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Tabulate Corals from the Moore Creek Limestone (Middle Devonian: Late Eifelian–Early Givetian) in the Tamworth Belt (New South Wales, Australia)

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Zusammenfassung

Tabulate Korallen des mitteldevonischen (Eifelium–frühes Givetium) Moore Creek Limestone zwischen Tamworth und Moore Creek wurden einer neuen Untersuchung unterzogen. Folgende Taxa werden beschrieben: *Heliolites porosus* (GOLDFUSS 1826), *Thamnopora crummeri* (ETHERIDGE 1899), *Cladopora* sp., *Alveolites suborbicularis* LAMARCK 1801, *Alveolites* sp. nov. aff. *A. hemisphericus* (CHERNYSHEV 1937), *Syringopora auloporoides* DE KONINCK 1876 und *Remesia porteri* (ETHERIDGE 1899).

Abstract

Tabulate corals from the Middle Devonian (Eifelian–early Givetian) Moore Creek Limestone of the Tamworth – Moore Creek area are re-investigated. *Heliolites porosus* (GOLDFUSS 1826), *Thamnopora crummeri* (ETHERIDGE 1899), *Cladopora* sp., *Alveolites suborbicularis* LAMARCK 1801, *Alveolites* sp. nov. aff. *A. hemisphericus* (CHERNYSHEV 1937), *Syringopora auloporoides* DE KONINCK 1876 and *Remesia porteri* (ETHERIDGE 1899) are described.

1. Introduction

The Moore Creek Limestone Member is located in the Tamworth Belt of New South Wales and is a stratigraphic unit in the New England Orogen (Text-Fig. 1). Moore Creek Limestone south of Moore Creek and east of Moore Creek Road (Text-Fig. 1) is the type locality of the Moore Creek Limestone Member in the Yarrimie Formation (CROOK, 1961). The limestones are Middle Devonian (Eifelian to early Givetian) in age (PHILIP, 1967; MAWSON et al., 1988; MAWSON & TALENT, 1994; MAWSON et al., 1997) and one of a large number of time-equivalent limestone bodies in the northern Tamworth Belt (CHAPPEL, 1961; POHLER & HERBERT, 1993).

The surrounding sediments of the Yarrimie Formation (Tamworth Group) are volcaniclastic siltstones, tuffites, siliceous shales, sandstone, and conglomerates of deep water aspect. The entire sequence shows signatures of

