smaller and larger plates. In the larger corallites, small, globose, lateral dissepiments lining the septa may intervene between the septa and the normal dissepiments. The tendency for the septa to become retiform at the periphery in the larger corallites gives the outer dissepimentarium a lace-like appearance.

Comparisons: The study of eleven topotypes (UQF 57617, 57619-57626, NMV P24502) of *M. approximans* shows that variation at the type locality is greater than previously thought. The coralla are small, rarely exceeding 10 cm in diameter and adult corallites range from 7 to 13.5 mm (mean of twenty-eight corallites, 10.1 mm). Their septal number varies from 34 to 46 (mean 37.3). The septa are variously modified, the commonest being dilated and with or without carinae, becoming fusiform in transverse section except where the dissepimentarium is narrow when they are cuneate; others may be strongly retiform in the outer dissepimentarium. The septa reach the axis in 37% of the corallites and in 10% are withdrawn more than half the radius of the tabularium. Except in forms with the septa withdrawn from the axis the tabularia are biserial with the axial tabellae tent-shaped and producing a clisioid structure. The dissepimentarial floors are commonly everted.

Eight specimens (UQF 3681-3, 57628-30, NMV 15954, 26043) from the Coopers Creek Formation at Tyers Quarry, Tyers, near Walhalla are from larger coralla up to 25 cm in diameter. The corallites are generally larger, from 10 to 18 mm in diameter (mean of sixteen corallites 13.4 mm) and with more septa, 34 to 48 (mean 41.4), than the topotypes. The septa show the same variation in modification as the topotypes although the commonest form is that of heavily carinate septa becoming retiform in the outer disseptimentarium. In 72% of the corallites the septa are either retiform or fusiform and carinate while in only 13.6% are they thin and non-carinate. The major septa are generally long extending more than half the radius of the tabularium and in 56% they reach the axis. The tabularium is generally tent-shaped and biserial. The dissepimentaria are broad and everted.

TABLE I—PERCENTAGES OF CORALLITES WITH VARIOUS TYPES (A-C) OF SEPTAL MODIFICATION

Locality	N	*Septal modification*				
		A1	A2	B1	B2	C
Coopers Creek	36	19.4	5.5	36.1	33.3	5.5
Tyers	22	13.6	4.5	4.5	23.3	50.5
Point Hibbs	87	42.5	10.3	16.1	19.5	11.5

N, number of corallites; A1, thin non-carinate; A2, thin, carinate; B1, fusiform, non-carinate; B2, fusiform, carinate; C, retiform.

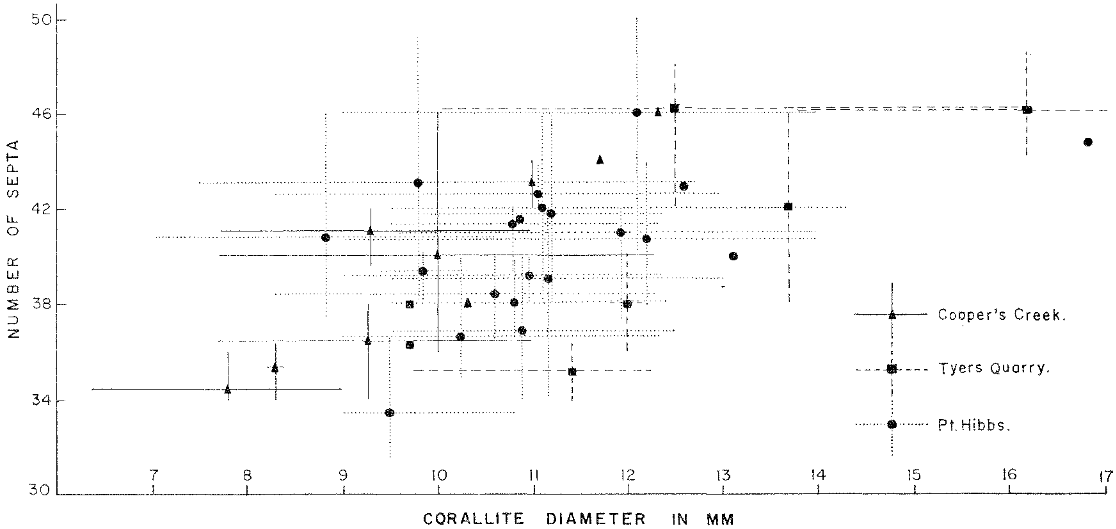


FIG. 2.—Plots of septal number and corallite diameter for *Martinophyllum approximans* from Coopers Creek and Tyers Quarry, Victoria and Point Hibbs, Tasmania, showing the means for each corallum and the range of variation within the corallum.

The Point Hibbs material is intermediate between the Coopers Creek and Tyers material in size of corallum (maximum diameter 18 cm), diameter of corallite (range of 103 corallites 8 to 18 mm, mean 11.6 mm) and septal number (of 103 corallites 32 to 50, mean 40.2), see text-figure 2. Although the septa show the same degree of modification as the Victorian material, the commonest are thin, noncarinate and withdrawn from the axis. Only in 20% of the corallites do the major septa reach the axis and in 23% they do not extend more than half the radius of the tabularium from the axis. The tabularia are simpler and contain more complete tabulae than the Victorian material. The dissepimentarial floors are flatter and less commonly everted than in the Coopers Creek and Tyers material.

The collections from the three localities, although their characteristic septal structure, mean corallite diameter and mean septal number are distinct, show similar variation and are considered conspecific. However, larger collections from the Victorian localities may show that subspecies should be distinguished for the three localities.

A specimen UQF 17115 from Bell Point, Waratah Bay [presumably from the Waratah Limestone but possibly from the Bell Point Limestone] figured as *Hexagonaria* aff. *approximans* by Hill (1954, pl. 6, figs 4a, b) is similar to the larger of the topotypic specimens and has been discussed by Jell & Pedder (1969). A second specimen (UQF 17120) from Waratah Bay referred to *Hexagonaria* aff. *approximans* by Hill, 1954, p. 108, from the base of *Amphipora* limestone [Bluff Member of the Waratah Limestone] south of the Bluff is not considered conspecific with the first as it shows strong yard-arm carinae that are not known in *M. approximans*.

The septal modification giving retiform septa is similar to that illustrated by Haller (1935) and by Birenheide (1963) for species referred to *Cyathophyllum* and that by Birenheide (1964, pl. 8) and by Wedekind & Vollbrecht (1931, pl. 20) for species of *Plasmophyllum* (*Mesophyllum*). The arrangement of lateral dissepiments in rows parallel to the septa is also seen in these same genera (Birenheide, 1963, pl. 50 and Vollbrecht, 1926, pls 15, 16).

Genus **GURIEVSKIELLA** Zheltongova, 1961

Gurievskiella Zheltonogova, *in* Zheltonogova & Ivaniya, 1961, p. 403; Jell & Hill, 1969, p. 11.

Type species, diagnosis, discussion and distribution: See Jell & Hill (1969).

Gurievskiella abyssus sp. nov.

Plate 1, figs 2-9

Latin, *abyssus*—deep pit, reference to calice.

Holotype: UTGD 52033/2 from the Point Hibbs Limestone, Point Hibbs, western Tasmania; Emsian?

Diagnosis: Solitary to weakly compound Rugosa with very deep calice. Septa fusiform, extending unequally to the axis, carinate peripherally; cardinal septum commonly short; counter septum longest of major septa; fossula may be weakly developed; trabeculae monacanths with their fibres nearly parallel to trabecular axis. Tabularium wide, tabulae broad and arched with upturned margins. Dissepimentarium narrow, dissepiments numerous, small, globose, evenly declined axially.

Description: The corallum is either solitary or compound in which two generations of offsets form a loosely united bushy colony. The corallites are moderately small, occasionally curved, and trochoid becoming ceratoid to sub-cylindrical in the larger specimens. The holotype is a slightly curved, trochoid corallite 18 mm in calicular diameter and approximately 33 mm in height; it shows one peripheral offset. The maximum corallite diameter measured was 22 mm in a corallite 35 mm in height. The calice is characteristically deep with steep sides and a narrow margin. Its floor is arched with a narrow periaxial trough and broad high median boss. Smaller corallites with the calice extending almost to the proximal tip are considered juveniles. The epitheca where preserved is thin. The exterior of the corallites shows prominent septal grooves, broad interseptal ridges and less obvious growth annulations. Increase is peripheral, non-parricidal; commonly four offsets are developed simultaneously.

In adult corallites there are usually twenty-nine to thirty-five septa of each order. They are pinnately arranged about a long counter septum and a commonly reduced cardinal septum. The cardinal fossula is only sometimes apparent in transverse section. The alar septa are commonly longer than the metasepta. In specimens in which the fossula is distinguishable, it is on the concave side of the curved corallites. The septa are fusiformly dilated in the dissepimentarium where they are commonly carinate or vepreculate. Carinae are short and irregular. The major septa extend unevenly to the axis. They are commonly thin midway between the tabularial boundary and the axis but dilated in an axial zone where they become irregular, often turned aside and commonly joined or interfingered with adjacent septa. Axially some are represented by discrete traberculae.

The septa are monacanthine. The fibres of a trabecula diverge only slightly from its axis. The fibres or groups of fibres may be elongated laterally to produce vepreculae or carinae. No central axis can be seen in the elongated lateral bundles to suggest that they are rhipidacanths.

The tabularium is wide with domed tabularial floors except for a narrow marginal furrow. It is deeply concave beneath the cardinal fossula. The tabulae are domed with upturned edges; in larger specimens they may be replaced by flat to elongate convex tabellae.

The dissepimentarium is narrow, only occasionally consisting of more than three rows of dissepiments. The dissepiments are small, globose and steeply inclined inwards and downwards; no areas of eversion of the dissepimentarial floors are developed. In the smaller specimens the high narrow calical lips have only a single series of small dissepiments.

Remarks: The generic affinities of this species are obscure. In its deep calice and bilateral symmetry it resembles *Ceratophyllum* Gürich, 1896, with type species *C. typus* Gürich, 1896, p. 181, from the Stinkkalken, Szydlowek, Poland, Middle Devonian (possibly Lower Givetian). It differs however in septal microstructure, in not possessing rhipidacanths, and in its steeply and evenly declined dissepimentarium. *Kunthia* Schlüter, 1885, with type species *K. crateriformis* Schlüter, 1885, p. 7; 1889, pl. 1, figs 10, 11, from the Middle Devonian of Esch, Eifel district, Germany, has a similar deep calice and has fusiform septa with short irregular carinae of the phillipsastraeinid type. However, the type specimen of *K. crateriformis* has not been sectioned and its internal structure is not known.

In the new species, the septa, their bilateral arrangement and their microstructre are typical of *Gurievskiella* to which we refer it with some reservation. Its dissepimentarium of small dissepiments evenly declined axially is as in *Disphyllum* whereas in *Gurievskiella* the dissepimentarium is usually everted. The absence of eversion in *G. abyssus* may result from the narrowness of its dissepimentarium and the height of the calicular rim. *G. abyssus* does not resemble any other previously described species.

Subfamily DISPHYLLINAE Hill, 1939

Genus **DISPHYLLUM** de Fromentel, 1861

Disphyllum de Fromentel, 1861, p. 302; Lang & Smith, 1934, p. 80; Lang & Smith, 1935, p. 544; Smith, 1945, p. 20; Hill & Jell, 1970b (in press).

Type species, diagnosis and distribution: See Hill & Jell (1970b).

Disphyllum repansum sp. nov.

Plate 2, figs 3, 4, 6-9

Latin, *re*—again, *pando*—to spread.

Holotype: UTGD 52805 from the Point Hibbs Limestone, Sanctuary Bay, Point Hibbs, western Tasmania; Emsian?

Diagnosis: *Disphyllum* of essentially phaceloid habit in which the tall cylindrical corallites are laterally expanded periodically so that the corallum becomes periodically cerioid. Major septa long but do not reach the axis; tabularial floors arched, tabellae large and convex.

Descriptions: The coralla are phaceloid and the corallites lie closely together, never more than 8 mm apart. The corallites are initially trochoid to ceratoid but become cylindrical and tall; the average diameter is 11 mm and the largest 13.5 mm. Periodically within a corallum the corallites are expanded laterally so that adjacent corallites are in contact for up to 7 mm of their length and in transverse section the colony then appears cerioid. The calices usually have a narrow calicular rim and slope evenly downwards to a moderately deep axial pit except where the corallites are in contact when the rim becomes broad and even everted in places. The corallite walls are thin, 0.2 mm thick, and externally show narrow septal grooves and broad rounded interseptal ridges. Increase is predominantly peripheral and non-parricidal but some offsets develop from the median parts of the tabularium. In at least one corallite of QVM 834, increase is parricidal; a large corallite gave rise to seven peripheral offsets from its dissepimentarium; simultaneously it grew forward from its wide axial region and then gave rise to two axial parricidal offsets (pl. 2, fig. 4). Increase in the corallum is commonly associated with the lateral expansion of the corallites.

