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Ordovician Corals from Ida Bay, Queenstown and Zeehan, Tasmania

By

DOROTHY HILL
University of Queensland

(WITH 3 PLATES)

ABSTRACT

Tasmanian Ordovician coral faunas appear to lie within the range Blackriveran—Richmondian of the N. American succession. Species, mostly new, are described and illustrated belonging to the genera *Streptelasma, Tryplasma, Lichenaria, Tetradium, Billingsaria, Nyctopora, Lyopora, Protaraea, Coccoseris, Acidolites, Propora, Plasmoporella* and *Eofletcheria.*

Core No. 2 Oceana Mine, Zeehan: This 964 feet core was obtained from a borehole dipping at 74° in a direction of N.52°W. The cores did not show good bedding, but angles of 35°, 25°, 19° and 19° with the axis of the core were obtained from samples 31 (215′), 42 (252′ 6″), 85 (875′ 6″) and 93 (914′ 6″) from which it was deduced that the true thickness of the beds was between 300 and 500 feet; for general argument 400 feet is assumed. The core is of blue-grey to black impure limestone with grey-black argillaceous bands; gastropods occur throughout, but are relatively richest in two bands, one between 130 and 170 feet in the core, the other between 774 and 786 feet; a brachiopod band occurs between 890 and 918 feet, and *Receptaculites* at 682 feet. There is a rich coral zone between 47 and 102 feet in the core, possibly representing 44 feet true thickness of strata; this contains *Tryplasma cerioides* sp. nov., *?Lichenaria* sp., *Tetradium* sp., *T. ?compactum* sp. nov., *?Billingsaria ?banksi* sp. nov., *Nyctopora zeehanensis* sp. nov., *?Nyctopora* sp., *Lypora* cf. *favosa* (M'Coy), and *Eofletcheria contigua* sp. nov. Of the genera represented, on present records *Lichenaria, Tetradium, Billingsaria* and *Eofletcheria* first appeared in N. America in Chazy strata, *Nyctopora* first appeared in N. America in Black R. strata, as did *Tryplasma* (if this is congeneric as I suspect with *Foerstephyllum* Bassler). *Lyopora* in N. America is confined to Trenton strata, and *Lichenaria* does not occur later than Trenton. In Great Britain *Lyopora* and *Billingsaria* are known only from the Criaghead Limestone. In Norway the earliest *Tryplasma, Eofletcheria* and *Lyopora* so far known are from the Encrinite Limestone, and the earliest *Nyctopora* from the Mjøsa Limestone, but *Lyopora* and *Nyctopora* continue into 5a beds at Stord. In N.S.W., *Tetradium, Billingsaria Nyctopora, Coccoseris* and *Propora* occur in strata overlain by beds with the *Nemagraptus gracilis* fauna.

The equivalence of the above-mentioned strata to the standard graptolite sequence would appear to be (Hill, 1951), Chazy = pre-*Nemagraptus gracilis* zone (but possibly of this zone); Black R = *N. gracilis* zone; Trenton = zones above *N. gracilis* to and including *Pleurograptus linearis* though possibly basal Trenton beds may be within the *N. gracilis* zone; Richmondian = *D. anceps* zone; Craighead Limestone = ?*Climacograptus peltifer* zone; Encrinite Limestone = *D. clingani* zone; 5a = *D. anceps* zone.

Ordovician coral faunas are perhaps as yet insufficiently known for sure correlation work, but it would seem that the horizon of the Oceana coral zone is more likely to fall within the limits of the Trentonian (top of *Nemagraptus gracilis* zone to top of *P. linearis* zone) than within the Chazy, Black R or Richmondian, and is possibly low in the Trentonian.

In the beds below the Coral Zone, only *Tetradium* spp. and *Lichenaria ramosa* are known, and these are most likely to be Trenton or pre-Trenton; the beds below the Coral Zone possibly represent 300-350 feet true thickness of strata. Following are the identifications of corals for the Oceana Bore, the figure given being depth in the core:—

Feet.	
47—102	Coral zone—*T. cerioides*, ?*Lichenaria* sp., *Tetradium* ?*compactum*, *T. sp.*, *Nyctopora zeehanensis*, *N.* sp., *Billingsaria* ?*banksi*, *Lyopora* cf. *favosa*, *Eofletcheria contigua*
143—149	*T. dendroides*
169½–170	*Tetradium*
199—215	*T. dendroides*
215—221	*T. compactum*
225	*T. dendroides*
245—249	*T. compactum*
251	*T. ?tasmaniense*
379	*T. compactum*
449—502	*T. petaliforme*
507	*Tetradium* sp.
578	*Lichenaria ramosa*
599	*L. ramosa*
692	*Receptaculites*
746—750	*L. ramosa*
750	*Tetradium*
774—775	*L. ramosa*
776—796	Dark argillaceous limestone with many gastropods and 784—786 *L. ramosa*
875—886	*L. ramosa*
890—918	Brachiopod band
922—923	*L. ramosa*
937—938	?*Tetradium*

Smelter's Quarry, Zeehan: Melbourne University collection herefrom contains *Tetradium dendroides* (very numerous), *T. tasmaniensis* (1 specimen, MUGD 2132), *T. conjugatum* (MUGD 2130), ?*Lichenaria* ?*ramosa* (MUGD 2256, 218, 228), ?*Nyctopora* sp. (MUGD 2131) and ?*Protaraea* sp. (197-199). *T. tasmaniense* Chapman was originally des-

cribed from the limestone on the Smelters-road, opposite the smelting works. This fauna differs from that of the Oceana Coral Zone only in its relative poverty in species and the presence of doubtful *Protaraea*, no heliolitids being observed in the Oceana fauna. In N. America *Protaraea* is not known from beds older than Trenton. The age indicated is probably Trenton.

Smelter's Quarry, Queenstown: Melbourne University collection of corals from this quarry consists entirely of *Tetradium* spp. The commonest is *T. tasmaniense* Chapman; others are *T. conjugatum, T. dendroides* and ?*T.* sp. cf. *syringoporoides*. Previously described from the old Flux Quarry, now disused, at the northern end of Queenstown on the western side of the Strahan road, before it climbs out of the valley of the Queen R. half a mile N. of the railway crossing, are *Tetradium tasmaniense, Alveolites,* sp., *Protaraea* cf. *richmondense* Foerste and *Acidolites* sp. These were considered (Hill and Edwards, 1941, p. 230) Trentonian or Richmondian. All the material from Queenstown is very badly preserved, so that identification is hazardous. The limestone here is some 400 feet thick.

Bubb's Hill: Loc. 15 near H.E.C. Tower 287, Victoria Pass, Lyell Highway, Tasmania. Here *Eofletcheria ida, Nyctopora* sp. and *Plasmoporella* sp. occur. These indicate an Ordovician horizon, possibly Upper Ordovician, since *Plasmoporella* is not known elsewhere older than F_1 in the Baltic countries and *Nyctopora,* though dominantly Middle Ordovician, occurs in 5a in Norway, but is unknown in Silurian beds.

Near Ida (Wheelbarrow) Bay, a small indentation in the S.E. Tasmanian coastline in the Hastings district, a fauna very like that of the coral zone of the Oceana core occurs, but contains also solitary Rugosa and heliolitids. We have *Streptelasma* sp. cf. *aequisulcatum* (M'Coy), *Tryplasma cerioides, Lichenaria ramosa, Tetradium* ?*compactum, Tetradium* sp., *Billingsaria banksi, Eofletcheria ida* sp. nov., *Coccoseris ramosa* sp. nov., and *Acidolites* sp. These corals were not collected zonally over the section, and probably more than one horizon is represented. The occurrence of a different species of *Eofletcheria* suggests that although Ida Bay has two species in common with the Oceana No. 2 coral zone, a slightly different horizon may be represented. The oldest *Coccoseris* so far known is from the Cliefden Caves Limestone of New South Wales (*N. gracilis* zone) in which *Billingsaria banksi* occurs; *Acidolites* elsewhere is Upper Ordovician. The *Streptelasma* is quite like that from the Robeston Wathen (= *C. wilsoni* and *D. clingani* zones) and Coniston Limestones of Great Britain, and those from the *Cyclocrinus* Beds (possibly *C. wilsoni* zone) of Norway. The age of the Ida Bay fauna therefore seems to be at oldest Blackriveran, but probably lies between that and Richmondian.