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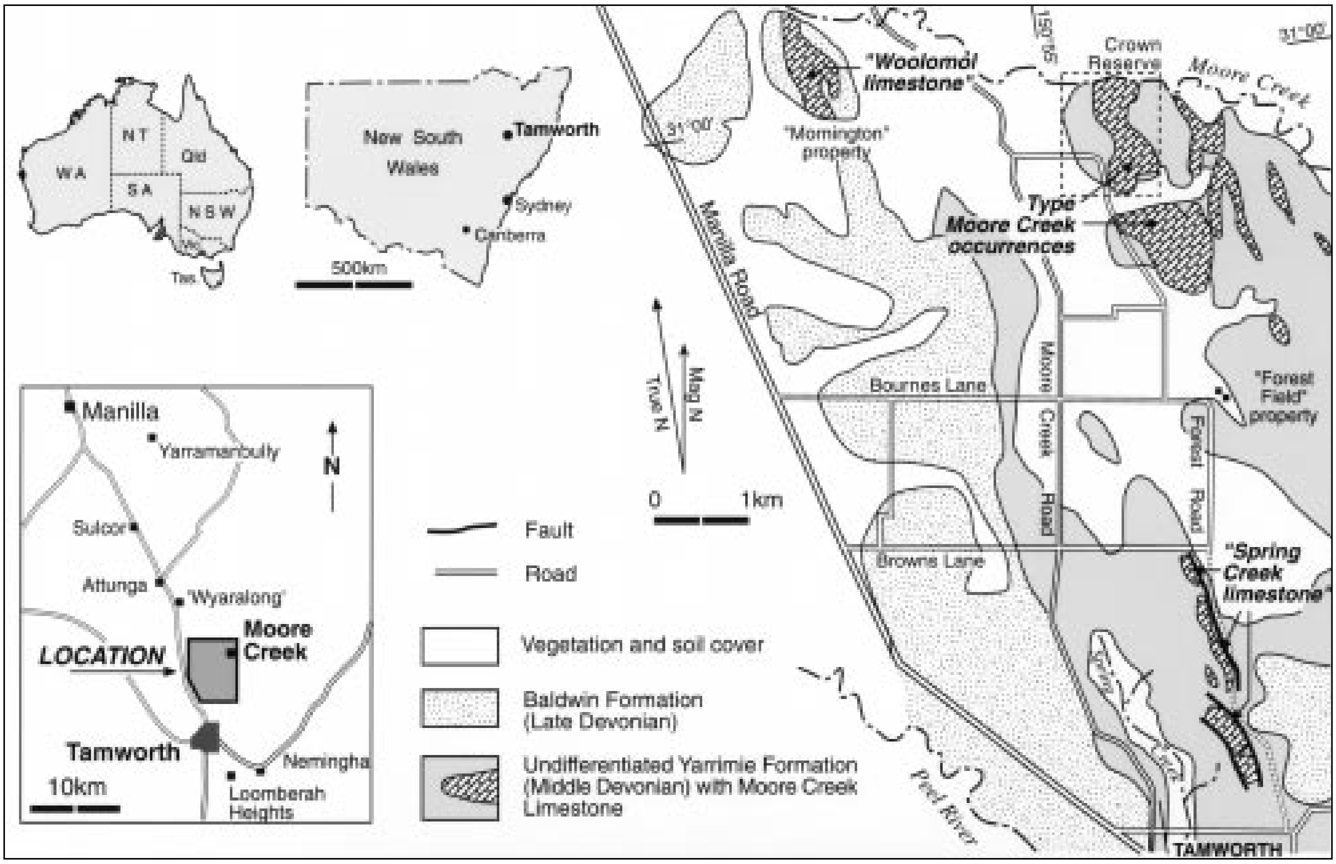

Text-Fig. 1.
Simplified geological map showing location of Moore Creek Limestone cropping out north of Tamworth, New South Wales. Based on mapping of BENSON (1915).

deposition within an intra-oceanic island arc setting (LEITCH, 1974; CAWOOD, 1983). The rugose corals from the Moore Creek Limestone are highly endemic and difficult to correlate with faunas outside Australia (HILL, 1942; PEDDER, 1967, 1968). The tabulate coral faunas are poorly known and have not been studied since ETHERIDGE (1899). Preliminary results of this reinvestigation were presented by BRÜHL & POHLER (1997). This paper is an attempt to apply modern taxonomy to this neglected fossil group in eastern Australia.

2. Previous Work

The Moore Creek Limestone has been a focus of fossil collections and studies since T.W.E. DAVID and E.F. PITTMAN constructed a seven kilometre long detailed section across the northern Tamworth region (DAVID & PITTMAN, 1899).

Corals collected from the section were sent to R. ETHERIDGE Jr. for determination. ETHERIDGE (1899) described 19 species of rugose and tabulate corals from the "Spring Creek limestone", the "Woolomol limestone" and from adjacent limestone occurrences at Moore Creek and Moonbi (Text-Fig. 1).

BENSON (1915) mapped the North Tamworth-Spring Creek area and distinguished two stratigraphic sequences, an older Tamworth Series and a younger Baldwin Series. He considered the Tamworth Series to be Middle Devonian in age, based on corals and other fossils collected in the region. BENSON (1915, p. 560) assigned the name Moore Creek Limestone to the large bodies cropping out just south of Moore Creek and east of Moore Creek Road. He recognized the limestone bodies along Spring Creek to be similar in lithology and fossil content to those at Moore Creek. They were probably the focus of fossil collections from the "Spring Creek limestone". BENSON (1915, p. 563) also noted the occurrence of Moore Creek Limestone in portions 41, 42, 43 (= "Mornington" property, Text-Fig. 1) in the parish of Woolomol, which he considered a repetition of the series found at Moore Creek.