There are thirty-eight to forty-eight (mean forty-two) septa arranged in two orders. They are straight and thin or peripherally dilated to become cuneate in transverse section, except at the lateral expansions of the corallites where they are thin and corrugated or straight and fusiform. They are either smooth or carry short carinae especially where the septa are dilated. The major septa are two-thirds to four-fifths and the minor septa a little more than half, the radius of the corallite. The septal microstructure is disphyllinid with wide monacanths directed upwards and inwards. The tabularium is about half the diameter of the corallite. In juvenile corallites the tabulae are simple, complete and horizontal. In adult stages they become arched, sometimes with a median flattening or depression, and consist of elongate convex tabellae. The dissepiments are small, uniform and globose, evenly inclined towards the axis except where the dissepimentarium is expanded in the lateral swellings of the corallites; here they are larger, more elongate and horizontally based or declined peripherally.

Remarks: In growth form and internal structure *D. repansum* is distinct from all previously described species of *Disphyllum*. Its colony form, however, resembles that of *Eridophyllum colligatum* (Billings) from eastern North America as figured by Rominger (1876, pl. 38, fig. 3) from drift material of the Corniferous limestone of Michigan and by Lambe (1901, pl. 13, fig 2) from the Corniferous limestone of Walpole, Ontario. Oliver (1968, table III) lists *E. colligatum* from the late Lower Devonian Bois Blanc Formation of Ontario and western New York.

Suborder **Columnariina** Rominger, 1866

Family CHONOPHYLLIDAE Holmes, 1887

Subfamily ENDOPHYLLINAE Torley, 1933

Genus **ENDOPHYLLUM** Edwards & Haime, 1851

Type species: by subsequent designation of Schlüter (1889, p. 51), *Endophyllum bowerbanki* Edwards & Haime, 1851, p. 394; 1853, p. 233, pl. 53, fig. 1; Barton, near Torquay. The massive limestone of Barton Quarry, from which Edwards & Haime's type material presumably came, is now (Scrutton, 1968, p. 188) considered Upper Givetian. The neotype of this species, selected 'at least provisionally' by Jones (1929, p. 87), is British Museum specimen R1448 from Rocky Valley, Torquay; Upper [?] Devonian.

Diagnosis: Sub-cerioid, cerioid or thamasterioid Rugosa; corallites large with marginarium consisting of a septal stereozone broken up by large lonsdaleoid dissepiments, septa long, thinner and commonly convolute in wide tabularium, tabulae flat-topped domes with upturned edges.

Remarks: In referring our new species to this genus, we have considered the two morphologically similar and probably related but commonly solitary genera *Sinospongophyllum* Yoh, 1937 (type species *S. planotabulatum* Yoh, 1937, p. 64, pl. 6, fig. 2, Middle Devonian of Kwangsi, China) and *Tabulophyllum* Fenton & Fenton, 1924 (type species *T. rectum* Fenton & Fenton, 1924, p. 31, pl. 6, figs 8-12, Frasnian [Cerro Cordo Member, Lime Creek Formation], Hackberry Grove, Iowa, U.S.A.).

Sinospongophyllum planotabulatum was originally described as solitary. Fontaine (1966) has referred to it two specimens from the Middle Devonian of Poshi, Yunnan, which he interprets as simple coralla, capable of producing offsets, associated in groups, thus resembling fasciculate and cerioid coralla. The thin sections he figured (pl. 14, figs 1, 3) are indeed of similar character to those of the lectotype (the specimen from Chiao-ting, Ping-lo, Kwangsi figured by Yoh, 1937, pl. 6, figs 2a, b, and chosen by Engel & Schouppé, 1958, p. 95). We agree with McLaren (1964, p. 19) that the septal structure of *S. planotabulatum* is sufficienly distinctive to maintain *Sinospongophyllum* as a genus separate from *Neosponsophyllum* Wedekind, contrary to the opinion expressed by Engel & Schouppé.

We cannot agree with Fontaine (1966) that *Endophyllum yunnanense* Mansuy (1912) should be transferred to *Sinospongophyllum*. We think its growth form to be sub-cerioid like that of *Endophyllum abditum*. Jones (1929, p. 87) described *E. abditum* Edwards & Haime (1851) as subphaceloid or cerioid; typically its corallites are contiguous but incompletely so, having free rounded angles. The thin sections from the holotype of *E. yunnanense* figured by Fontaine (1966, pl. 2, fig. 1; pl. 4, fig. 1) show peripheral offsets, and tightly fitting polygonal corallites with angular corners. Jones' illustrations of both *E. bowerbanki* and *E. abditum* and those given by Smith (1945, pl. 31, fig. 3) of *E. abditum* show septal carination similar to that in *Sinospongophyllum* and *E. yunnanense*. One of the features which Fontaine used to distinguish *Sinospongophyllum* from *Endophyllum* was the development of small convex tabellae at the edge of the flat top of the axial tabellae. This feature is found in many corals with domed tabulae, commonly associated with a shortening of the major septa by withdrawal from the axis; the tabulae then tend to sag axially and to be reinforced at the inner edges of the septa by these small convex tabellae. This phenomenon is well seen in *Entelophyllum* and is sporadically developed in the aphroid *Endophyllum schlüteri* and in the cerioid *Endophyllum* sp. figured by Hill, Playford & Woods (1967, pl. D8, fig. 2).

We consider *E. abditum* and *E. bowerbanki* to be so similar in their internal morphology that they must be congeneric. *E. abditum* ranges in growth form within the one colony from closely phaceloid to subcerioid and cerioid; *E. bowerbanki* ranges similarly from cerioid to aphroid.

We retain *Sinospongophyllum* for solitary or weekly colonial species and note that it ranges from the Lower Devonian at least into the Middle Devonian. We find *Tabulophyllum* to be useful for solitary coralla or coralla which produce only one generation of offsets, with relatively thin, and commonly short septa, less closely spaced than in *Endophyllum*, but with a lonsdaleoid marginarium and tabulae that are flat-topped domes with upturned edges. Much further research is however required into relationships between *Tabulophyllum*, *Sinospongophyllum* and *Endophyllum*.

Distribution: Lower Devonian of Tasmania, Upper Emsian or Lower Eifelian of the Salair, Siberia; Middle Devonian of Europe, Asia and eastern Australia; ?Upper Devonian of Europe and Asia.

Endophyllum banksi sp. nov.

Plate 2, figs 1, 2, 5

Named in honour of Maxwell R. Banks, Geology Department of the University of Tasmania.

Holotype: UTGD 52091, Point Hibbs Limestone, southern shore of Sanctuary Bay, north side of Point Hibbs, western Tasmania; Emsian? Some fifteen paratypes.

Diagnosis: Large phaceloid to sub-cerioid colonies of large corallites; increase peripheral and commonly parricidal; dissepimentarium lonsdaleoid; tabularium wide, axial tabellae wide, flat-topped, domes; periaxial tabellae not regularly developed, flat or concave; septa long, crowded, thickened to contiguity peripherally; major septa may be convolute or grouped in tabularium; fossula slightly expanded axially.

Description: The holotype, a fragment, consists of two very large pieces, the larger 30 cm across. The corallites are conical, large, up to 45 mm in diameter. At this diameter the tabularium is 13 mm wide. A few corallites are oval in section. They are closely spaced and are commonly in contact with neighbours, when they become polygonal through mutual pressure. The calice has a sloping platform and shows the upper edges of the crowded long septa, each as a continuous radial ridge. Increase is peripheral, offsets arising with a diameter of 5 mm or more in a ring or partial ring around the dissepimentarium; the parent commonly fails to grow further; the offsets expand rather rapidly to adult diameters of over 30 mm. The thickness of the common wall between two contiguous corallites ranges from 1 to 1.25 mm.

The septa are crowded, and of two orders, sixty to sixty-five of each at diameters of 35 to 45 mm, and forty to forty-six at diameters of 18 to 20 mm. The septa are somewhat thickened in the tabularium and the thickening increases outwards so that neighbouring major and minor septa are contiguous in the dissepimentarium, where however, their vertical continuity is broken by large, inclined, elongate lonsdaleoid dissepiments, which are arranged in two or three vertical series, not regularly, but with interspersed smaller, elongate dissepiments.

The major septa are very long, reaching almost to the axis; in the tabularium they may all curve convolutely; in other corallites they may be grouped in irregular groups. A cardinal fossula is commonly plainly marked, bounded by the septa neighbouring a short cardinal septum and is slightly expanded inwards but almost closed at its axial end. The counter septum may be distinguished by its neighbouring minor septa being longer than the other minor septa. The minor septa may be contratingent; they may extend halfway across the zone of periaxial tabellae but in some corallites may be shorter.

The microstructure of the septa is somewhat obscured by recrystallisation; they show a median dark line in those parts within the tabularium; but in those parts based on the lonsdaleoid dissepiments the crystalline needles of $CaCO_3$ are less regularly pinnately arranged; as seen in radial longitudinal section of the dissepimentarium, the 'fibres' of the septa form large contiguous trabeculae that vary in width up to 12 in 2.5 mm; in some of these there appears to be a grouping of the fibres into 'tufts' in which the axial fibres are longer than the peripheral ones; the recrystallisation however leaves some doubt as to whether these tufts might not be second order trabeculae each with its own axis of divergence for its fibres. The orientation of the trabeculae in the discontinuous pieces of the septa based on the dissepiments is perpendicular to the curvature of the dissepiments.

The axial tabellae are flat-topped domes that may sag a little axially, when they may be reinforced by an irregular peripheral ring of smaller tabellae. They tend to be arranged in groups in which tabellae of smaller diameter lie with their outer edges abutting on tabellae of larger diameters. The periaxial tabellae are irregularly spaced, less numerous than the periaxial tabellae, and either flat or concave.

Remarks: In its growth form *E. banksi* resembles *E. abditum* and *E. yunnanense* rather than *E. bowerbanki*, being subcerioid to cerioid. The 'colony' from the Middle Devonian of Poshi, Yunnan, called *Sinospongophyllum planotabulatum* Yoh by Fontaine (1966, pl. 1, fig. 1) looks externally quite like our species, but Fontaine in his description implies that it is an association of solitary individuals with occasional offsets rather than a real colony.

The Tasmanian species differs from *E. bowerbanki*, *E. yunnanense* and *E. abditum* in having, in adult corallites between 30 and 40 mm in diameter, twice as many septa as the first two, and one and a half times as many as the third. Its septa are uniformly longer and more thickened than in the solitary corals referred by Fontaine (1966) to *Sinospongophyllum*.

The astraeoid *E. prantli* (Zheltonogova *in* Zheltonogova & Ivaniya, 1961) from the 'Lower Eifelian' Salairka beds (either Upper Emsian or Lower Couvinian, of the Salair, Siberia, has a wide tabularium like that of *Endophyllum*, rather than a very narrow one like that of *Iowaphyllum johanni* (Hall & Whifield, 1872, from the Frasnian [Cerro Gordo Member, Lime Creek Formation], of Hackberry Grove, Iowa, U.S.A.), the type species of *Iowaphyllum* Stumm (1949), to which genus Zheltonogova referred it. Its other characters are endophylloid. For a tabularium of 13 mm diameter ,it has only half the number of septa that *E. banksi* has, but the skeletal thickening is similar in the two species.

Phillipsastrea cuncta Pocta, 1902, which Prantl (1951, p. 11, pl. 4, figs 1, 2) transferred to *Iowaphyllum*, resembles *E. banksi* in the arrangement of its thickened septa and long lonsdaleoid dissepiments, but is described as thamnasterioid to subaphroid, with narrow tabularium (4-7 mm) and only eighteen septa of each order. The monotype is from the Slivenec Limestone of Koneprusy, Czechoslovakia, now (Pribyl & Vanek, 1968) regarded as Lower Pragian (Upper Siegenian). It should be re-investigated for possible relationship to *Endophyllum*.

Suborder **Cystiphyllina** Nicholson *in* Nicholson & Lydekker, 1859

Family TRYPLASMATIDAE Etheridge, 1907

Genus **TRYPLASMA** Lonsdale, 1845

Tryplasma spp.

Plate 3, figs 3-6

Tryplasma is represented in the fauna by twenty-two fragments of solitary coralla. Nineteen are from cylindrical corallites showing repeated rejuvenescence and are up to 12 mm in diameter. The rejuvenescence rings usually parallel one another and represent constrictions in the corallite diameter of less than 1 mm. They contain fifty-eight to seventy-two septa. The major septa are up to 2.5 mm in length and commonly only slightly longer than the minor septa. The septa project from a narrow stereozone and are spinose and rhabdacanthine. The trabeculae are straight and are commonly inclined upwards and inwards; however in parts of some corallites, especially before rejuvenescence, they tend to be almost horizontal. The tabulae are complete and slightly domed to concave; periodically they are thickened and then usually carry short trabeculae. These specimens show some similarity to *T. columnare* Etheridge, 1907, from the Siegenian? to Emsian Garra Formation of New South Wales but the material is not sufficient for precise identification.