The King Mine Core No. 13 at Zeehan has only *Aulopora* sp. as an identifiable coral. This occurs between 530 feet 6 inches and 532 feet, is not known elsewhere and cannot be considered to indicate any particular age for its stratum since *Aulopora* extends from the Ordovician into the Upper Devonian.

Systematic Descriptions

Where ordinal, family, subfamily or generic diagnoses are not given the reader should consult Hill, D, 1951 " The Ordovician Corals ". *Proc. Roy. Soc. Qld.*, LXII, pp. 1-27. Where type species of genera are not cited reference should be made to Lang, W. D., Smith, S. and Thomas, H. D., 1940. Index of Palaeozoic Coral Genera. British Museum (Natural History), pp. i-vii, 1-231.

Order: **RUGOSA** Edwards and Haime, 1850

Sub-order: **Streptelasmatina** Wedekind, 1927 (as Streptelasmacea)

Family: **STREPTELASMATIDAE** Nicholson, 1889 (as Streptelasmidae)

Genus: *Streptelasma* Hall, 1847

Streptelasma sp. cf. *aequisulcatum* (M'Coy) (Pl. III, fig. 35)

* MUGD 2126 from Ida Bay is a fragment of a solitary coral with considerable patches of recrystallisation; at a diameter of 18 mm. there are at least 35 major and 35 minor septa so dilated as to be contiguous in the minor septal zone about 3 mm. wide; the thick major septa extend unequally into the tabularium, most but a little way, some few a considerable way, some running together in groups of two or three, and many with thickened paliform lobes axially. The arrangement of these axial ends is not clearly seen, but is comparable with that in *S. aequisulcatum* (M'Coy, 1850; 1851, p. 39, pl. 1B, figs. 23, 24) from the Coniston Limestone of England, which is either of the zone of *Pleurograptus linearis* or the zone of *Dicellograptus anceps*. The specimen is very like *S.* sp. cf. *aequisulcatum* M'Coy (Sedgwick Museum A8510d) from the Robeston Wathen Limestones of Wales, which is possibly of the *Climacograptus peltifer* zone, though probably of either the *C. wilsoni* or the *D. clingani* zone.

Sub-order: **Cystiphyllina** Nicholson, 1889 (as Group Cystiphylloidea)

Family: **TRYPLASMATIDAE** Etheridge, 1907 (as Tryplasmidae)

Genus: *Tryplasma* Lonsdale, 1845

Tryplasma cerioides sp. nov. (Pl. I, figs. 1a, b, Pl. III, fig. 36)

Holotype: MUGD2123, Ida Bay, Tasmania.

Diagnosis: Cerioid or partly phaceloid *Tryplasma* with peripheral increase; corallites up to 9 mm. in diagonal diameter, with numerous short, subequal septa.

Description: The corallum is cerioid in part but phaceloid in peripheral regions; new corallites arise inside the calice, around the periphery. There is considerable variation in size of corallite, the largest observed being 8 and 9 mm. in diagonal diameters. There is a narrow peripheral stereozone about 0·25 mm. wide, within which the neighbouring septa are contiguous and each is a continuous vertical plate; but inside this zone, the axial edge of each septum is acanthine, the trabeculae being in single vertical series and extending almost horizontally inwards for a maximum observed distance of 1 mm. In a corallite of 8 mm. diagonal diameter there are 38 septa which are not divisible into alternate orders of longer and shorter (major and minor) septa; the septa of neighbouring corallites are opposite or sub-opposite. There are no dissepiments and the tabulae are complete and moderately arched.

* MU = Melbourne University Collection.

The species is common at Ida Bay, and here the tendency for cylindrical groups of buds to grow freely up from cerioid regions of the corallum is very marked.

Two good specimens occur in the Oceana No. 2 Core in sample 7 at 62 feet to 62 feet 6 inches and in sample 8 (62 feet 6 inches to 63 feet, Pl. I, fig. 1). Corallites doubtfully referred to the species (doubtfully because their stereozones and septa are longer) are present in sample 3 from Oceana No. 2 Core at 47 to 48 feet.

Two cerioid species have recently been described (Hill, 1953) from the Middle Ordovician ($4\beta\delta$) Encrinite Limestone of Skien District, Norway, and their possible generic identity with *Foerstephyllum* Bassler (1950, p. 269) indicated, depending on which of the syntypes of *Columnaria? halli* Nicholson, 1879 is designated as lectotype of this species, which is the type species of *Foerstephyllum*. Our Australian species is not unlike specimens referred to *C. halli* from the Black R. and Trenton of U.S.A.

Order: **Tabulata** Edwards and Haime, 1850

Family: **CHAETETIDAE** Edwards and Haime, 1850

Sub-family: **Lichenariinae** Okulitch, 1936 (as Lichenaridae)

Genus: *Lichenaria* Winchell and Schuchert, 1895

Lichenaria is very common in the Chazy, Black R. and Trenton of North America, and Bassler (1950) has referred two species from the Canadian to the genus. The Tasmanian species described below is the first known from outside N. America.

Lichenaria ramosa sp. nov. (Pl. I, figs. 14, 15, pl. III, fig. 37)

Holotype: UT 23503 from sample 85 at 875 feet 6 inches down in Core No. 2, Oceana Mine, Zeehan, Tasmania, in the Smelter's Limestone. Other specimens occur in this core over the range 578 feet down to 923 feet 6 inches.

Diagnosis: Rather slenderly branching coralla with 3 to 4 polygonal corallites in 1 mm., numerous tabulae, no septa and no mural pores.

Description: The corallum is ramose, the branches being cylindrical or a little flattened, 5 to 10 mm. across, and not regular in direction. The corallites diverge from the axis, slowly at first but with gradually increasing curvature, the calices opening almost at right angles. New corallites appear at the angles of the old, and are at first of very small diameter, but grow to average size in quite short distances. The corallites are 4 to 6-sided each side being reasonably straight. The walls are a little thickened but show no septa, septal spines or mural pores. The tabulae are numerous, complete, flat and distant except in a zone up to 1 mm. wide at the surface of the branch, where they are close and incomplete, successive tabellae inosculating off-centre. The calices are very deep in unweathered specimens, the walls projecting 0·5 mm. above the topmost tabula.

The small size of the corallites raises doubts whether the species might be polyzoan, but the absence of acanthopores, or of any other evidence of dimorphism, the absence of moniliform wall thickenings and the presence of numerous tabulae support reference to the Tabulata. It differs from N. American species of *Lichenaria* in its ramose habit and small size of corallite. Several specimens have been collected from Ida Bay.

Sub-family: **Tetradiinae** Nicholson, 1879

The possibility that the Tetradiinae may be calcareous algae seems to me to deserve serious investigation.