HILL (1943, p. 142) referred to this location as "Woolomol limestone", probably based on labelled coral specimens collected by I. BROWN and in unspecified collections in the Australian Museum and at the University of Queensland. Hence ETHERIDGE's corals from the "Woolomol limestone" are probably from that location. Corals collected from areas of limestone labelled "parish of Moonbi" may be from Moore Creek Limestone south of the parish of Woolomol (MAWSON et al., 1997).

Most of the corals collected and determined by us are from the presumed type locality south of Moore Creek (Crown Reserve) and from the Spring Creek locality (Text-Fig. 1).

3. Carbonate Lithofacies and Biofacies

The succession of the Moore Creek Limestone in the Crown Reserve begins with fossil-poor nodular and flasery packstones and wackestones above a tectonized contact with silicified siltstones of the lower Yarrimie Formation. Succeeding dark, massive limestones are characterized by large *Xystriphyllum* and *Sociophyllum* colonies, ramose, tabular and laminar tabulate corals and irregularly shaped alveolitids. Upsection, the flat stratified corals become dominant and the sequence becomes thick-bedded with bedding defined by coalesced heliolitid colonies, tabular stromatoporoids and tabulate corals. Towards the top silicification increases and bed thicknesses decrease.

Tabulate corals are particularly abundant in the central and upper parts of the Moore Creek Limestone Member in the Crown Reserve, with ramose tabulozoa and "ragged" alveolitids dominant in the central unit and flat, stratified alveolitids in the upper unit. Hemispherical colonies of heliolitids in the upper unit grew in such proximity that they eventually formed "pavements" which preferentially silicified. The matrix enveloping the corals and other macrofossils is uniformly composed of lime mud (micrite or microsparite), with echinoderm, brachiopod, trilobite and coral debris. Algal remains are conspicuously absent. The corals probably inhabited a deep, subtidal, low energy marine environment.

One of the most common associations found in Devonian limestones is that of stromatoporoids and syringoporids. This was first observed by PHILLIPS (1841), who erected the stromatoporoid genus *Caunopora* based on the tubes found in the stromatoporoid coenostea. Later, it was realized that *Caunopora* tubes are tabulate coral skeletons of *Syringopora* with an altered wall structure (MISTIAEN, 1984). The relationship between the corals and the stromatoporoid is not clear but was probably commensal, with the coral gaining support from the stromatoporoid (KERSHAW, 1987). MORI (1970) in his study of the coral/stromatoporoid association from Silurian biostromes from Gotland, recorded the relationship only from shallow water environments. In deeper, quieter water he found *Syringopora* grew independently. This observation holds true for the Moore Creek Limestone which is interpreted as a deeper water deposit. In shallow water limestones the stromatoporoids are associated with *Syringopora* or *Syringoporella* with thin tubes (0.15 mm–0.3 mm in diameter). Tubes of non-commensal fasciculate syringoporid corals are larger. This different diameter may be an ecological adaptation resulting from a need for a more stable skeleton rather than a species characteristic.

4. Palaeobiogeography

The fairly close relationship between eastern Australia and south-east Asian Devonian faunas has been appreciated for many years (HILL, 1957; BOUCOT et al., 1969; DUBATOLOV, 1972; TALENT, 1985; TALENT et al., 1987, and in prep.). In the Early and early Middle Devonian a high degree of provincialism existed in the coral faunas of eastern Australia. This decreased in the Late Eifelian when, as a consequence of migration, a large number of genera became cosmopolitan. This pattern is reflected in the tabulate coral faunas of the late Eifelian to early Givetian Moore Creek Limestone, which show obvious connections with coeval faunas in Eurasia. Many taxa are comparable with species from the Eifelian and Givetian beds of Europe and/or Asia.