Three specimens UTGD 51635, 51664, 51716 are trochoid with strong oblique rejuvenescence. They show numerous epithecal scales arranged in chevrons parallel to the rugae. They contain seventy-eight to eighty-two rhabdacanthine septa, the rhabdacanths projecting inwards and upwards from a narrow stereozone. The minor septa are half as long as the major septa. The tabulae are widely spaced and horizontal. In their shape, short minor septa and flat tabulae, these specimens resemble *T. wellingtonense* Etheridge, 1895, also from the Garra Formation.

Family GONIOPHYLLIDAE Edwards & Haime, 1850

Genus **RHIZOPHYLLUM** Lindström, 1866

Rhizophyllum enorme Etheridge, 1903

Plate 3, figs 1, 2

Rhizophyllum enorme Etheridge, 1903, p. 232, pl. 47, figs 1-7; Hill & Jones, 1940, p. 182, pl. 2, figs 3, 4.

Rhizophyllum cf. *enorme*; Hill, 1942a, p. 15, pl. 1, fig. 4.

Rhizophyllum uralicum Soshkina, 1949, p. 56, pl. 11, fig. 1; 1952, p. 176, pl. 10, fig. 40.

Rhizophyllum enorme; Bulvanker 1958, p. 46, pl. 17, fig. 1; Zheltonogova & Ivaniya, 1961, p. 393, pl. D47, fig. 2.

Type specimens: Two specimens AM F45944, F45945 from Boree Creek, portion 3, parish Cudal, county Ashburnham, near Molong, central New South Wales; Garra Formation, Siegenian? to Emsian.

Diagnosis: Large, solitary *Rhizophyllum* with septa well developed although commonly discontinuous in part on the flat counter side and with narrow stereozone on the curved side.

Description of Tasmanian material: The five corallites are solitary, calceoloid, suberect, and slightly curved in the counter-cardinal plane in their young stages. The apical angle varies from 45° to 60°. The largest is about 95 mm in height measured from the apex to the calicular lip on the flattened side; its maximum diameter is 70 mm and thickness measured at right angles is 33 mm. The exterior shows repeated rejuvenescence involving only small contractions of the diameter with the contractions, which are most noticeable on the flat side, never more than 5 mm. Rootlets up to 2.5 mm in diameter project from the rejuvenescence rings on the flat surface at or near its angle with the curved surface. The epitheca is almost entirely removed but where present, usually in the grooves of rejuvenescences, it is thin and shows fine growth rings, narrow septal furrows and broad longitudinal interseptal ridges. A broad ridge external to the counter septum divides the flat side longitudinally. The calice is deep, and steeply tilted down from the flat side. The calicular floor slopes moderately steeply away from a flat or slightly everted calicular platform on the flat side towards a deep sub-semicircular trough immediately inside the narrow steeply inclined calicular lip on the curved side. This trough deepens sharply in the counter cardinal plane. The calicular platform on the flat side exhibits radial ridges and a deep median pit in the large specimen and a prominent tooth in the smallest specimen.

In transverse section the corallum is semicircular with septa developed along the straight side. On this flat side the median (counter) septum is usually swollen laterally; it is the longest of the septa in sections through the young parts of the corallites and in the small specimen; however in calicular sections of the larger specimens it is considerably shorter than the adjacent septa which may be up to a quarter of the width of the corallite in length. The septa shorten gradually towards the angles where it is thought but not proved, that the alar fossulae are developed. In calicular sections a narrow stereozone is developed at the inner edges of the septa by the fusion of adjacent septa. In the calicular section of the largest corallite there are twenty-five septa on either side of the counter septum. Major and minor septa cannot be distinguished with certainty. In places the septa are discontinuous and represented by one or perhaps several rows of small corn-like projections on the dissepiments. On the curved side, there is a narrow stereozone, in which radial elements are sometimes distinguishable. The fossula is excentric, lying adjacent to the centre of the curved surface and is elongate in the counter-cardinal plane.

In longitudinal section through the fossula the lumen is filled with large skeletal elements sloping down towards the deep fossula. They are differentiated into elongate dissepiments and horizontal to concave tabellae. The dissepiments on the counter side are horizontally based near the periphery but increase in inclination towards the axis. Those on the cardinal side are steeply inclined. The tabularial floors are flat to concave. The boundary between tabularium and dissepimentarium is quite marked on the cardinal side but the two zones merge on the counter side. Periodic thickening of certain successive calicular floors or parts of floors give close, narrow stereocones corresponding probably with the rejuvenescence rings.

Remarks: The larger specimens from Point Hibbs resemble *R. enorme* from the Upper Siegenian? to Emsian Garra Formation, New South Wales, in all respects except that stereocones are more frequently developed, the peripheral stereozone on the curved side is slightly thicker, and the tabellae less globose; all these differences are of degree and in our opinion within the limits of intraspecific variation. The smallest specimen has a very acute apex and then expands rapidly so that the corallum appears flared; in section it is similar to the early stages of the larger specimens. It is considered a young form. Specimens from the Garra Formation show rapid but less marked expansion in the early stages of growth.

Tasmanian specimens are distinguished from the Wenlockian *R. sinense* Lindström, 1883b (see Hill & Jell, 1969) by their more complete septa and larger dissepiments and tabellae. They differ from *R. ukalundense* Jell & Hill, 1969 from the Emsian or more probably early Couvinian of Ukalunda, north Queensland, in their narrower and more poorly developed peripheral stereozones.

The only other recorded occurrence in Australia is one specimen referred to *R.* cf. *enorme* by Hill (1942a, pl. 1 fig. 4) from the Emsian Mt Etna Limestone, central Queensland.

Family PLASMOPHYLLIDAE Dybowski, 1873

Genus **PLASMOPHYLLUM** Dybowski, 1873

Subgenus **Plasmophyllum (Plasmophyllum)** Dybowski, 1873

Type species, synonymy and discussion: See Birenheide (1964) and Jell & Hill (1969, p. 15).

Distribution: Lower and Middle Devonian, cosmopolitan.

Plasmophyllum (*Plasmophyllum*) *tasmaniense* sp. nov.

Plate 3, figs 7-13

Holotype: UTGD 52054, Point Hibbs Limestone, Point Hibbs, western Tasmania; Emsian?

Diagnosis: Solitary *P.* (*Plasmophyllum*) with inversely and obliquely conical calicular floors deepest at the cardinal fossula at the outer edge of the tabularium, expanding slightly into a shallow subquadrate counter-cardinal trough and then rising more steeply towards the calicular edge. Skeletal thickening variable, greatest in early stages and in cardinal quadrants, and in adult stages commonly confined to distant calicular floors (in 'septal cones'). Septa numerous and long, represented by thorn-like trabeculae, in contact in the thickened zones, isolated elsewhere.

Description: The corallum is solitary, ranging from sub-erect to slightly and irregularly curved, commonly with rejuvenescence. The longest fragment is 80 mm, and the maximum diameter observed is 40 mm. Many corallites grow no wider than 17 to 20 mm, and there are several smaller individuals. Externally the corallites show longitudinal ridges of uniform width and narrower furrows. One specimen (pl. 3, fig. 13) shows epithecal scales arranged in chevrons.

The septa are very numerous; at a diameter of 24 mm UTGD 51656 showed forty-nine long major septa and forty-nine slightly thinner and shorter minor septa, countable because their peripheral bases were all clearly preserved in the transverse section. At a diameter of 36 mm the holotype has approximately fifty-seven of each order. Each septum is represented by a radial longitudinal row of thorn-like trabeculae contiguous where skeletal thickening occurs, but isolated elsewhere. The trabeculae are perpendicular to the curvature of the dissepiments on which they are based or through which they pass; those based on tabulae are perpendicular to the curvature of the tabulae, and their radial arrangement is less regular than it is in the dissepimentarium. The trabeculae may pierce the horizontal skeletal elements of two or more successive calicular floors; or they may be discontinuous below such floors, appearing as small corns on the horizontal skeletal elements. Within each septum, there may be on the average four trabeculae in 2.5 mm measured perpendicular to their length. The microstructure of the trabeculae has been affected by recrystallisation but traces of groupings of their fibres are visible in some (pl. 3, figs 7f, g), indicating that they were either rhabdacanths or, less probably, tufted monacanths. Growth lamellation has been emphasised in their basal parts (pl. 3, fig. 8d). In some places the trabeculae appear to be simple monacanths.

A cardinal fossula is present, almost at the periphery in young forms without dissepimentarium, and immediately after rejuvenescence, but lies at the outer margin of the tabularium in adult stages with a dissepimentarium.

The dissepimentarium is moderately wide; the dissepiments are steeply inclined on the cardinal side, less so in the counter and alar sectors. They are long, broad plates weakly convex upwards and inwards, supplemented by smaller, similar plates. The tabularial floors are broad and flat to shallowly concave, the deepest part being in the cardinal fossula; from the fossula there extends in the tabularial floors of most individuals, a subquadrate, shallower depression, the longer axis of which lies in the counter-cardinal plane; the tabulae and auxiliary tabellae then slope upwards and outwards to merge in the counter and alar sectors with the dissepiments.

Skeletal thickening is variable. In many specimens it is very great in young stages, and extends quite far up into the later stages in some. It is greater in the cardinal quadrants than in the counter quadrants; in some specimens the more delicate tissue of the counter quadrants has broken away. In most corallites periodic thickening affects the later stages in 'septal cones'. All the horizontal skeletal elements corresponding with a particular calicular floor are thickened, and diagenesis has emphasised the growth lamellation so that the sclerenchyme appears lamellar rather than fibrous. Thickened trabeculae arise from these thickened dissepiments or tabulae; their bases appear not quite in contact, being separated by lamellar sclerenchyme. In many transverse sections the thickening outlines the shallow broad subquadrate counter-cardinal trough in the tabularium.

Remarks: The epithecal scales of *P.* (*P.*) *tasmaniense* are like those described for *Tryplasma tubulatum* (Schlotheim) by Lindström (1883a), for *Chavsakia chavsakiensis* Lavrusevich (1959) and for *Holmophyllum squamosum* Lavrusevich (1960).

Due to the deepest part of the calicular floor being at the cardinal fossula, and to the presence of a broad shallow trough in the counter-cardinal plane, the calicular floors and 'septal cones' of thickening appear excentric and oblique but subsymmetrical. Differences in the obliquity of both transverse and longitudinal sections result in different patterns, and the orientation of all thin sections must be carefully noted; without careful study their appearance may be so different as to suggest different species.

The range and type of variation is that seen in *Plasmophyllum* (*Plasmophyllum*) Dybowski, so admirably analysed by Birenheide (1964), and we have therefore placed our species in this genus. The presence of rhabdacanthine or at least of tufted monacanthine trabeculae has however not been noted in the German Middle Devonian species described by Birenheide.

The taxonomic value of rhabdacanthine trabeculae requires critical evaluation. Among the Silurian cystimorphs, *Holmophyllum* Wedekind, 1927 (type species *H. holmi* Wedekind, 1927, p. 31, pl. 4, figs 6-8, from the Eke Marls?, Lower Ludlovian, of Lau-backar, Gotland) has large isolated trabeculae that are rhabdacanths, though these are never seen to be immersed in lamellar sclerenchyme as in a typical solitary tryplasmid. Its septa are withdrawn to the dissepimentarium, leaving a tabularium with concave to flat tabularial floors; the dissepimentarium contains both large and small dissepiments, unthickened in the holotype. The thin transverse section of the holotype is figured herein (pl. 4, fig. 6) and clearly shows that the fibres of the trabeculae are grouped into rod-like second order trabeculae. *Mazaphyllum* Crook (1955) from the Silurian of New South Wales (type species *M. cortisjonesi* Crook, 1955, p. 1053, text-figs 2, 3) is thamnasterioid with horizontal skeletal elements like those of *Holmophyllum*, with long rhabdacanthine and also some holacanthine? trabeculae. *Hedstroemophyllum* Wedekind, 1927 (type species *H. articulatum* Wedekind, 1927, p. 65, pl. 21, figs 1, 2, from the Wenlockian of the northwest coast of Gotland), has long isolated monacanthine trabeculae in some of which the fibres appear grouped in tufts rather than in second order trabeculae; the junction of dissepimentarium and tabularium is less sharply marked than in *Holmophyllum*, and the tabularial floors are inversely concave with an occasional large convex plate. Two thin sections of a paratype are illustrated herein (pl. 4, fig. 3). *Hedstroemophyllum* seems morphologically intermediate between *Cystiphyllum* Lonsdale, 1839 (type species *C. siluriense* Lonsdale, 1839, pl. 16 *bis*, figs 1, 1a, Wenlock Limestone, Dudley, England, longitudinal section of its holotype figured herein (pl. 4, fig. 8)) and *Gyalophyllum* Wedekind, 1927 (type species *G. angelini* Wedekind, 1927, p. 64, pl. 19, figs 1, 2, basal Ludlovian Klintberg Group, Klintberg, Gotland, thin sections of holotype figured herein (pl. 4, fig. 1)). In the holotype of *C. siluriense* the trabeculae are very short and slender, set in the rather slight skeletal thickening on certain of the calicular floors. In *G. angelini* the trabeculae are long and contiguous in each radial longitudinal row, and are rhabdacanths, not, apparently, immersed in lamellar sclerenchyme.