Genus: *Tetradium Dana*, 1848

Bassler (1950, pp. 279-292) has reviewed the N. American species of *Tetradium*. His work indicates that average corallite diameter is constant in a species, if one takes as average diameter that where the septa extend from half to two thirds of the distance to the centre. Also that the growth form of the corallum is not in general a safe indication of stratigraphic horizon. Thus N. American species may be divided into four groups, according to growth form:—

(1) *T. syringoporoides* group, with coralla consisting of single corallites dividing at long intervals into four tubes which separate and continue as separate individuals until division occurs again;

(2) *T. cellulosum* group, with single corallites dividing less slowly at more or less regular intervals into separate bundles each of 4 to 16 or more closely adhering corallites;

(3) *T. halysitoides* group, where increase is so rapid that chains or networks enclosing empty spaces result;

(4) *T. fibratum* group, with massive (cerioid) coralla in which the corallites reproduce so quickly that they remain in contact throughout their length. Representatives of all four groups may be found over the range Black River to Richmondian.

In Oceana Core No. 2, Zeehan, *Tetradium* occurs somewhat rarely from 57′ 6″ to 143′ 6″, is relatively common between 149 and 750 feet, but is apparently absent in the shelly limestones from 750 feet to the bottom of the core at 964′ 6″.

Tetradium petaliforme sp. nov. (Pl. I, fig. 10).

Holotype: UT 23513 from sample 50 at 449 feet down in Core No. 2 Oceana, Zeehan, from the Smelter's limestone. Other coralla occur in the same core in samples 51 (501 feet) and 52 (502 feet).

Diagnosis: Massive *Tetradium* with large, very thin walled corallites typically 8 sided and 1·5 mm. in diameter.

Description: The external form of the corallum is either cerioid (massive without lacunae) or, more likely, with thick chains or networks of corallites enclosing empty spaces; the uncertainty is because the species is known so far only from 7/8 inch cores. The corallites are very thin walled; they are arranged in sub-parallel rows such that those of neighbouring rows are sub-opposite; the edges of the otherwise four-sided prisms are bevelled, and often also the four sides are bent inwards in their mid-lines, so that a four-petalled Tudor-rose pattern is obtained in transverse section. The dividing walls of new corallites proceed inwards from the mid-lines of the four main faces; when they extend from $\frac{1}{2}$ to $\frac{2}{3}$ across the radius, the smaller diameter of the corallite is approximately 1·5 mm. Tabulae are rare to absent.

Remarks: In the holotype, the corallites show a greater diameter in one direction, usually 1·8 mm. against 1·5 mm; this may be due to distortion or perhaps to obliquity of section.

Tetradium tasmaniense Chapman (Pl. II, figs. 17, 23, 24)

Tetradium tasmaniense Chapman, 1919, p. 8, pp. 1-3

Type material: Of the type material, from the Smelter's Road, Zeehan, only two thin sections used by Chapman for his figs. 1-2, have been located, 13138-9 in the Nat. Mus. Melb.; some of the characters of the species are therefore in doubt. Consequently, I have examined with especial care the various species of *Tetradium* occurring in the present collections from Zeehan, though there is of course, no certainty that any of these new collections are from the same locality or even the same horizon as the type material. I have many specimens from Smelter's Quarry mostly weathered out from their containing limestone, and some fresh material embedded in limestone from Bore Core No. 2 Oceana Mine. The weathered specimens are with two exceptions branching forms in which the branches broaden distally or at least do not taper, the corallites opening at the tops of the branches and running quite parallel to one another inside the branch. One exception, MUGD 2130 is *T. conjugatum*, a species with slender tubes containing 4 corallites, of the *T. syringoporodies* type. The other, is a coarsely branching form with tapering branches, on which the corallites open all round the periphery, as well as the tip, though not at right angles to the axis.

It is thought that the thin sections Chapman illustrated must have come from a form like the last, though it is the only one of its kind in the present collections and probability would suggest that a single specimen picked up at random like the type was would be from that species most commonly represented in the surface outcrop of the limestone.

Of Chapman's thin sections one shows vertical sections through branches about 4 mm. wide from which the outer parts have been worn by weathering before burial. In these the thin-walled corallites are of roughly parallel growth, with tabulae rare to absent. The other shows what is probably a transverse section of a branch about 10 mm. in diameter, which has no enclosing boundary wall as in *T. dendroides*, but has corallites tending to present oblique or vertical sections at the circumference, though those at the axis are transverse sections. The largest corallite in which the septa are only $\frac{2}{3}$ the radius has a larger diameter of 1·25 mm. and a smaller of 1 mm.; in parts of the section, corallites of only 0·6 or 0·7 mm. shorter diameter and 1 mm. longer diameter are seen with septa extending right to the axis, so that the corallites of this species are of variable size. The walls are moderately thick, so that the inner corners are somewhat rounded. The sections tally with a branch whose corallites open outwards at the periphery, as in the single specimen MUGD 2132 (Pl. II, fig. 17) not with a branch with an enclosing wall as in the common species from Zeehan quarries. Such branches with circumferential calices are very common in the Queenstown Quarries almost to the exclusion of branches with enclosing walls.

A very similar appearance is given by a section from 251-252 feet down in Oceana No. 2 Core, Zeehan (Pl. I, fig. 11).

Some specimens from Queenstown Quarries referred to *T. tasmaniense* have corallites opening very obliquely, yet without projecting lower lips.

Tetradium compactum sp. nov. (Pl. I, fig. 12).

Holotype: UT 23517 from sample 31 (215 feet to 215 feet 6 inches) in Core No. 2 Oceana, Zeehan, Tasmania, in the Smelter's Limestone.

Diagnosis: Massive, cerioid *Tetradium* with moderately thick-walled corallites 0·8 in diameter.

Description: The total form of the colony is unknown but one 7/8 inch core passed through a corallum, at least 22 cm. long and 20 mm. tall, with a hummocky upper surface and apparently without lacunae. The corallites average 0·8 mm. diameter when the new dividing walls extend between $\frac{1}{2}$ and $\frac{2}{3}$ of the way to the centre; the new dividing walls thicken peripherally, and the main walls are rather thickened; the corallites are chiefly 4-sided, often with rather rounded corners, and arrangement in parallel rows is neither marked nor persistent. Tabulae are rare to absent. There may be a broadly marked curvature in upward direction of growth of the corallites in considerable portions of the corallum (see figure of vertical section).

Remarks: This massive species occurs in the No. 2 Oceana core at Zeehan over the section 215 to 379 feet. Of North American species it shows considerable resemblance to the Trentonian *T. fibratum* Safford, in which however the corallites are much larger. In sectioning material from Ida Bay, a fragment of a *Tetradium* colony was encountered with numerous corallites in connection by common walls and of average diameter about 0·8 mm.; this is doubtfully referred to *T. compactum* (Pl. III, fig. 38).

Tetradium dendroides sp. nov. (Pl. I, fig. 9, pl. II, figs. 16, 28).

Holotype: MUGD 2260, from Smelter's Quarry, Zeehan, Smelter's Limestone.

Diagnosis: Ramose *Tetradium* with cylindrical or flattened branches on which the calices of 0·75 mm. adult diameter, open terminally and not laterally.

Description: The corallum is branching, the branches being cylindrical or flattened, each enclosed in epitheca laterally. The cylindrical branches are up to 10 mm. in diameter, and the flattened branches to 7 mm. across. The calices open only at the tops of the branches, and before the dividing walls become complete are 0·75 to 0·8 mm. in diameter, though they may be as wide as 1·0 mm. when the dividing walls are complete. Arrangement into parallel rows in the flattened branches is imperfect. The walls are moderately thick and the angles of the corallites moderately rounded.

Remarks: This branching form, common in the Quarries at Zeehan, differs from *T. tasmaniense* in having its calices at the tips only, and not along the sides of the branches. In Oceana Core No. 2, Zeehan, it is found between 131 feet and 226 feet (in samples ?19, ?20, 25, 26, 27, 28, 29, 30 and 37). It is rare in the Queenstown Quarries.