Heliolites porosus (GOLDFUSS 1826), for example, is a cosmopolitan species, common in the late Middle Devonian of western Germany and North Africa. *Thamnopora crummeri* (ETHERIDGE 1899) is comparable to extra-Australian taxa of early Givetian age, such as *Thamnopora* ex gr. *cervicornis* (DE BLAINVILLE 1830). The species of *Cladopora* abundant in the Moore Creek Limestone cannot be assigned to formally named species from Eurasia and Australia. In Australia,this genus ranges from the Late Silurian to Devonian. Two species of *Alveolites* are recognized: *Alveolites suborbicularis* LAMARCK (1801) and *Alveolites* sp. nov. aff. *A. hemisphericus* (CHERNYSHEV, 1937). The former species is known from the Middle Devonian of Europe and Asia. *Alveolites* sp. nov. aff. *A. hemisphericus* is close to *Alveolites hemisphericus* (CHERNYSHEV, 1937) from the Late Silurian of Asia and probably a new species. The auloporids are represented by *Syringopora auloporoides* DE KONINCK 1876 and *Remesia porteri* (ETHERIDGE 1899). *Syringopora auloporoides* DE KONINCK 1876 is very common in the Moore Creek Limestone, where it forms large fasciculate colonies. With *Remesia porteri* (ETHERIDGE 1899) the occurrence of this genus is documented for the first time from Australia. It was previously known from the Middle Devonian of central Europe (Moravia, Eifel Hills and Ardennes), and possibly from Asia.

The coral fauna from the type locality of the Moore Creek Limestone confirms the Middle Devonian age of the succession.

5. Notes on systematic descriptions

For nomenclature of tabulate coral sample localities in the Moore Creek area see Text-Fig. 1. Abbreviations of sample numbers: MC = Moore Creek Limestone at Crown Reserve; MCS = Moore Creek Limestone at Spring Creek; AM = Australian Museum palaeontological thin section register. Stubs which remained after preparing the thin sections of the described specimens are housed at the Australian Museum.

Tabulata MILNE-EDWARDS & HAIME 1850
Heliolitida FRECH 1897
Heliolitidae LINDSTRÖM 1873
Heliolites DANA 1846

Diagnosis (after HILL, 1981, p. F603 and BIRENHEIDE, 1985, p. 40): Massive Heliolitidae with cylindrical tabularia surrounded by coenenchyme tissue of smaller prismatic tubes. Tabularia with 12 well, or barely, developed septa and commonly horizontal, complete tabulae. Coenenchyme tubes also with complete, horizontal tabulae and complete walls.

***Heliolites porosus* (GOLDFUSS 1826)**
(Pl. 1, Figs. 1–4)

1826 *Astraea porosa* GOLDFUSS, p. 64, Pl. XXI, Fig. 7.
1899 *Heliolites porosa* (GOLDFUSS) – ETHERIDGE, p. 173–174, Pl. XIX, Figs. 3, 4; Pl. XXV, Figs. 1, 2.
1936 *Heliolites porosus* (GOLDFUSS) – LECOMPTE, p. 93, Pl. XIV, Figs. 2–5.
1940 *Heliolites porosus* (GOLDFUSS) – JONES & HILL, p. 204, Pl. IX, Fig. 3.
v. 1980 *Heliolites porosus porosus* (GOLDFUSS) – IVEN, p. 167, Pl. 14, Figs. 1–4.
v. 1980 *Heliolites porosus bergeri* IVEN, p. 170, Pl. 12, Figs. 1, 2, 5; Pl. 13, Figs. 1, 2.
1985 *Heliolites porosus* (GOLDFUSS) – BIRENHEIDE, p. 40.

Diagnosis (after BIRENHEIDE, 1985, p. 40): Spherical to dome-shaped or polymorphic colonies of *Heliolites*. Cylindrical corallites with 12 short or moderately long septa. Corallite diameter 1.0 to 1.8 mm, and diameter of prismatic coenenchyme tissue-tubes varies between 0.2 and 0.45 mm. Tabulae are regularly developed.