In view of Birenheide's conclusions on the Devonian cystimorphs, it seems not unlikely that some of these four genera may prove to be synonymous, when full-scale studies are undertaken on them. Another genus that should be considered in this connection is *Lamprophyllum* Wedekind, 1927 (type species *L. degeeri* Wedekind, 1927, p. 78, pl. 27, figs 1-4, from the [Hemse Group, Ludlovian] marls of Petesvik, Gotland). Thin sections of the holotype are figured herein (pl. 4, fig. 2). It has short major septa, degenerate minor septa, a wide tabularium of flat tabellae, and numerous series of small dissepiments, and may bear the relation to the Silurian cystimorphs that the septate *Plasmophyllum* (*Mesophyllum*) does to the other Middle Devonian cystimorphs. *Stortophyllum* Wedekind, 1927 (type species *S. simplex* Wedekind, 1927, p. 31, pl. 4, fig 1, Ludlovian Eke marls of Lau-backar, Gotland) has rhabdacanths as in *Tryplasma*. The thin section of the holotype is figured reversed herein (pl. 4, fig. 5).

None of the Eurasian Ludlovian, Skalian or Gedinnian species so far referred in the literature to *Holmophyllum*, *Hedstromophyllum*, *Gyalophyllum* or *Lamprophyllum* resemble our species; nor do any of the Eurasian Skalian or Lower or Middle Devonian cystimorphs referable to *Nataliella* Sytova, *Thecaspinellum* Nikolaeva (and its possible synonym *Chavsakia*), or to the protean genus *Plasmophyllum*. None of the Silurian or Devonian cystimorphs of eastern North America described by Stumm (1965) are at all closely comparable with our new species.

Order TABULATA Edwards & Haime, 1850

Superfamily *FAVOSITOIDEA* Dana, 1846

Family FAVOSITIDAE Dana, 1846

Genus **FAVOSITES** Lamarck, 1816

Favosites goldfussi d'Orbigny, 1850

Plate 5, figs 1-3

Favosites gothlandica Goldfuss, 1826, *pars*, p. 78, pl. 26, fig. 3b only.

Favosites goldfussi d'Orbigny, 1850, *pars*, p. 107; Jones, 1936, p. 19, pl. 2, figs 8-10; Philip, 1962, p. 142, pl. 11, figs 6-9, *quo vide for* discussion of Australian occurrences.

Description of Tasmanian material: The fifteen coralla are commonly pyriform or small subhemispherical colonies up to 5 cm in diameter. One, UTGD 51790, is a fragment of a larger colony and measures 8 mm in height and 4 mm by 7 mm across. Adult corallites are five- to seven-sided and their mean diameter within a corallum varies from 2.3 to 2.7 mm. Young corallites are triangular to quadrate in cross section and usually originate in the corners of the parent corallites; the wall is inserted very soon after their origin. The walls are straight as seen in transverse section but somewhat irregular in vertical section. They are 0.12 to 0.2 mm in thickness and show a median dark plane in transmitted light with fibres normal to it on either side; growth lines subparallel to the median plane can occasionally be traced across the fibres. Bundles of the fibres become elongated into spines. The spines are 0.2 mm at their base, taper axially, and project up to 0.35 mm into the lumen; they are nearly horizontal or are inclined upwards and inwards at less than 20° to the horizontal, and are sometimes slightly curved. They may be arranged in as many as seven irregular alternating rows on each face. The mural pores are round, 0.14 to 0.23 mm in diameter, and are arranged in two alternating rows or occasionally in a single irregular row. They are often closed by a thin diaphragm in the plane of the mid-line of the walls. The tabulae are thin, complete and horizontal with five to ten per 5 mm.

Remarks: In growth form, size and internal structure, the Point Hibbs material shows more similarity to the specimens referred to *F. goldfussi* from the Couvinian of Belgium by Lecompte (1939, pl. 13, figs 1-13; pl. 14, figs 1, 2), than to the other Australian specimens referred to that species. The smaller pyriform colonies resemble Lecompte's *F. goldfussi* forma *pyriformis* and the larger discoidal to subhemispherical type, his *F. goldfussi* forma *regularis*. Jones (1936) noted that a similar variation in growth form was shown by *F. goldfussi* from the Eifelian of the Eifel; he regarded the small pyriform coralla previously referred to *F. forbsi* var. *eifelensis* Nicholson as young forms of *F. goldfussi*. The lectotype of *F. goldfussi* (chosen by Jones, 1936, p. 20) from the *Calceola*-Schichten, Middle Devonian of Germany, is of the small pyriform type; its internal structure has not been illustrated. In the Tasmanian forms the tabulae are more widely spaced than in the Belgian specimens (ten to twenty against thirty to fifty per 10 mm), and sometimes there is only a single row of mural pores on the corallite face. *Favosites saginatus* Lecompte, 1939, p. 94, pl. 14, figs 8-14, from the Couvinian of Belgium is similar to the Point Hibbs *F. goldfussi* in corallite size and spacing of tabulae but differs in having much thicker walls; its septa are commonly stouter and more prominent.

Favosites careyi sp. nov.

Plate 5, figs 4, 5

Named in honour of Professor S. W. Carey, Geology Department of the University of Tasmania

Holotype: UTGD 51781 from the Point Hibbs Limestone, Sanctuary Bay, Point Hibbs, western Tasmania; Lower Devonian. Three paratypes.

Diagnosis: Thin-walled, regularly polygonal, large corallites (mean adult diameter 3.0 to 3.8 mm); short extremely thin septal spines are developed sparsely; mural pores small (0.08 to 0.2 mm), arranged in three to five alternating vertical series. Tabulae complete, commonly horizontal and distant.

Description: All the specimens are fragments of large massive coralla; the largest is 5 x 12 cm across and 12 cm high. The adult corallites are polygonal, five- to seven-sided, and are relatively large, from 2.6 to 4.8 mm in diameter; the means of the four coralla vary from 3.05 to 3.8 mm. The walls are straight and show a median dark line in transmitted light, with fibres normal to it on either side. They are straight or rarely slightly wavy in transverse section and are relatively thin (0.1 to 0.25 mm). Increase is peripheral and non-parricidal with the wall separating the offset usually based on a tabula.

Septa poorly developed, consisting of rare septal spines which are short, extremely slender projections from the wall and are almost horizontal. The mural pores are round, small (0.08 to 0.2 mm in diameter) and are arranged in three to five alternating vertical rows on each face of the corallites; there may be three in a horizontal row (pl. 5, fig. 4b). Those in the one vertical row are 0.5 to 0.8 mm apart. The tabulae are complete, horizontal or slightly arched and distant, 0.6 to 1 mm apart.

Comparison: Of the Australian *Favosites*, *F. careyi* resembles *F. richardsi* Jones, 1937, pp. 89-90, pl. 12, figs 2, 3 from the Silurian (Ludlovian?) Barrandella Shales, Hattons Corner, Yass New South Wales, in corallite size, tabular spacing, and the arrangement of mural pores in three or more rows. It differs however in the more polygonal nature of the corallites, scarcity of septal spines which are more slender, and smaller mural pores. The specimen referred to F. *richardsi* by Jones, 1944, p. 35, pl. 1, figs 5, 6 from the Upper Silurian of the Wellington district, New South Wales differs from the new species in that the corallites are nearly round, contain more numerous spines and have only two rows of pores on each face.

The arrangement and small size of the mural pores, scarcity of septal spines, regular polygonal form of the corallites and the thin walls of *F. careyi* distinguish it from all other species of *Favosites* with similar sized corallites. It shows most resemblance to *F. shirdagicus* Kim, 1966, p. 36, pl. 22, fig. 1 from the 'Lower Eifelian' (either Upper Emsian or Lower Couvinian) zone of *Favosites regularissimus* Yanet, Mt Raykazak southwestern part of Zarafshan Range, Central Asia. *F. careyi* has more numerous and smaller (0.1 to 0.25 mm compared with 0.25-0.35 x 0.45-0.55 mm) mural pores, less well developed septal apparatus, and polygonal five- to six-sided corallites as opposed to the more rounded eight- to nine-sided corallites of *F. shirdagicus*.

Genus **SQUAMEOFAVOSITES** Chernyshev, 1941

Type species, diagnosis and distribution: See Jell & Hill (1969).

Squameofavosites bryani (Jones, 1937)

Plate 5, figs 6, 7

Favosites bryani Jones, 1937, p. 96, pl. 15, figs 3-6.
Favosites ?bryani; Hill, 1942b, pl. 2, fig. 6.
Squameofavosites bryani; Jell & Hill, 1969, p. 21, pl. 7, figs 2, 3.
Holotype, diagnosis and distribution: See Jell & Hill (1969).

Description: The thirty coralla are flattened hemispherical to cake-like colonies varying in diameter from 2 to 11 cm. The corallites are of moderate size, average diameter 1.05 mm; within a corallum the corallites are of uniform size but there is a considerable range (0.82 to 1.23 mm) in the mean between coralla. The adult corallites are four-to seven-sided, the sides are straight or rarely slightly curved. Increase is peripheral, non-parricidal. In transverse section the parent is elongated immediately prior to budding and the dividing wall is then inserted usually developing from the free edge of a squamula (pl. 5, fig 6d). The offsets are quadrate. The corallite walls are straight and commonly moderately thick, 0.1 to 0.16 mm, but in other parts of a corallum may be as thin as 0.06 mm. The mural pores are round or suboval, large (0.2 to 0.35 mm in diameter), closely spaced (centres 0.6 mm apart), and arranged in a single median row or rarely two subalternating rows on each face. Above and occasionally below the mural pores, squamulae project up to 0.35 mm into the lumen as eaves-like platforms. They are 0.3 mm wide and 0.03 mm thick at their base and taper axially. They are typically horizontal or slightly inclined upwards. Small short spines are sometimes developed on the wall alongside the mural pores. The tabulae are flat, horizontal and complete; they may be suspended from the free edges of squamulae. Zones in which the tabulae are closely spaced (up to twenty per 5 mm) alternate with zones in which they are distant (six per 5 mm).

Remarks: The Point Hibbs specimens do not differ significantly in internal structure from the holotype of *S. bryani* from the Cavan Bluff Limestone of Taemas. However their mean corallite diameter (0.83 to 1.23 mm mean 1.05 mm) is less than that of the holotype (1.27 mm) but is within the range of other specimens of *S. bryani* from Taemas. The mean corallite diameters of two topotypes (UQF 53136, 53137) are 1.20 and 0.99 mm respectively. The paratypes of Jones (1937) have means of 1.39 and 1.42 mm; corallites of specimens from the *Receptaculites* limestone of Taemas vary from 1.4 to 1.7 mm. Philip (1960) admitted a range of 0.8 to 1.5 mm in *Favosites squamuliferus* forma *bryani* Jones (forma α).

Squameofavosites bryani var. *ramosus* var. nov.

Plate 6, fig. 4

Figured specimen: UTGD 51745 from Point Hibbs Limestone, Point Hibbs, Tasmania.

Description: The specimen is a worn flat colony 8 cm in diameter and 2.5 mm thick. It consists of a compact mass of finger-like branches each approximately 1 cm in diameter diverging from the centre of one edge. The branches are for the most part cylindrical, horizontal, bifurcating and intertwining in the horizontal plane; they periodically give off vertical branches which are commonly intergrown. The corallites parallel the axis in the central part of the branches but curve to open normal to the surface. Their diameter varies from 0.8 to 1.5 mm (mean 1.17 mm). The common wall is variable in thickness (0.08 to 0.3 mm). Short septal spines project upwards and inwards and are approximately 0.14 mm in diameter at their base. Above the mural pores squamulae are commonly developed. The mural pores are round or slightly ovate vertically; they are commonly 0.2 to 0.25 mm in diameter and arranged in a single row. The tabulae are unevenly spaced, five to twelve per 5 mm. They are commonly complete but in places are incomplete. As seen in longitudinal section, they are sometimes grouped at or near a mural pore. Occasionally a tabula does not span the lumen nor join with other tabulae but is based like a bubble on the wall. In longitudinal section such a tabula appears circular or parabolic.

Remarks: This form resembles typical *S. bryani* in all characters except growth habit and the occasional irregularity of the tabularium; we regard it as a growth form of that species.

In growth habit it shows a closer similarity to *Rudakites multiformis* Leleshus, 1964, p. 47, pl. 4, figs 1-4, the type species of that genus, from the 'Hercynian limestones' late Lower Devonian (Coblenzian Stage) of the northern slopes of the Zeravshan Ranges, left side of the Shishkat Gorge (right tributary of the River Kshtut) Central Tadzhikistan, U.S.S.R., than to any *Favosites*. The corallite walls in *R. multiformis* are thickened near the surface so that *Rudakites* is grouped with the Thamnoporidae; the Tasmanian specimen does not show any thickening.