Of the American species, this form is most closely comparable with the Blackriveran *T. cellulosum*. MUGD 2243 from the Queenstown Quarries (Pl. II, fig. 29) has a similar type of growth to *T. dendroides*, but the branches are closely spaced, almost touching, and the parallel

corallites are larger, of average diameter 1 mm. when the new dividing walls are $\frac{1}{2}$ to $\frac{2}{3}$ the radius of the old corallite. Only one branch of *T. tasmaniense* (MUGD 2132, pl. II, fig. 17) is represented in the M.U. collection from Zeehan Quarries, though there are 104 branches of *T. dendroides*.

Tetradium conjugatum sp. nov. (Pl. II, figs. 18, 25).

Holotype: MUGD 2247, Queenstown Quarries, Tasmania; Smelter's Limestone.

Diagnosis: Corallum of corallites 1 mm. in diameter united in very irregular mesh so that the lacunae occupy less space than the corallites.

Description: The corallum consists of single corallites of average diameter 1 mm. dividing at long intervals into 4 tubes, one or two of which then separate slightly from the others, but may grow to touch corallites from other divisions, so that chains occur with narrow irregular lacunae, the lacunae occupying far less space in any transverse section of the colony than the corallites; the corallite walls have rounded corners and become indented at the positions of growth of new walls. Tabulae are rare.

Other material is MU 40 from the Queenstown Quarries, and MUGD 2130 from Zeehan Quarries.

In N. America, the *T. halysitoides* group is common in Black R and Trenton strata, rare in the Richmondian.

?*Tetradium* sp. cf. *syringoporoides* Ulrich
(Pl. II, fig. 27)

MU 47–MUGD 2250, Queenstown Quarries, Tasmania, are of coralla with distant slender corallites about 1 mm. in diameter spaced on the average about 5 mm. apart. The corallites tend to be square in section, with rounded edges, but the infilling is recrystallised and no dividing walls or tabulae can be distinguished in thin section, though some corallites are seen on the weathered surface to divide into four, which diverge rather rapidly. The growth habit is thus of the *T. syringoporoides* group which is dominantly Blackriverian, though one form occurs in the Upper Chazy of Canada, and others are known in the Trenton of Central Tennessee and the Richmondian of N. Greenland.

Tetradium sp. (Pl. I, figs. 13a, b)

Three specimens were encountered in thin sections of samples from Oceana No. 2 Core, Zeehan, in which the growth form appears to be of single corallites dividing at long intervals into four tubes which separate and continue as separate individuals until division occurs again. The diameter of the adult corallites when the dividing walls extend $\frac{1}{2}$ to $\frac{2}{3}$ way to the centre, is 1·5 mm.; the walls are rather thin, and the angles of the corallites are rounded; tabulae are not seen. None are in my opinion sufficiently well preserved for nomination as a type specimen, so the species to which they belong, and which I believe to be separable from the other four Zeehan species described above is at present given no name. The specimens are from samples 62 (at 750′), 53 (507′ 6″) and 21 (169′ 6″ to 170′).

Family: **SYRINGOPHYLLIDAE.** Pocta, 1902

=Lyoporidae Kiaer, 1930; Calapoeciidae Hill, 1951.

Massive; septa short, thick, spinose and typically equal in number in any species; mural pores interseptal and arranged in horizontal rows, each row just above a tabula; coenenchyme may be formed by extensions from the tabulae and septa which intersect to enclose horizontal tubular spaces. M.Ord. — L. Sil.

Sub-family: **Billingsariinae** Hill, 1951 (=emend. Billingsaridae Okulitch, 1936)

=Nyctoporinae Hill, 1951

Coenenchyme absent or of vertical trabeculae only, septa short, typically 16, may alternate in size. M.–U.Ord.

Genus: *Billingsaria* Okulitch, 1936

Type species by original designation *Columnaria parva* Billings, 1859.

Septal trabeculae dilated wedgewise to form a thick wall; vertical trabeculae may develop at axis. M.Ord., N.Am., Aus.

I have considerable doubt whether the separation of this genus from *Nyctopora* is justifiable.

Billingsaria banksi sp. nov. (Pl. III, fig. 40).

Holotype: MUGD 2113 from Ida Bay, S.E. Tasmania.

Diagnosis: *Billingsaria* with corallites 3 in 3 mm.

Description: Corallum hemispherical. There are 3 calices in 3 mm. Each corallite possesses 8 septa each about $\frac{1}{3}$ of the radius of the corallite, and dilated wedgewise towards the periphery; most corallites also show 8 much shorter septa, alternating with the longer; the septal trabeculae are clearly visible in transverse section, one in each short septum, two or more in each longer septum and they are apparently almost vertical. Some corallites show a strong columella, consisting apparently of a single trabecula, others several disjunct trabeculae, and many, no axial structure. Tabulae are thin and rather distant.

Remarks: A very small specimen UT 23532 (Pl. 1, fig. 2) from sample 3 (47 to 48′) in Core No. 2 Oceana, Zeehan, Smelter's Limestone, encrusting a polyzoan, is referred somewhat doubtfully to this species, owing to the habit and smaller size of corallite (4 in 3 mm.).

This Tasmanian species is very similar to the N. American Chazy type species and to the Scottish Craighead (?=Trenton) *B. occidentalis* (Nich. & Eth.). The trabeculae are not tightly welded together and in thin sections where recrystallisation has occurred the spaces between them appear falsely as canals (cf. Okulitch, 1936, p. 61).

Genus *Nyctopora* Nicholson, 1879

Type species *N. billingsi* Nicholson, 1879, which was a *nom. nov.* for *Columnaria goldfussi* Nicholson 1875 (*non* Billings, 1858 from the Trenton of Peterborough, Canada.

Walls and septa relatively thin. M.–U.Ord.

Nicholson's figures of the type species (1879, pl. 9, figs. 3*a-c*) show a moderately thin and rather crenulate wall with mural pores and without regularity of septal arrangement. A thin section of a specimen in the British Museum from Nepean Pt., Ottawa, referred to *N. billingsi*, shows a horizontal row of small pores in the walls as in *Calapoecia*. Bassler (1950, p. 267) has founded *Saffordophyllum* on a species in which there are 8 septa only and these proceed from inwardly directed undulations in the thin wall; Nicholson's figure of *N. billingsi* however, suggests that it also has undulate though somewhat thicker walls. Those species with 12 septa placed by Bassler in *Saffordophyllum* and in *Nyctopora* (*Proheliolites*) should, it seems to me, be transferred to the family Heliolitidae, genus *Proheliolites*.

Nyctopora zeehanensis, sp. nov. (Pl. I, figs. 3*a*, *b*)

Holotype: UT 23531 from sample 11 at 91 feet in Core No. 2 Oceana Mine, Zeehan, in Smelter's Limestone.

Diagnosis: Corallum massive with corallites 1·25 mm. in diameter with rather thin, crenulate walls; septa unequally developed from corallite to corallite but in parts of some eight longer alternate with eight shorter, each rising from an inwardly projecting crenulation.

Description: The corallum is large and cerioid, with corallites 1·25 mm. in average adult diameter and five or six-sided. The common walls are moderately thin with vertical waves; septa project from the inwardly projecting crests; septal development is imperfect, or unequal from corallite to corallite; the maximum development would appear to be 16, 8 longer and 8 shorter, but sections of few corallites show this perfectly; some show no septa; others show a few longer septa with perhaps a few shorter alternating; the waves in the wall are likewise not regularly or equally developed. The septa appear trabeculate. No mural pores have been observed, and the tabulae are thin, almost horizontal and rather close.

Remarks: Except for the absence of mural pores, this species resembles very closely the thin sections of the syntype of the type species figured by Nicholson (1879, pl. 9, figs. 3*a-c*) from the Trenton of Peterborough, Canada.