Description: There are several colonies from Crown Reserve. The coralla of this species form platy to subspherical masses. The corallite tubes are circular and their diameter varies between 1.0 and 1.5 mm. Their average distances from each other measure between 0.65 and 2.25 mm. Walls of corallite tubes are 0.05 to 0.1 mm thick. In most of the corallites septa are well developed with 12 normally present in one corallite; length of septa is irregular averaging between 0.3 and 0.5 mm. Infrequently some septa reach almost to the middle of the tube. The coenenchymal tubes are polygonal to prismatic in cross-section, sometimes with a rounded inner lumen. The walls of coenenchymal tubes vary in thickness from 0.025 to 0.050 mm with diameter varying from 0.175 to 0.3 mm; mean diameter is 0.25 mm. Tabulae of the corallite tubes are regularly developed, complete, and more or less horizontal. The tabulae of the coenenchymal tubuli are more numerous, but also complete.

Remarks: The coralla described herein belong to the *H. porosus* species group as defined in BIRENHEIDE & KAYA (1987, p. 282) because of the "moderate to great distance of the tubuli to each other". The specimens from Moore Creek are, in most respects, similar to *Heliolites porosus* described by ETHERIDGE (1899, p. 173–174) and by BIRENHEIDE (1985, p. 40), but show minor differences in the length of septa. ETHERIDGE (1899, p. 174) noted that this species is very abundant in the Moore Creek Limestone at Moore Creek: "In the Moore Creek Limestone *Heliolites porosa* weathers into very beautiful specimens, leaving the whole of the tissues exposed, so that the structure can be studied almost as well in this condition as in microscopic sections."

Favositida WEDEKIND 1937
Favositidae DANA 1846
Pachyporinae GERTH 1921
Thamnopora STEININGER 1831

Diagnosis: Ramose Pachyporinae colonies with corallites diverging in longitudinal direction in the axial zone of the branch so that the calices open more or less perpendicular to the surface of the branch. Walls thickened, increasing distally. Septal spines frequent to absent. Mural pores numerous to rare. Tabulae thin, irregularly developed.

Thamnopora crummeri (ETHERIDGE 1899)

(Pl. 2, Figs. 1–3)

1899 *Favosites ? crummeri* ETHERIDGE, p. 171; Pl. 14, Figs. 5, 6; Pl. 35.

Diagnosis: Moderately thick branches of *Thamnopora* with relatively large corallites. Average diameter of the branches 10 to 15 mm. Corallite diameter averages 1.0 to 1.5 mm, occasionally reaching 2 mm. Corallites sub-polygonal or more or less rounded in the peripheral and axial zone. Walls thickened in the marginal region, less so in the axial region. Septal spines absent. Mural pores are rare, irregularly scattered.

Description: Fragments averaging 8 to 14 mm in diameter. Corallites open obliquely to the surface of the branches, averaging 1 to 1.5 mm in diameter. In transverse section the corallites are irregularly polygonal with moderately thick walls (0.15 to 0.25 mm/axial; 0.25 to 0.35 mm/peripheral) 0.75 to 1.0 mm in inner diameter and up to 1.5 mm diameter in peripheral zone.

ETHERIDGE (1899) described the visceral chambers of the corallites as occasionally reduced to more or less cylindrical tubes through the thickening of the walls by secondary deposits. In longitudinal section tabulae are rarely preserved because the coralla are affected by diagenetic alteration. In some regions mural pores are present but irregularly scattered with an average diameter of 0.2 mm.