Family PACHYPORIDAE Gerth, 1921

Genus **CLADOPORA** Hall, 1851

Cladopora sp.

Plate 6, figs 1-3

Description: The numerous fragments, mostly weathered, are of cylindrical branchlets, straight or slightly flexuous, with diameter ranging from 1.125 to 4 mm approximately, except for one larger branch (UTGD 52157, pl. 6, fig. 2) which shows repeated one-sided dichotomy and has a diameter of 5 to 6 mm, expanding a little just below a dichotomy; one branchlet shows very rapid tapering to a blunt point. The corallites open obliquely, and are arranged not very regularly in longitudinal rows, those of neighbouring rows alternating. Most of the branches are worn, but in the large branch (UTGD 52157) some show slightly projecting crescentic lower lips; the median pits in the calices are subcircular.

In their tangential section the calices are seen to be polygonal to subpolygonal-rounded, the lower lip being the more rounded, or crescentic; the diameter from median dark line to median dark line (angle to angle) is about 0.375 mm in large calices and the rounded axial pit is 0.25 mm or somewhat narrower; common walls between these pits range from 0.175 to 0.35 mm in thickness. Their walls are only slightly thickened. In the axial region of the branch the diameter of corallites ranges up to 0.175 or even 0.25 mm and they grow vertically for a short distance. As the corallites diverge to open at the periphery at an angle of about 40°, both diameter and wall thickening gradually increase. Sparse tabulae are present, but septal spines are not certainly observed. Mural pores are sparse and small (0.05 to 0.10 mm) in the axial parts of the branch, but have not been observed in the peripheral zone of greater skeletal thickening.

Remarks: No tabulae are reported by Oliver (1963) in the type material of the type species *Cladopora seriata* Hall, which is somewhat less thickened than our material.

The Tasmanian material may prove conspecific with that described as *Cladopora* sp. by Jell & Hill, 1969 from the Ukalunda Beds of north Queensland. It is also comparable with *Cladopora gippslandica* Chapman as figured by Philip (1962, pl. 18, figs 1, 6, 7) from the Gedinnian [?] Boola Beds, Tyers River area, Victoria. However Chapman (1907) described his type specimens as having calicular openings taller than wide. In the Tasmanian material the median pits of the calices are subrounded.

It is possible that all three forms are *Thamnopora*, but fragments of slender branches of similar type are currently referred to *Cladopora* in the absence of a critical investigation of the relations between *Cladopora* and *Thamnopora*.

Superfamily *SYRINGOPOROIDEA* Nicholson, 1879

Family NEOROEMERIIDAE Radugin, 1938

Genus **THECOSTEGITES** Edwards & Haime, 1849, p. 261

Type species, synonymy, diagnosis, discussion and distribution: See Hill & Jell (1970a).

Thecostegites ejuncidus sp. nov.

Plate 6, fig. 5

Latin, *ejuncidus*—slender, rush-like.

Holotype: UTGD 51744, Sanctuary Bay, Point Hibbs, Tasmania; Point Hibbs Limestone, Emsian?. One paratype.

Diagnosis: *Thecostegites* with long, slender, closely spaced corallites and lateral expansions; with few septal spinules and numerous thin tabulae.

Description: The holotype is a subglobular corallum about 70 mm tall and 85 mm in diameter, broken at the base. The paratype is a very small fragment encrusting an alga?.

The corallites range in diameter from 0.625 to 1.0 mm, a common reading being 0.875 mm; they are long and straight, the longest observed extending through 15 mm of the corallum; this was not necessarily the total length of corallite, for the plane of section was not necessarily truly longitudinal; also stylolitic planes parallel to the lateral expansions are present causing horizontal discontinuities in parts of the corallum. The corallites are not perfectly cylindrical, their diameter expanding very slightly towards the ring of mural pores at each lateral expansion, contracting again between rings. The corallites may be contiguous or almost contiguous, and are only seldom separated by a distance as great as their diameter.

Septal spinules are sporadically developed in radial longitudinal series, projecting inwards from the peripheral stereozone, and a few are based on tabulae.

The tabulae are very thin, numerous, commonly complete and either subhorizontal or slightly concave; in places they may be incomplete, and grouped, forming very short excentric axial tubes in the corallites. Mural pores are numerous, arranged in close rings, and opening into the narrow transverse expansions that unite the corallites. Tabulae may continue from the corallites into these expansions. Each corallite has a peripheral stereozone about 0.125 mm thick, and this is continuous along both lower and upper surfaces of the expansions.

The expansions range in thickness from 0.25 mm (when the upper and lower stereozones are almost contiguous) to 0.625 mm; distance between expansions is commonly less than their thickness.

Remarks: *T. ejuncidus* differs from all previously described species of the genus in having more closely spaced and smaller corallites, with numerous tabulae and relatively sparse development of axial tubes, which remain short. Only *T. lepas* Sokolov (1952) from the central Russian upper Givetian has corallites of comparable diameter (0.8 to 0.9 mm as against 0.625 to 1.0 mm in the Australian species); *T. lepas* is readily distinguished by its short rare tubuli, its thinner walls (less than 0.1 mm) and the thickness of its connecting platforms which follow one another without intervening spaces, giving a compactness to the corallum, similar to that in *Neoroemeria*.

REFERENCES

BIRENHEIDE, R., 1963.—*Cyathophyllum*- und *Dohmophyllum*-Arten (Rugosa) aus dem Mitteldevon der Eifel. *Senckenberg. leth.* 44 (5), 363-458, pls 46-62.

————, 1964.—Die 'Cystimorpha' (Rugosa) aus dem Eifeler Devon. *Abh. senckenb. naturforsch. Ges.* 507, 1-120, pls 1-28.

BULVANKER, E. Z., 1958.—*Devonskie chetyrekhluchevye korally okrain Kuznetzkogo basseyna.* 2 vols., 1-212, pls 1-93. Leningrad. (Vses. nauchno-issled. geol. inst.).

CHAPMAN, F., 1907.—Newer Silurian fossils of eastern Victoria, Part I. *Rec. geol. Surv. Vict.* 2 (1), 67-80, pls 1-8.

————, 1914a.—Newer Silurian fossils of eastern Victoria, Part III. *Rec. geol. Surv. Vict.* 3, 301-316, pls 46-61.

————, 1914b.—Australasian fossils. 1-341. Melbourne.

CROOK, K. A. W., 1955.—*Mazaphyllum*, a new cystiphyllid coral from the Silurian of New South Wales. *J. Paleont.* 29 (6), 1052-1056, text-figs 1-3.

DUBATOLOV, V. N., CHEKHOVICH, V. D. & YANNET, F. E., 1968.—Tabulyaty pogranichnykh sloev silura i devona Altae-Sayanskoy gornoy oblasti i Urala. *In* IVANOVSKIY, A. B. (Ed.) 1968. *Korally pogranichnykh sloev silura i devona Altae-Sayanskoy gornoy oblasti i Urala.* 5-170, pls 1-65. Nauka, Moscow.

EDWARDS, H. M. & HAIME, J., 1851.—Monographie des polypiers Fossils des terrains palaeozoiques. *Arch. Mus. Hist. nat. Paris* 5, 1-502, pls 1-20.

————, 1853.—A monograph of the British fossil corals. Part IV. Corals from the Devonian Formation. *Palaeontogr. Soc.* [*Monogr.*], 211-244, pls 47-56.

ENGEL, G. & SCHOUPPE, A. VON, 1958.—Morphogenetisch-taxionomische Studie zu der devonischen Korallengruppe *Stringophyllum*, *Neospongophyllum* und *Grypophyllum*. *Paläont. Z.* 32, 67-114, pls 8, 9.

ETHERIDGE, R., 1895.—An undescribed coral from the Wellington limestone, New South Wales. *Rec. geol. Surv. N.S.W.* 4, 160-162, pls 21, 22.

————, 1903.—An unusually large form of *Rhizophyllum*, lately discovered in New South Wales. *Rec. geol. Surv. N.S.W.* 7, 232, 233, pl. 47.

————, 1907.—A monograph of the Silurian and Devonian corals of New South Wales. Part II—The genus *Tryplasma*. *Mem. geol. Surv. N.S.W.* (*Palaeont.*) 13, 41-102, pls 10-28.

FENTON, C. L. & FENTON, M. A., 1924.—The stratigraphy and fauna of the Hackberry stage of the Upper Devonian. *Contr. Mus. Geol. Univ. Mich.* 1, 1-260, pls 1-45.

FONTAINE, H., 1966.—Quelques Madréporaires dévoniens du Musée du Service Géologique de Saigon. *Archs géol. Viêt-Nam* 9, 51-95, pls 1-16.

FROMENTEL, E. DE, 1861.—*Introduction a l'étude des polypiers fossiles.* 1-357. Paris.

GOLDFUSS, G. A., 1826-1833.—*Petrefacta Germaniae.* 1, 1-76, pls 1-25 (1826); 77-164, pls 26-50 (1829); 165-240, pls 51-71, (1831); 241-252, (1833). Düsseldorf.

GURICH, G., 1896.—Das Palaeozoicum im polnischen Mittlegebirge. *Zap. imp. miner Obshch.* (2) **32**, 1-539, pls 1-15.

HALL, J. & WHITFIELD, R. P., 1872.—Descriptions of new species of fossils from the Devonian rocks of Iowa. *23rd Ann. Rept New York State Cabinet Nat. Hist.*, 223-239, pls 9-12.

HALLER, W., 1936.—Einige biostratigraphische Untersuchungen in der Roher Mulde unter besonderer Berücksichtigung der Keriophyllen. *Jb. preuss. geol. Landesanst. BergAkad.* **56**, 590-632, pls 32-43.

HILL, D., 1942a.—The Lower Devonian rugose corals from the Mt Etna Limestone, Queensland. *Proc. Roy. Soc. Qd* **54**, 13-22, pl. 1.

——, 1942b.—Some Tasmanian Palaeozoic corals. *Pap. Proc. Roy. Soc. Tasm.* 1941, 3-12, pl. 2.

——, 1950.—Middle Devonian corals from the Buchan district, Victoria. *Proc. Roy. Soc. Vict.* **62** (2), 137-164, pls 5-9.

——, 1954.—Devonian corals from Waratah Bay, Victoria. *Proc. Roy. Soc. Vict.* **66**, 105-118, pls 6-9.

—— & JELL, J. S., 1969.—On the rugose coral genera *Rhizophyllum* Lindström, *Platyphyllum* Lindström and *Calceola* Lamarck. *Neues Jb. Geol. Paläont.* (In press).

——, 1970a.—The tabulate coral families Syringolitidae Hinde, Roemeriidae Pocta, Neoroemeriidae Radugin and Chonostegitidae Lecompte, and Australian species of *Roemeripora* Kraicz. *Proc. Roy. Soc. Vict.* (In press).

——, 1970b.—Devonian corals from the Caning Basin, Western Australia. *Bull geol. Surv. West Aust.* **121** (In press).

HILL, D. & JONES, O. A., 1940.—The corals of the Garra Beds, Molong district, New South Wales. *J. Proc. Roy. Soc. N.S.W.* **74**, 175-208, pls 2-8.

——, PLAYFORD, G. & WOODS, J. T., 1967.—*Devonian fossils of Queensland.* 1-32, 15 pls. Qld Palaeontogr. Soc., Brisbane.

JELL, J. S. 1969.—Septal microstructure and classification of the Phillipsastareiclae. *In* Campbell, K. S. W. (Ed.) 1969. *Stratigraphy and Palaeontology: Essays in honour of Dorothy Hill.* 50-73, pls 7, 8. A.N.U. Press, Canberra.

——, & HILL, D., 1969.—Devonian corals from the Ukalunda district, North Queensland. *Publs geol. Surv. Qld* **340**, 1-27, pls 1-9.

—— & PEDDER, A. E. H., 1969.—*Martinophyllum*, a new genus of Devonian rugose corals. *J. Paleont.* **43** (3), 735-740, pls 95, 96.

JONES, O. A., 1929.—On the coral genera *Endophyllum* Edwards & Haime and *Spongophyllum* Edwards & Haime. *Geol. Mag.* **66**, 84-91, pl. 10.

——, 1936.—The controlling effect of environment upon the corallum in *Favosites*; with a revision of some massive species on this basis. *Ann. Mag. nat. Hist.* (*10*) **17**, 1-24, pls 1-3.

——, 1937.—The Australian massive species of the coral genus *Favosites*. *Rec. Aust. Mus.* **20** (2), 79-102, pls 11-16.

——, 1944.—Tabulata and Heliolitida from the Wellington district, N.S.W. *J. Proc. Roy. Soc. N.S.W.* **77**, 33-39, pl. 1.

KHALFIN, L. L. (Ed.), 1961.—Biostratigrafiya paleozoya Sayano-Altayskoy Gornoy oblasti, Tom II Sredniy Paleozoy. *Trudy sib. nauchno-issled. Inst. Geol. Geofiz.* (*miner.*) **20**, 1-850, pls S1-29, D1-105.