Nyctopora sp. (Pl. II, fig. 30)

One small domed fragment from Loc. 15, near H.E.C. Tower, 287, Bubb's Hill, Victoria Pass, Lyell Highway, Tasmania has corallites 1 mm. in average diameter, with 8 very short major and 8 minor septa each of vertical trabeculae, and rather distant flat tabulae. The occurrence of this typically Ordovician genus sufficiently determines the age of the Bubb's Hill fauna as Middle or Upper Ordovician though the material is insufficient for detailed description.

?*Nyctopora* sp. (Pl. I, fig. 4)

Material: One fragment UT 23530 from sample 14 (94 feet 6 inches to 95 feet), from Core No. 2, Oceana Mine, Zeehan.

Description: The corallum, known only from a fragment intersected in a bore core is either ramose or tumulose, since in a vertical section the corallites curve outwards from an axial region to open somewhat obliquely

at the calices, opposite calical faces on the branch or tall tumulus being 15 mm. distant. The corallites are prismatic, usually five or six-sided, the average adult diameter being about 1 mm. Recrystallisaton leaves one uncertain whether the common walls are thick or not; in some parts of the transverse section of the corallum one may consider trabeculae distinguishable in the walls, almost vertical, like those of *Billingsaria;* in others, outgrowths from the walls appear to be secondary calcite, dark in colour but not so dark as the actual wall tissue. Because of this doubt, I am uncertain whether *Nyctopora* or *Lichenaria* is the correct generic reference, but I incline to the view that separate trabeculae are present as in the Billingsariinae and therefore place the fragment doubtfully in *Nyctopora.* No mural pores are present in either of the sections prepared. In vertical section, the walls appear a little thickened, and many of the tabulae show a sudden axial uparching.

Sub-family: **Syringophyllinae.**

=Calapoeciinae Hill, 1951.

Cerioid or with coenenchyme; septa 20 to 24, equal. M.Ord.-Sil.

Genus: *Lyopora* Nicholson & Etheridge, 1878

=*Liopora* Lang, Smith & Thomas, 1940, *non* Girty, 1915.

Type species: *Palaeopora*? *favosa* M'Coy, 1850, p. 285, described and figured as *Palaeopora favosa* M'Coy, 1851, p. 15, pl. 1C, fig. c, 3*a-d,* from the Ordovician limestone and shale of Craighead, Girvan, Ayrshire, Scotland. The Middle Ordovician Craighead Limestone is possibly of the *Climacograptus peltifer* zone.

Massive coralla with polygonal corallites in which each corallite has a single peripheral ring of ?20 vertical series of slightly inclined thick trabeculae, those of neighbouring corallites alternating or opposed; the thick double walls so formed may be pierced in horizontal zones by a row of irregular rounded pores, each caused by a local thinning of the trabeculae; the tabulae are distant and slightly sagging.

The genus is known from the *Climacograptus peltifer* zone in Scotland (Craighead) and Kalstad, Mjϕsa and Encrinite Limestones (4β) in Norway and the Trenton (Jacksonburg Limestone) of New York, U.S.A. The known range is thus between the *C. peltifer* and *Dicranograptus clingani* zones inclusive.

Lyopora cf. *favosa* (M'Coy) (Pl. I, fig. 5)

Material: One fragment UT 23537 in sample 6 (58 feet to 58 feet 6 inches) in Core No. 2, Oceana Mine, Zeehan, Tasmania, Smelter's Limestone.

This small fragment differs in no essential particular from the type species especially as it is developed in Norway; the common walls between corallites are on the average 1 mm. thick, the free space in the corallite 1·3 mm. wide, thus slightly smaller than in the Norwegian and Scottish examples. The trabeculate septa are distinguishable, in transverse section, but no information on inclination of the trabeculae is available from the vertical section owing to recrystallisation. Vacuities in the wall are in somewhat irregular horizontal rows. The tabulae are thin, sagging and distant. Detailed description of the Scottish (Cox, 1936) and Norwegian (Hill, 1953) specimens should be consulted.

Family: **HELIOLITIDAE** Lindström, 1873 (as Heliolithidae)

Massive coralla with slender tabularia separated by coenenchyme; each tabularium with twelve equal spinose septa and with complete tabulae. M.Ord.–U.Dev.

Sub-family: **Coccoseridinae** Kiaer, 1899

Encrusting, discoid, nodular or branching; coenenchyme tubular; trabeculae greatly thickened; septal trabeculae curving upwards and inwards to become vertical in axial parts of tabularia; coenenchymal trabeculae vertical, spaced so as to form vertical tubules. M.Ord.–L.Sil.

Coccoseris ramosa sp. nov. (Pl. III, fig. 41)

Holotype: MUGD 2119, Ida Bay, S.E. Tasmania.

Diagnosis: Branching coralla with small tabularia about 1 mm. apart; septal, axial and coenenchymal trabeculae so stout as to fill all spaces. M.Ord.–L.Sil.

Description: The corallum is branching, the branches being 12 to 15 mm. in diameter. The 12-septate tabularia diverge from axis to periphery of branch, and each is about 1 to 1·5 mm. in diameter, with the septa forming a collar about the axial trabeculae which form a plug about 0·5 mm. wide, no free space occurring anywhere in the tabularia; each tabularium is separated from its neighbour by vertical coenenchymal trabeculae; the septal trabeculae curve upwards and inwards, all so dilated as to leave no intervening spaces.

The European species are from $4\beta\delta$ and $5a$. This Tasmanian species has rather a narrow coenenchyme, perhaps narrow enough for it to be better placed in the middle and upper Ordovician *Protarea*. The two genera seem to merge and should, perhaps, be united.

Genus: *Acidolites* Lang, Smith and Thomas, 1940

Coenenchyme wide, trabeculae relatively slender, leaving spaces crossed by dissepiments. U.Ord.–L. Sil.

Acidolites sp. (Pl. III, figs. 42, 43)

MUGD 2120 from Ida Bay is from a thin blister-like lamellar corallum, from which only one section, a transverse section, was obtainable. The tabularia are 1 to 1·25 mm. in diameter, and are distant from one another also 1 to 1·25 mm.; each has twelve short equal septa in general discontinuous with the vertical trabeculae of the wide axial or columellar zone; the tubules of the coenenchyme are small, with walls as thick as the septa, but not so thick as to fill the tubules. No truly vertical section being possible, the nature of the transverse skeletal elements is not known.

The specimen is very likely conspecific with the very poorly preserved *Acidolites* sp. (Hill & Edwards, 1941, pl. vii, figs. 3*a*, *b*), from the old flux quarry, N. end of Queenstown, W. of the Strahan Road, half a mile from the railway station, though the Queenstown specimen has tabularia not more than 1 mm. in diameter.

MUGD 2114 from Ida Bay has tabularia of 1 mm. diameter, but these are more closely spaced than in MU 309 or the Queenstown form

and the coenenchyme is coarser; also the axial trabeculae are few, and the tabulae are thin, numerous and gently depressed, and I am uncertain whether it is conspecific.

Sub-family: **Plasmoporinae** Sardeson, 1896

=Proporinae Hill, 1951

Coenenchyme of domed plates and isolated trabeculae, or with trabeculae uniting to form discontinuously walled tubuli. M.Ord.–U.Sil.

Genus: *Propora* Edwards & Haime, 1850

Coenenchyme of domed plates and isolated trabeculae not more thickened in surface zones than in inner or axial zones of the corallum. Tabulae flat or sagging. M.Ord.–U.Sil.

Propora sp. cf. *hirsuta* Lindström (Pl. II, fig. 22)

An unnumbered specimen, almost certainly from one of three localities, Smelter's Quarry, Zeehan, Smelter's Quarry Queenstown, or Bubb's Hill, is very close indeed to *P. hirsuta* Lindström (1899, p. 64) from the Upper Ordovician F_1 of the Baltic countries and from the Middle Ordovician Robeston Wathen Limestone of Wales.