Remarks: The Moore Creek Limestone north of Tamworth is the stratum typicum and the locus typicus of *Thamnopora crummeri*. The described specimens are characteristic of the genus *Thamnopora* and correspond well with the description of *Thamnopora crummeri* by ETHERIDGE (1899, p.172). The species *Thamnopora crummeri* is closely comparable with representatives of the species group of *Thamnopora cervicornis* (DE BLAINVILLE 1830) of the Givetian of Eurasia but shows minor differences in the development of pores and corallite diameter. As the Australian species is insufficiently known it must be reinvestigated on the basis of original and better preserved material. Based on material at hand, it cannot be decided if both species are indeed conspecific.

Cladopora HALL 1851

Diagnosis: Corallum ramose with small, slender, cylindrical branches. Corallites in axial zone parallel but diverge gradually to open obliquely to the surface of the branch in lozenge shaped calices. Walls in axial zone thin, increasing toward peripheral zone. Tabulae, septal spines and mural pores rare to absent.

Cladopora sp.

(Pl. 3, Figs. 1–4)

?1969 *Cladopora* sp. JELL & HILL, p. 22, Pl. 9, Figs. 2–6.

Description: Small fragments of straight, slender, cylindrical, forking branches ranging in diameter from 2.0 to 4.25 mm. The calices open obliquely on the surface of the branches. The corallite openings are subcrescentic or slit-shaped. Transverse sections of the branches show an axial zone where the corallites are relatively thin-walled, 0.075 to 0.1 mm. They are irregularly polygonal and more or less rounded internally. From the axial zone where the corallites run parallel to the outer surface they gradually diverge outward to open obliquely to the surface. The thickening of the wall increases towards the peripheral zone to the calical openings. The corallites in the axial zone are 0.125 to 0.3 mm in diameter. Tabulae, mural pores, and septal spines could not be observed.

Remarks: The specimens from Moore Creek correspond well with *Cladopora* sp. by JELL & HILL (1969) from the Ukalunda Beds in Queensland which were dated as Emsian by BROCK & TALENT (1993). It also resembles *Cladopora gippslandica* (CHAPMAN 1907) as described by PHILIP (1962) from the early Devonian Boola beds in Victoria. *Cladopora* sp. is very abundant in the Moore Creek limestones.

Alveolitidae DUNCAN 1872
Alveolitinae DUNCAN 1872
Alveolites LAMARCK 1801

Diagnosis (after BRÜHL, 1996, p. 8): Massive coralla with spherical, encrusting or irregular polymorph growth forms. Corallites crescentic or irregularly angular or rounded. Tabulae numerous, regularly developed, complete, horizontal or oblique, straight or curved.

Mural pores frequent. Walls thin in basal parts, elsewhere less to moderately thickened. Septal spines commonly numerous to rare.

Alveolites suborbicularis LAMARCK 1801

(Pl. 4, Figs. 1–3)

1801 *Alveolites suborbicularis* LAMARCK, p. 376.
? 1941 *Alveolites suborbicularis* – JONES, p. 44–45, Pl. I, Fig. 3.
1996 *Alveolites suborbicularis* – BRÜHL, p. 10–11, Pl. 1, Figs. 1a-d, 2a-d; Pl. 2, Fig. 3a-b – [cum syn.].

Diagnosis: Polymorph colonies of *Alveolites*. The corallum spreads subhorizontally and is composed of different layers of corallites. The thickness of the sheets varies. The corallites are more or less crescentic or subcrescentic with the great diameter between 0.5 mm and 1.0 mm and the small diameter between 0.3 mm and 0.5 mm (mean 0.35 mm). Corallite walls are relatively thin in basal layers (0.05mm to 0.08 mm) and moderately thick in other parts of the colony (0.1 to 0.25 mm). Mural pores occasionally numerous, well rounded, about 0.15 to 0.2 mm in diameter. Tabulae numerous and complete, horizontal or inclined. Septal spines well developed, irregularly scattered on corallite walls.