KIM, A. I., 1966.—Tabulyatomorfnye korally paleozoya Zarafshano-Gissarskoy gornoy oblasti. 1-17, pls 1-35. FAN, Tashkent. (Minist. geol. Uzbekskoy SSR).

LAMBE, L. M., 1901.—A revision of the genera and species of Canadian Palaeozoic corals. The Madreporaria Aporosa and the Madreporaria Rugosa. *Contr. Can. Palaeont.* **4** (2), 97-197, pls 1-18.

LANG, W. D. & SMITH, S., 1934.—Ludwig's 'Corallen aus Paläolithischen Formationen' and the genotype of *Disphyllum* de Fromentel. *Ann. Mag. nat. Hist* (*10*) **13**, 78-81.

——, 1935.—*Cyathophyllum caespitosum* Goldfuss, and other Devonian corals considered in a revision of that species. *Q. Jl geol. Soc. Lond.* **91** (4), 538-590, pls 35-37.

LAVRUSEVICH, A. I., 1959.—Novyy rod *Chavsakia* iz ludlovskikh otlozheniy Zeravshano-Gissarskoy gornoy oblasti. *Izv. Akad. Nauk tadzhik. SSR* (*estest. Nauk*) (1959), **1** (28), 35-40, pls 1-3.

——, 1960.—*Holmophyllum* s cheshuychatoy epitekoy iz silura Zeravshano-Gissarskoy gornoy oblasti. *Dokl. Akad. Nauk tadzhik. SSR* **3** (4), 21-26, pls 1, 2.

LECOMPTE, M., 1939.—Les Tabulés du Dévonien moyen et supérieur du bord sud du Bassin de Dinant. *Mem. Mus. r. Hist. nat Belg.* **90**, 1-229, pls 1-23.

LELESHUS, V. L., 1964.—Novyy devonskiy rod *Rudakites* (Tabulata) iz Tadzhikistanta. *Paleont. Zh.* 1964 (4), 45-48, pl. 4.

LINDSTROM, G., 1883a.—Om de Palaeozoiska formationernas operkelbärande koraller. *Bih. K. svenska VetensAkad. Handl.* **7**, (4), 1-112, pls 1-9.

——, 1883b.—Obersilurische Korallen von Tshau-tiën im nordöstlichen Theil der Provinz Sz'-Tshwan. *In* RICHTHOFEN, F. VON, 1883. *Beitrage zur Päläontologie von China*, IV. [Also issued as Band IV of RICHTHOFEN, F. VON, 1883. China]. 50-74, pls 5-7. Berlin.

LONSDALE, W., 1839.—Corals. *In* MURCHISON, R. I., 1839. *The Silurian System.* 675-694, pls 15, 15 *bis*, 16, 16 *bis*. London.

MANSUY, H., 1912.—Etude géologique du Yun-nan Oriental IIe Partie, Paleontologie. *Mém. Serv. geol. Indochine* **1** (2), 1-146, pls 1-25.

MCLAREN, D. J., 1964.—Corals of the Devonian Horn Plateau Formation. *Bull. geol. Surv. Can.* **114** (2), 3-28, pls 2-12.

OLIVER, W. A., 1963.—Redescription of three species of corals from the Lockport Dolomite in New York. *Prof. Pap. U.S. geol. Surv* **414-G**, G1-G9, pls 1-5.

——, 1968.—Succession of rugose coral faunas in the Lower and Middle Devonian of eastern North America. *In* OSWALD, D. H. (Ed.), 1968. *International symposium on the Devonian System, Calgary*, 1967, *Vol.* 2. 733-744. Alberta Soc. Petrol. Geol., Calgary.

D'ORBIGNY, A., 1850.—*Prodrome de paléontologie stratigraphique universelle des animaux mollusques et rayonnés.* I, 1-394, Paris.

PHILIP, G. M., 1960.—The Middle Palaeozoic squamulate favositids of Victoria. *Palaeontology* **3** (2), 186-207, pls 30-34.

——, 1962.—The palaeontology and stratigraphy of the Siluro-Devonian sediments of the Tyers area, Gippsland, Victoria. *Proc. Roy. Soc. Vict.* **75** (2), 123-246, pls 11-36.

—— & PEDDER, A. E. H., 1968.—Stratigraphical correlation of the principal Devonian limestone sequences of eastern Australia. *In* OSWALD, D. H. (Ed.), 1968. *International symposium on the Devonian System, Calgary*, 1967, *Vol.* 2. 1025-1041. Alberta Soc. Petrol. Geol., Calgary.

POCTA, P., 1902.—Anthozoaires et Alcyonaires. *In* BARRANDE, J., 1902. *Système Silurien du centre de la Bohême*, **8** (2), 1-347, pls 20-117. Prague.

PRANTL, F., 1951.—On the supposed occurrence of the genus *Phillipsastrea* d'Orbigny, 1849, in the Devonian of Bohemia. *Sb. nar. Mus. Praze* (*B*) **7** (3) (Geol. Palaeont. 2), 3-17, pls 1-4.

PRIBYL, A. & VANEK, J., 1968.—Biostratigraphische Studie über die Fauna des Budnaniums bis Pragiums im Binblick auf die Grenze zwischen Silur und Devon im Barrandium und in den übrigen europaischen Gebieten. *Neues Jb. Geol. Paläont. Mh.* 1968 (7), 413-448.

ROMINGER, C., 1876.—*Lower Peninsula* 1873-1876. *Vol.* 3, *pt* 2, *Palaeontology. Fossil corals.* 1-161, pls 1-55, Geol. Surv. Michigan, New York.

SCHLUTER, C., 1885.—Ueber neue Korallen aus dem mitteldevon der Eifel. *Verh. naturh. Ver preuss. Rheinl.* **42**, 6-13 [Not seen].

——, 1889.—Anthozoen des rheinischen Mittel-Devon. *Abh. preuss. geol. Landesanst.* **8** (4), 261-465, pls 1-16.

SCRUTTON, C. T., 1968.—Colonial Phillipsastraeidae from the Devonian of south-east Devon, England. *Bull. Br. Mus. nat. Hist.* (*Geol.*) **15** (5), 181-281, pls 1-18.

SMITH, S., 1945.—Upper Devonian corals of the Mackenzie River region, Canada. *Spec. Pap. geol. Soc. Am.* **59**, 1-126, pls 1-35.

SOKOLOV, B. S., 1952.—Tabulyaty paleozoya evropeyskoy chasti SSSR, Chasti IV, devon Russkoy platformy i Zapadnogo Urala. *Trudy vses. neft. nauchno-issled. geol.-razv. Inst.* (*new*) **62**, 1-291, pls 1-40.

SOSHKINA, E. D., 1949.—Devonskie korally Rugosa Urala. *Trudy. paleont. Inst.* **15** (4), 1-162, pls 1-58.

——, 1952.—Opredelitel' devonskikh chetyrekhluchevykh korallov. *Trudy paleont Inst.* **39**, 1-178, pls 1-49.

STRUSZ, D. L., 1968.—Lower and Middle Devonian of the Molong Geanticline, New South Wales, Australia. *In* OSWALD, D. H. (Ed.), 1968. *International symposium on the Devonian System, Calgary*, 1967, *Vol.* 2. 123-133. Alberta Soc. Petrol. Geol., Calgary.

STUMM, E. C., 1949.—Revision of the families and genera of the Devonian tetracorals. *Mem. geol. Soc. Am.* **40**, 1-92, pls 1-25.

STUMM, E. C., 1965.—Silurian and Devonian corals of the Falls of the Ohio. *Mem. geol. Soc. Am.* **93**, 1-184, pls 1-80.

TALENT, J. A., 1965.—The stratigraphic and diastrophic evolution of central and eastern Victoria in the Middle Palaeozoic times. *Proc. Roy Soc. Vict.* **79** (1), 179-195.

——————— & BANKS, M. R., 1968.—Devonian of Victoria and Tasmania. *In* OSWALD, D. H. (Ed.), 1968. *International symposium on the Devonian System, Calgary*, 1967, *Vol.* 2. 147-163. Alberta Soc. Petrol. Geol., Calgary.

VOLLBRECHT, E., 1926.—Die Digonophyllinae aus dem unteren Mittle-Devon der Eifel. *Neues Jb. Miner. Geol. Paläont. BeilBd.* 55 (B), 189-273, pls. 8-16.

WEDEKIND, R., 1927.—Die Zoantharia Rugosa von Gotland (bes. Nordgotland). *Sver geol. Unders. Afh.* (*Ca*) **19**, 1-95, pls 1-30.

——————— & VOLLBRECHT, *E.*, 1931, 1932.—Die Lytophyllidae des mittleren Mitteldevon der Eifel. *Palaeontographica* **75** (3-6), 81-110, pls 15-46 (1931); **76**, (4-6), 95-120, pls 9-14 (1932).

YOH, S. S., 1937.—Die Korallenfauna des Mittledevons aus der Provinz Kwangsi Südchina. *Palaeontographica* (*A*) **87**, 45-76, pls 4-9.

ZHELTONOGOVA, V. A. & IVANIYA, V. A., 1961.—Devonskaya sistema, podklass Tetracoralia (Rugosa). *In* KHALFIN, L. L. (Ed.), 1961. 368-408, pls D27-57.

EXPLANATION OF PLATES

Unless otherwise stated, specimens are from the Emsian? Point Hibbs Limestone, Point Hibbs, west coast of Tasmania, and figures are x 2.

PLATE 1—

FIG. 1.—*Pseudamplexus princeps?* (Etheridge). 1, *a*, T.S., x 1; *b*, L.S.; UTGD 52066.

FIGS. 2-9.—*Gurievskiella abyssus* sp. nov. 2, Holotype, *a*, T.S.; *b*, L.S.; UTGD 52033/2. 3, *a*, T.S.; *b*, L.S.; UTGD 51571. 4, x 1; UTGD 89801. 5, UTGD 51989. 6, UTGD 51740. 7, *a*, T.S.; *b*, L.S.; UTGD 51739. 8, *a*, T.S.; *b*, L.S.; UTGD 52029. 9, T.S.; UTGD 89807.

FIGS 10-13.—*Martinophyllum approximans* (Chapman). 10, T.S.; UTGD 52013. 11, T.S.; UTGD 51518. 12, L.S.; UTGD 51516. 13, *a*, T.S.; *b*, L.S.; UTGD 52008.

PLATE 2—

FIGS 1, 2, 5.—*Endophyllum banksi* sp. nov. 1, Holotype, *a*, *b*, T.S., x 1; *c*, L.S., x 1; *d*, T.S., x 5; UTGD 52091. 2, *a*, T.S., x 1; *b*, L.S., x 1; UTGD 52025. 5, T.S., x 1; UTGD 52077.

FIGS 3, 4, 6-9.—*Disphyllum repansum* sp. nov. 3, *a*, T.S.; *b*, L.S.; UTGD 52205. 4, x 1; QVM 834 (1962:38:2). 6, T.S.; UTGD 52207. 7, T.S.; UTGD 52201. 8, Holotype, *a*, T.S.; *b*, L.S.; UTGD 52085. 9, T.S.; UTGD 52206.

PLATE 3—

FIGS 1, 2.—*Rhizophyllum enorme* Etheridge. 1, *a*, x 0.5; *b*, x 0.5; *c*, T.S. of juvenile stage, x 1.5; *d*, L.S. x 1.5; UTGD 51431. 2, *a*, x 0.5; *b*, T.S.; *c*, L.S.; UTGD 89799.

FIGS 3-6.—*Tryplasma* spp. 3, x 1; UTGD 51554. 4, *a*, T.S.; *b*, L.S.; UTGD 51685. 5, *a*, T.S.; *b*, L.S.; UTGD 51736. 6, *a*, T.S.; *b*, L.S.; UTGD 51664.

FIGS 7-13.—*Plasmophyllum (Plasmophyllum) tasmaniense* sp. nov. 7, Holotype, *a*, T.S., x 1.5; *b*, T.S.; *c*, *d*, *e*, L.S., x 1.5; *f*, *g*, T.S., x 2.5; UTGD 52054. 8, *a*, *b*, T.S.; *c*, L.S.; UTGD 51656. 9, T.S.; UTGD 52033/1. 10, T.S.; UTGD 52037. 11, x 1; UTGD 52039. 12, x 1. UTGD 51528. 13, x 1; UTGD 51477.

PLATE 4—

FIG. 1.—*Gyalophyllum angelini* Wedekind. Holotype, *a*, T.S.; *b*, L.S.; *c*, L.S., x 10;*d*, T.S. x 10; T.S.-SMF 10827, L.S.—SMF 10826, Senckenberg Museum, Frankfurt, Germany. Lower Ludlovian Klinteberg Group, Klinteberg near Klintehamm, Gotland.

FIG. 2.—*Lamprophyllum degeeri* Wedekind. Holotype, *a*, T.S., SMF 11140, Senckenberg Museum; *b*, L.S., SMF 11138. Lower Ludlovian Hemse Group, Hablinglo, Petesviken, Gotland.