The tabularia are about 2 mm. in diameter, and may be contiguous or up to 1 mm. distant from their neighbours; the walls of the tabularia are angulate, projecting outwards between the 12 equal septa and inwards at the septa; the angular projections into the coenenchyme may be lengthened by vertical trabeculae; discrete vertical trabeculae may also occur in the coenenchyme, but no tubes are found; the septa are spinose, the spines being long and curving upwards and inwards to the axis, so that they appear as separate dots in transverse section. The tabulae are thin and may be arched upwards by the septal spines; dissepiments occur in the narrow coenenchyme, with discontinuous vertical trabeculae.

Probably Kiaer (1899) was right in regarding this species as of a genus distinct from *Heliolites* and *Propora,* but the name he chose—*Nicholsonia*—was preoccupied. Until the type specimens of M'Coy's species *Porites megastoma* are re-investigated it seems wise to refer our species to *Propora,* noting that it is not known to range into the Silurian.

Genus: *Plasmoporella* Kiaer, 1897, 1899

Like *Propora* but with domed and complete or incomplete, tabulae septa projecting into coenenchyme and slender trabeculae. U.Ord.–M.Sil.

Plasmoporella sp. (Pl. II, figs. 31, 32)

The specimens from Bubb's Hill, may well be conspecific with the form described by Hill (1942, p. 10, pl. 2, figs. 10*a, b*) from the limestone at the head of the Nelson R. It has the same closely packed, very fine tissue, with the tabulae replaced by numerous small tabellae; the dissepiments and tabellae appear rather taller domes than in the Nelson R. specimen.

Family: **AULOPORIDAE** Edwards and Haime, 1850

=Syringoporiens de Fromentel, 1864; Syringoporidae Hill, 1951.

Genus: *Aulopora* Goldfuss, 1829

Type species (designated by Edwards and Haime, 1850, pl. xxvi) *A. serpens* Goldfuss, 1829, p. 82, pl. xxix, figs. 1*a-d*, M.Dev., Bensberg & Eifel district, Germany.

Reptant coralla, corallites with thick walls and with calices opening upwards from prostrate conico-cylindrical proximal parts, each corallite arising through the lower calical wall of its predecessor. Tabulae present or absent. Ord.–Dev.

Aulopora sp. (Pl. II, fig. 34)

Material: UT 23538-9 from samples 145 and 146 (530 feet 6 inches to 532 feet) in Core No. 13, King Mine, Zeehan.

The sections show the corallum to be encrusting a polyzoan, with the slender, cylindrical, proximal parts of all corallites reptant, their calical portions turning to open with tall sides at right angles to the reptant parts. The calical parts may be 2·5 mm. to 3 mm. in diameter, and 4 or 5 mm. apart; they may extend 4 or 5 mm. above the substratum. The reptant parts are 1 to 2 mm. in diameter. The wall is relatively thin, about 0·25 mm. and the tabulae are incomplete, numerous and very thin. Septal spines are not observed. The base of the upright part of the corallite is filled with thin vesicular tissue.

This species of *Aulopora* was not observed in the Oceana No. 2 Core, nor anywhere else in the Zeehan district. Further specimens are required for full understanding. It is not necessarily Ordovician.

Genus: *Eofletcheria* Bassler, 1950

Genotype: (by original designation): *Columnaria incerta* Billings, 1859, p. 428; Mingan I., Gulf of St. Lawrence, N. America. Chazy, M.Ord.

Bushy colonies of slender cylindrical corallites; increase lateral and frequent, offsets diverging immediately or at first parallel to and in contact with parents, so that small sections of the corallum may be cerioid with two or three rows of two or three corallites in contact for some short distance, or so that a halysitoid chain may form temporarily; corallites with a moderately wide peripheral stereozone consisting of crowded, short, thick, monacanthine trabeculae in vertical series in contact laterally; the inner thin ends of the trabeculae sometimes project free from the stereozone; tabulae typically rare, horizontal, sagging or with a median notch, sometimes incomplete. No perforations through the walls in cerioid portions. M. & U. Ord., N. America, Scandinavia and Tasmania.

I have recently discussed the Norwegian species of this genus (Hill, 1953, p. 154).

Eofletcheria contigua sp. nov. (Pl. I, figs. 6, 7)

Holotype: UT 23527 from Core No. 2 Oceana Mine (believed to be from a level about 92 feet 6 inches) Zeehan; Smelter's Limestone.

Diagnosis: Corallites of average diameter 1 mm. grouped in cylindrical stems up to 9 mm. in diameter, and therein growing back to back, each proceeding vertically for some distance before curving outwards.

Description: The corallum is branching, the corallites being not very regularly grouped in roughly cylindrical stems up to 8 or 9 mm. in diameter; the corallites are of average diameter about 1 mm. and run more or less vertically in the axial parts of the branch where they are contiguous and prismatic, then curve to open obliquely; their calical parts may be free and cylindrical. No mural pores are observed in the cerioid parts. The thickness of the wall in each corallite may be 0·25 mm. so that common walls may be as much as 0·5 mm.; the cylindrical calical rims are thinner. The wall tissue is recrystallised and trabeculae are therefore not distinguishable. Tabulae are rare, very distant and domed. Polyzoa are sometimes seen occupying the spaces between the cylindrical calices.

Remarks: This species in its growth form is very similar to a specimen from the Encrinite Limestone of the quarry of Versvik, Norway, referred doubtfully to *E. irregularis* Hill (1953, p. 156, pl. 2, fig. 13).

Eofletcheria ida sp. nov. (Pl. II, fig. 33; Pl. III, fig. 44)

Holotype: MUGD 2128, Ida Bay, Tasmania. Other material, MU 300 = 292 also from Ida Bay.

Diagnosis: Corallum of erect branches 3 to 4 mm. in diameter, with three to four corallites 1·5 to 2 mm. in diameter back to back, growing vertically for 5 or 6 mm. before opening outwards.

Description: The corallum is branching, and it has not been ascertained whether the branches proceed from a reptant base or not. The branches are 3 or 4 mm. in diameter and in them the corallites grow vertically for a short distance, 5 or 6 mm., before turning rather sharply to open nearly at right angles, the calices projecting up to 2 mm. The corallites are 1·5 to 2 mm. in diameter, with a wall up to 0·5 mm. thick, though usually somewhat less. Neither septal spines nor mural pores, have been observed, and tabulae are very rare or may indeed be absent, most corallites containing nothing but muddy matrix inside the thick walls.

Remarks: This species differs from that of the coral zone of the Oceana No. 2 Core of Zeehan in its coarser corallites and slender branches, though the growth form is similar.

Several specimens from Bubb's Hill near H.E.C. Tower 287, Victoria Pass, Lyell Highway seem conspecific with the holotype.

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EXPLANATION OF PLATES

All figures are photographs of thin sections x1·8 diameter approximately except where otherwise indicated.

PLATE I

Corals from the Coral Zone between 47 feet and 102 feet in Core No. 2, Oceana Mine, Zeehan, Tasmania. ?Trentonian.

FIG. 1*a*, *b*.—*Tryplasma cerioides* sp. nov. UT 23502 from sample 8 (62 feet 6 inches to 63 feet); *a*, transverse; *b*, vertical.

FIG. 2.—*Billingsaria ?banksi* sp. nov. UT 23532 from sample 3 (47 feet to 48 feet); transverse, showing coralline algae.

FIG. 3.—*Nyctopora zeehanensis* sp nov. Holotype. UT 23531 from sample 11 (91 feet); *a*, transverse; *b*, vertical.

FIG. 4.—?*Nyctopora* sp. UT 23530 from sample 14 (94 feet 6 inches to 95 feet); *a*, transverse; *b*, vertical.