FIG. 3.—*Hedstrolmophyllum articulatum* Wedekind. Paratype, *a*, T.S.; *b*, L.S.; *c*, T.S. x 10; *d*, L.S. x 10; Cn 54875-6, Riksmuseet, Stockholm. Upper Llandovery, lower [Visby?] Marls, Stenkyrka, Gotland.

FIG. 4.—Gen. et sp. nov. *a*, T.S.; *b*, L.S.; UTGD 52040.

FIG. 5.—*Stortophyllum simplex* Wedekind. Holotype, *a*, L.S.; *b*, L.S., x 4; *c*, x 10; Cn 54864, Riksmuseet, Stockholm. Lower Ludlovian Eke Marls Lau-backar, Gotland.

FIGS 6, 7.—*Holmophyllum holmi* Wedekind. 6, Holotype, *a*, T.S.; *b*, T.S. x 10; Cn 54865, Riksmuseet, Stockholm. Lower Ludlovian Eke Marls, Lau-backar, Gotland. 7, Paratype, *a*, L.S.; *b*, L.S. x 10; Cn. 54866, Riksmuseet, Stockholm. Lower Ludlovian Eke Marls, Lau-backar, Gotland.

FIG. 8.—*Cystiphyllum siluriense* Lonsdale. Lectotype, L.S., Geol. Soc. Colln 6565, Geological Survey Museum, London. Wenlock Limestone, Dudley, Worcestershire, England.

PLATE 5—

FIGS 1-3.—*Favosites goldfussi* d'Orbigny. 1, *a*, T.S.; *b*, T.S., x 4; *c*, L.S.; UTGD 51764. 2, *a*, T.S.; *b*, T.S., x 4; *c*, L.S.; *d*, *e*, L.S., x 4; UTGD 51767. 3, T.S.; UTGD 52097.

FIGS 4, 5.—*Favosites careyi* sp. nov. 4, *a*, T.S.; *b*, T.S., x 4; *c*, L.S.; UTGD 51785. 5, Holotype, *a*, T.S.; *b*, T.S., x 4; *c*, L.S.; *d*, L.S., x 4; UTGD 51781.

FIGS 6, 7.—*Squameofavosites bryani* (Jones). 6, *a*, T.S.; *b*, T.S., x 4; *c*, L.S.; *d*, L.S., x 4; UQGD 51778. 7, *a*, T.S.; *b*, T.S., x 4; *c*, L.S.; *d*, L.S., x 4; UTGD 52086.

PLATE 6—

FIGS 1-3.—*Cladopora* sp. 1, L.S., x 5; UTGD 89795. 2, *a*, x 1; *b*, T.S., x 5; *c*, L.S., x 5; *d*, Tg. S., x 5; UTGD 52157. 3, T.S., x 5; UTGD 89795.

FIG. 4.—*Squameofavosites bryani* var. *ramosus* var. nov. 4, *a*, x 0.5; *b*, T.S.; *c*, T.S., x 4; *d*, *f*, L.S.; *e*, *g*, L.S. x 4; UTGD 51745.

FIG. 5.—*Thecostegites ejuncidus* sp. nov. 5, Holotype, *a*, T.S.; *b*, L.S.; *c*, T.S., x 4; *d*, L.S., x 4; UTGD 51744.

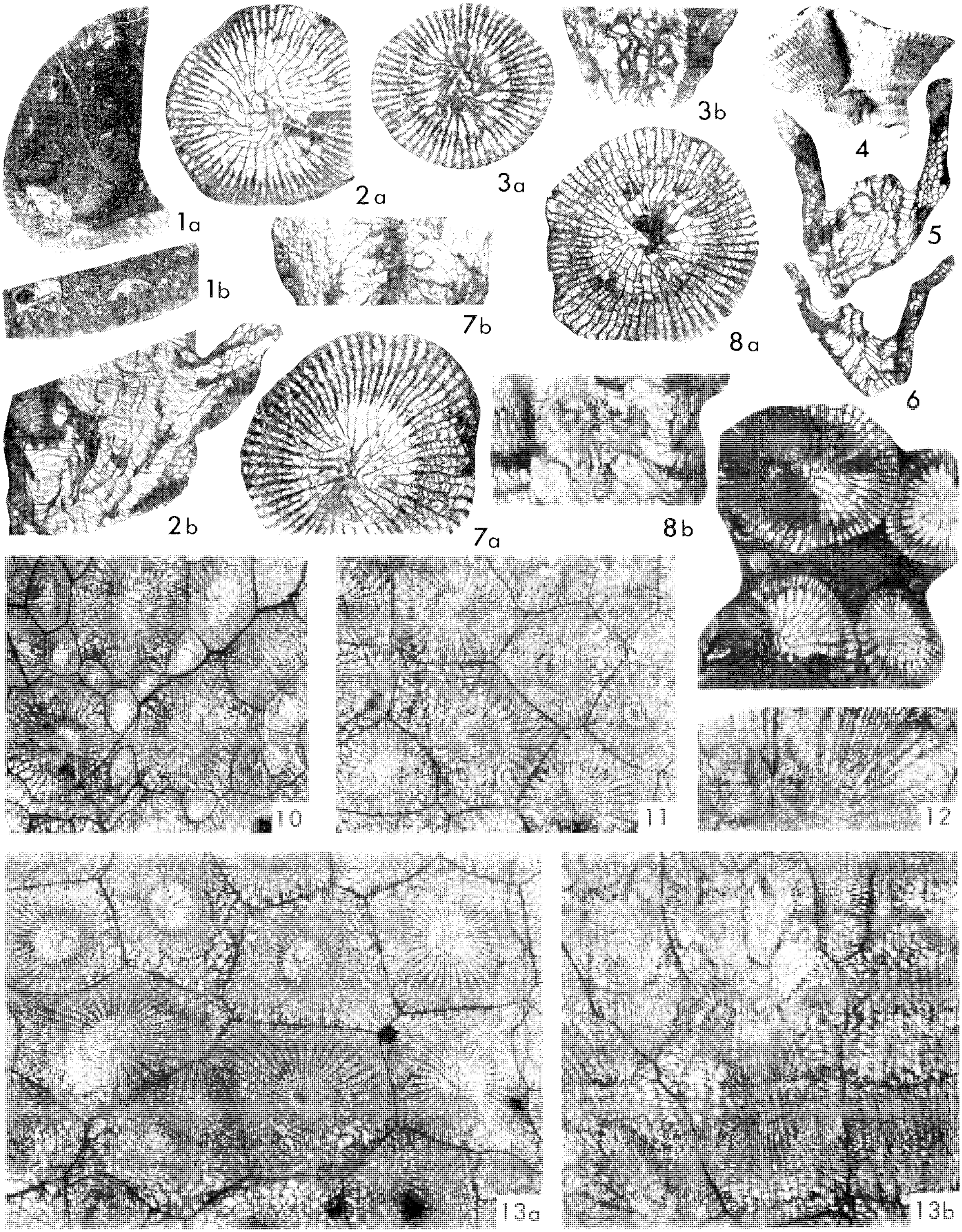
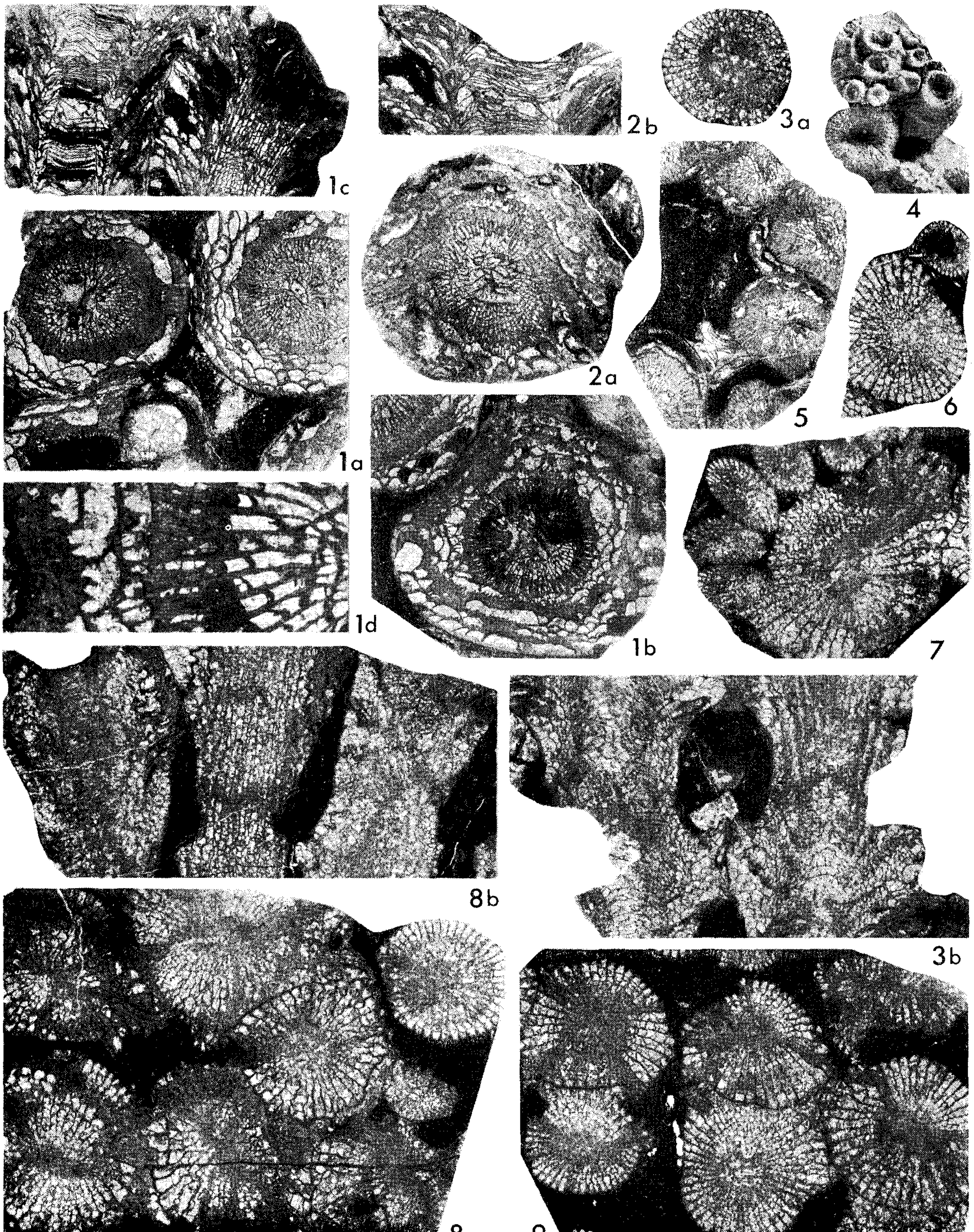