FIG. 5.—*Lyopora* cf. *favosa* (McCoy) UT 23537 from sample 6 (58 feet to 58 feet 6 inches); *a*, transverse; *b*, vertical.

FIG. 6.—*Eofletcheria contigua* sp. nov. Holotype UT 23527 from sample 12 (92 feet 6 inches).

FIG. 7.—*E. contigua* sp. nov. UT 23533 from sample 10 (89 feet); tranverse; encrusted by polyzoan.

FIG. 8.—*Tetradium ?compactum* sp. nov. UT 23525 from sample 12 (92 feet 6 inches); transverse.

Corals from below the Coral Zone in Core No. 2, Oceana Mine, Zeehan, Tasmania (102 feet to 964 feet); ?Trentonian to ? Blackriveran.

F.G. 9.—*Tetradium dendroides* sp. nov. U.T. 23519 from sample 27 (204 feet 6 inches); transverse.

FIG. 10.—*Tetradium petaliforme* sp. nov. Holotype UT 23513 from sample 50 (449 feet); *a*, transverse; *b*, vertical.

FIG. 11.—*Tetradium ?tasmaniense* Chapman. UT 23516 from sample 41 (251 feet to 252 feet).

FIG. 12.—*Tetradium compactum* sp. nov. Holotype UT 23517 from sample 31 (215 feet to 215 feet 6 inches); *a*, transverse; *b*, vertical.

FIG. 13.—*Tetradium* sp. UT 23522 from sample 21 (169 feet 6 inches to 170 feet); *a*, transverse; *b*, vertical.

FIG. 14.—*Lichenaria ramosa* sp. nov. Holotype UT 23503 from sample 85 (875 feet 6 inches).

FIG. 15.—*L. ramosa* sp. nov. UT 23504 from sample 56 (578 feet to 579 feet).

PLATE II

Corals from Smelter's Quarry, Zeehan, ?Trentonian.

FIG. 16.—*Tetradium dendroides* sp. nov. Holotype MUGD 2260, Smelter's Limestone; external views x1.

FIG. 17.—*T. tasmaniense* Chapman. MUGD 2132; external view x1.

FIG. 18.—*T. conjugatum* sp. nov. MUGD 2130; external view x1.

FIG. 19.—*Lichenaria ?ramosa* sp. nov. MUGD 2256; external view x1.

FIG. 20.—?*Nyctopora* sp. MUGD 2131; external view x1.

FIG. 21.—?*Protaraea* sp. MU 199; external view x1.

FIG. 22.—*Propora* sp. cf. *hirsuta* Lindström; NM. Doubtfully from Smelter's Quarry, Zeehan, may be however from either Smelter's Quarry Queenstown or from Bubb's Hill near H.E.C. Tower 287, Victoria Pass, Lyell Highway; *a*, transverse; *b*, vertical.

FIG. 23.—*Tetradium tasmaniense* Chapman. Cotypes NM/13138-9, thin sections.

Corals from Smelter's Quarry, Queenstown. ?Trentonian or ?Richmondian.

FIG. 24.—*T. tasmaniense* Chapman. MUGD 2253; external view x1.

FIG. 25.—*T conjugatum* sp. nov. Holotype MUGD 2247; *a*. external view x1; *b*, transverse section x1·8.

FIG. 26.—*T.* sp. cf. *halysitoides*?. MUGD 2246; *a*, external view x1.

FIG. 27.—?*T.* sp. cf. *syringoporoides* Ulrich; MUGD 2250; *a*, external view x1; *b*. thin section x1·8.

FIG. 28.—*T. dendroides* sp. nov. MUGD 2255; external view x1.

FIG. 29.—*T. dendroides* ?var. MUGD 2243; transverse section x1·8.

Bubb's Hill, near H.E.C. Tower 287, Victoria Pass, Lyell Highway.

FIG. 30.—*Nyctopora* sp. NM; *a*, transverse; *b*, vertical.

FIG. 31.—*Plasmoporella* sp.; NM.

FIG. 32. *Plasmoporella* sp. NM specimen from one of three localities—Bubb's Hill, Queenstown Quarries or Zeehan Quarries, probably the first.

FIG. 33.—*Eofletcheria ida* sp. nov. NM.

King Mine, Zeehan.

FIG. 34.—*Aulopora* sp. Encrusting polyzoan. UT 23538, sample 145 (530 feet 6 inches). King Mine, Core No. 13, Zeehan, Tasmanian age unknown.

PLATE III

Ida (Wheelbarrow Bay), Port Cygnet District, S.E. Tasmania. Trentonian or Richmondian.

FIG. 35.—*Streptelasma* sp. cf. *aequisulcatum* (M'Coy); MUGD 2126.

FIG. 36.—*Tryplasma cerioides* sp. nov. Holotype MUGD 2123.

FIG. 37.—*Lichenaria ramosa* sp. nov. MUGD 2116.

FIG. 38.—*Tetradium* ?*compactum* sp. nov. MUGD 2121; *a*, transverse; *b*, vertical.

FIG. 39.—*Tetradium* sp. MUGD 2112.

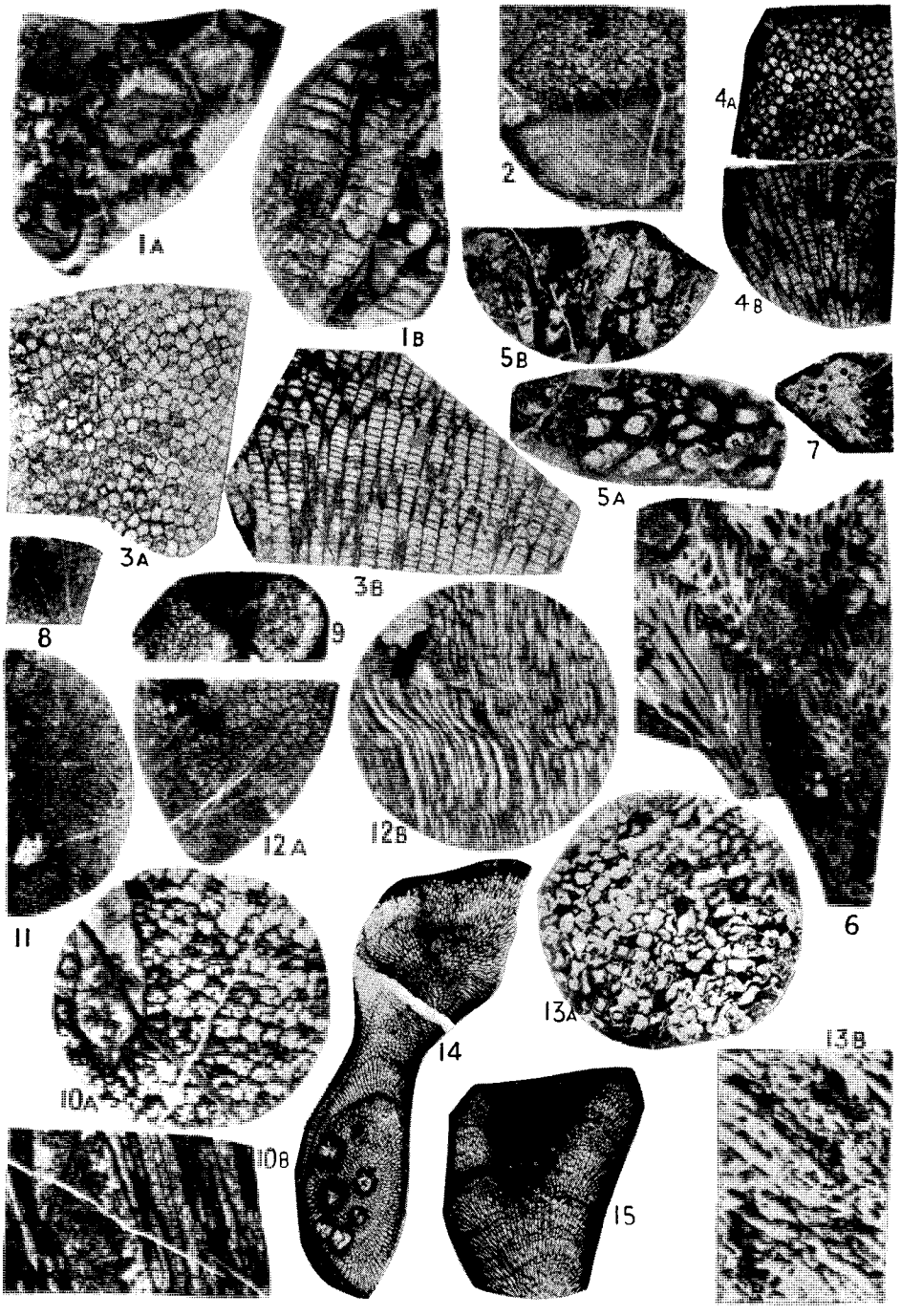
FIG. 40.—*Billingsaria banksi* sp. nov. Holotype MUGD 2113.