PLATE 1



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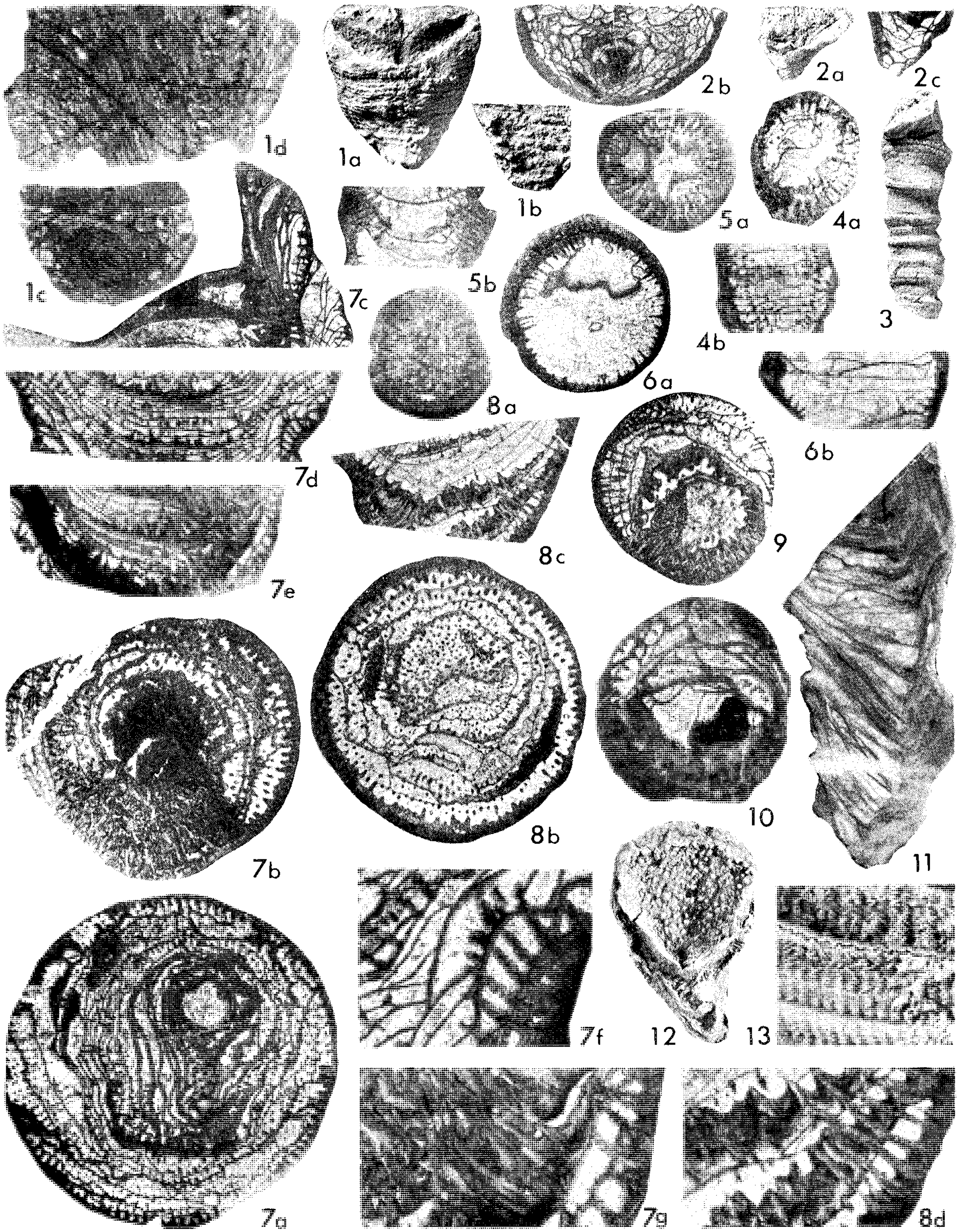
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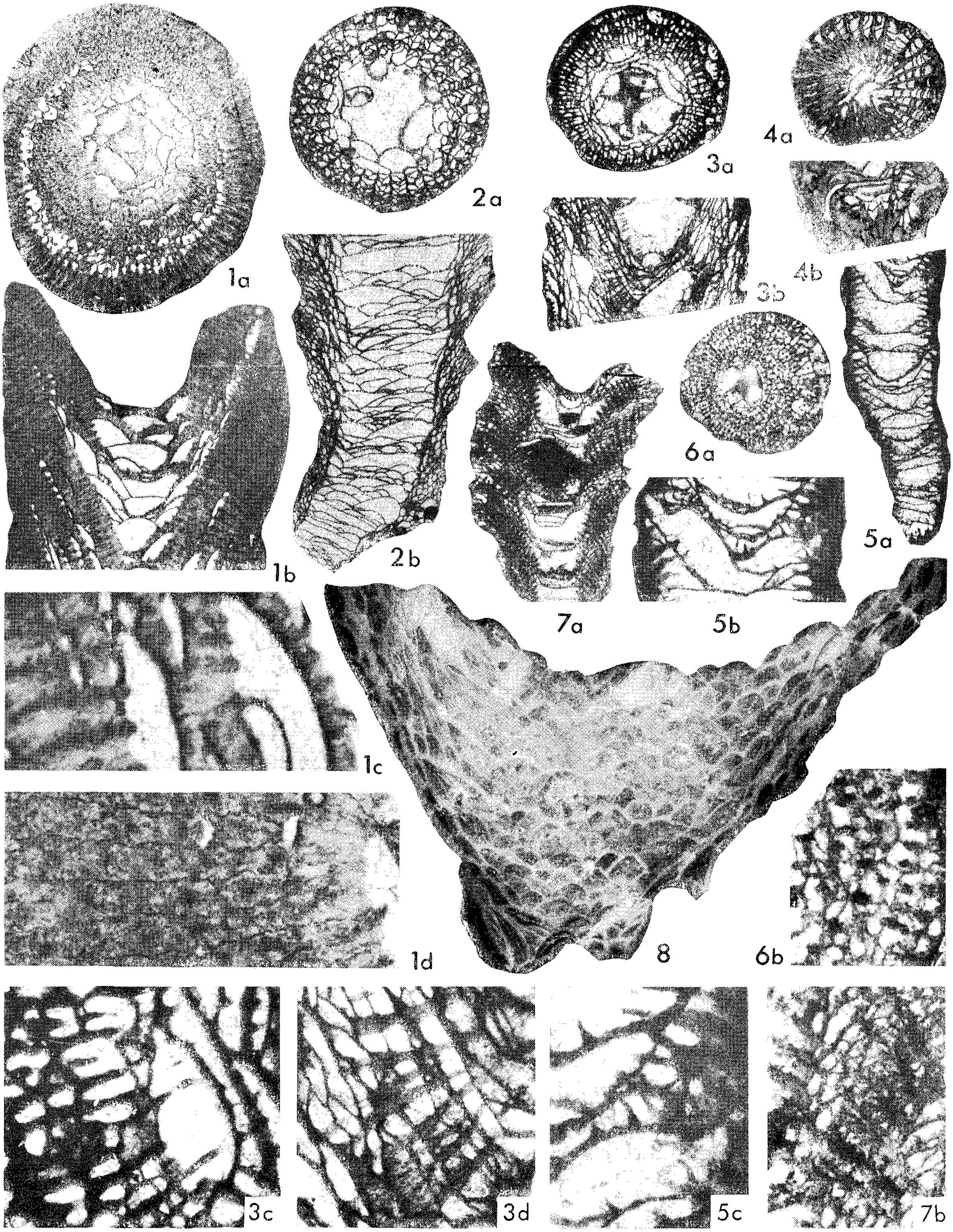
Plate 3



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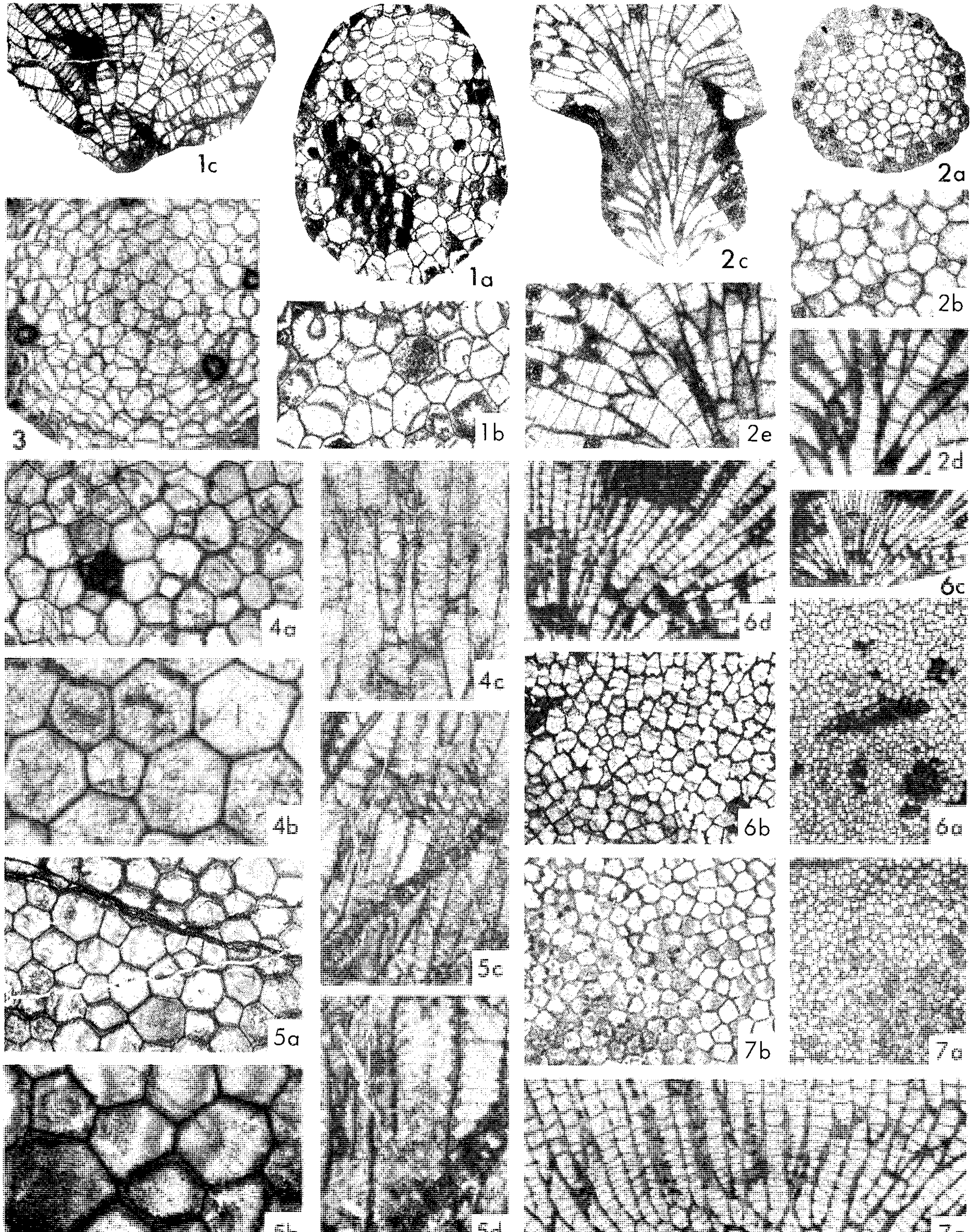

Plate 5

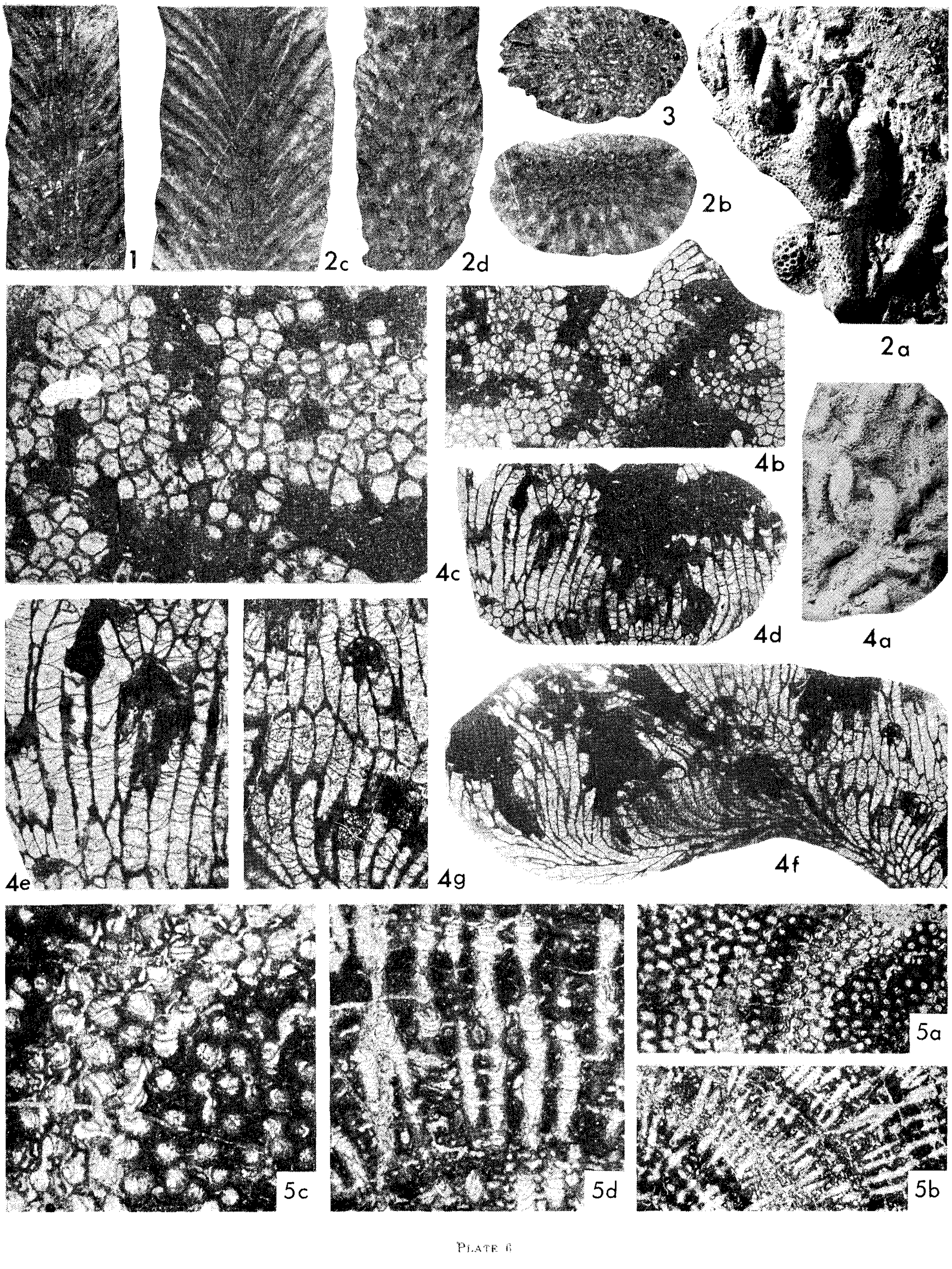

Plate 6