FIG. 41.—*Coccoseris ramosa* sp. nov. Holotype MUGD 2119.

FIG. 42. *Acidolites* sp. MUGD 2120.

FIG. 43.—*Acidolites* sp. MUGD 2114; *a*, transverse; *b*, vertical.

FIG. 44.—*Eofletcheria ida* sp. nov. *Holotype* MUGD 2128.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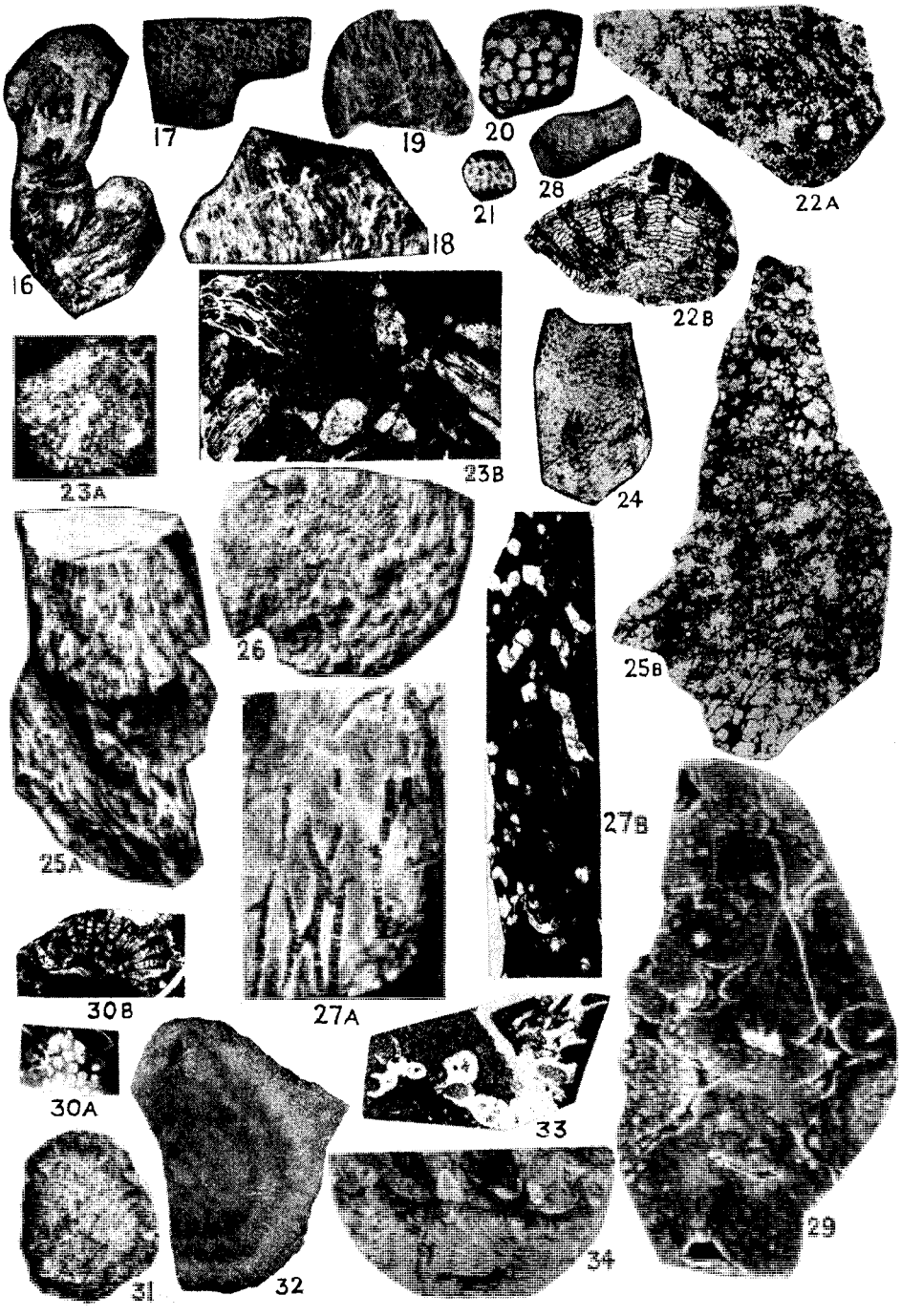
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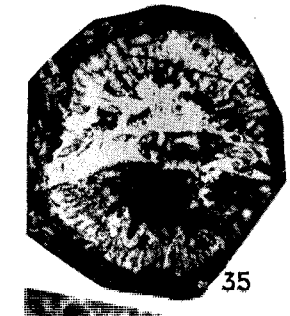
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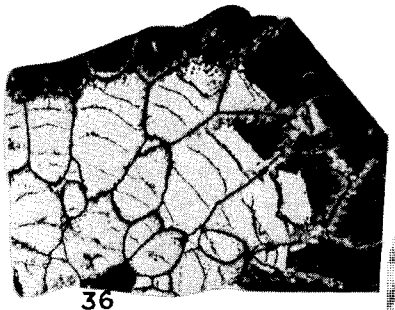
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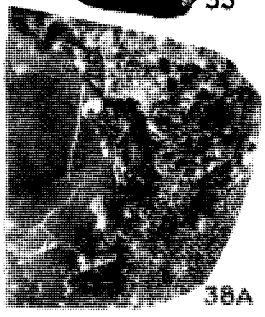
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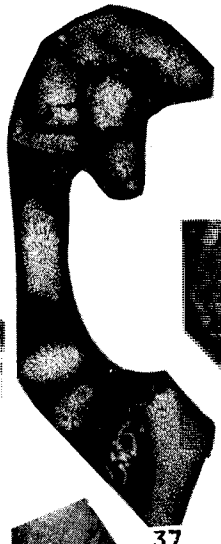
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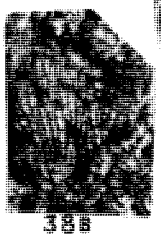
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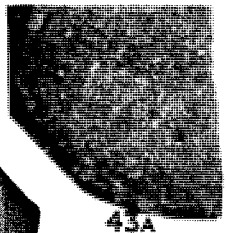
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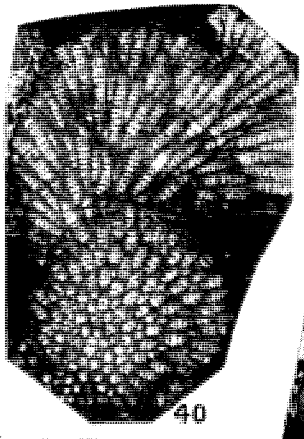
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