Description: The colonies are plate-like in growth, spreading horizontally or subhorizontally in several directions forming irregular, thick corallite layers. The thickness of the sheets varies between a few millimeters and 1 cm. The coralla are composed of corallites which open obliquely to the surface. In transverse section the corallites are crescentic, subcrescentic or subtriangular. Corallites in inner parts of the colony are frequently well-rounded. Corallite diameters vary: 0.5 to 1.0 mm/0.35 to 0.5 mm, averaging 0.75mm/0.35mm. The walls of the corallites are moderately thick, ranging from 0.05 to 0.1 mm in basal layers up to 0.2 to 0.25 mm in central and peripheral zones of the corallum. Mural pores are frequent and measure 0.15 to 0.2 mm in diameter. The tabulae are complete and are spaced 0.2 to 0.6 mm apart. They vary from horizontal to inclined and from slightly concave to slightly convex. Septal spines are well developed and common on the interior wall of each corallite, but in some corallites they are absent. Sometimes small spines project into the lumen from the lower wall.

Remarks: The described specimens are characteristic of the genus *Alveolites* LAMARCK 1801 and correspond very well to *Alveolites suborbicularis* LAMARCK 1801, as described from Europe and Asia and from the Late Eifelian of the Eifel Hills in Germany (BRÜHL, 1996). *Alveolites suborbicularis* was also described from Clermont (Queensland, Australia) by JONES (1941). The limestones in this region were originally considered to be “late Couvinian”, but subsequently, by using conodonts, the limestones were dated as *perbonus* Zone (Emsian) (BROCK & TALENT, 1993). In the light of this new information JONES’ previous species assignment needs to be reevaluated.

Alveolites sp. nov. aff. *Alveolites hemisphericus* (CHERNYSHEV 1937)

(Pl. 5, Figs. 1–2)

Description: The corallum is of laminar shape, 20 mm thick and 35 mm wide, composed of thin, platy layers of corallites. In vertical section the corallites are crescentic and chevron-shaped to ovate with infrequent septal spines on the basal wall. The corallites are commonly arranged in irregular vertical rows. The average diameter of the corallites varies between 0.5 mm and maximal 0.7 mm (mean 0.5 mm). Walls are moderately thick, averaging 0.1 to 0.125 mm. Mural pores are numerous in the side walls at the junction with the base, measuring 0.1 to 0.125 mm in diameter. Tabulae are developed, but because of diagenetic alteration, they are difficult to discern.

Remarks: There is only one specimen (MC 14h, AM 13508 and AM 13509) originating from the Moore Creek Limestone in the Crown Reserve. It resembles *Alveolites lemniscus* SMITH 1933 from the early Middle Devonian of northern France. The European species differs in having a larger corallite diameter (see SMITH, p. 140–141: larger diameter 0.75 to 1.25, smaller diameter 0.2 mm) and in having no septal spines. *Alveolites mirabilis* (SUGIYAMA 1940) from the Silurian *Halysites* limestone of Japan (Kitakami Mountains, north of Sendai) is similar to our specimen. SUGIYAMA (1940, p. 112–113) described *A. mirabilis* as the type-species of his new stromatoporoid genus *Kitakamiia*. This species definitely belongs to the genus *Alveolites* LAMARCK 1801 (see GALLOWAY, 1957, p. 455–456, ÜNSALANER-KIRAGLI, 1958, p. 85, FLÜGEL & FLÜGEL-KAHLER, 1968, p. 551, MORI, 1973, p. 401); the name *Kitakamiia* is a junior synonym of *Alveolites*. ÜNSALANER-KIRAGLI (1958) referred *A. mirabilis* to the European species *Alveolites lemniscus* SMITH 1933. In our opinion it is difficult to synonymize both species, because the corallite dimensions of *Alveolites lemniscus* (see above) are clearly larger than in *A. mirabilis* (see SUGIYAMA, 1940, p. 113, “distance between vertical elements” = largest diameter of corallites 0.5 to 0.75 mm). There is surely a certain resemblance in growth and phenotype between both taxa so that *A. mirabilis* belongs to the *lemniscus*-species group. *A. praelemniscus* LE MAÎTRE 1947 from the Emsian of Morocco is related to *A. mirabilis*, but also with larger diameters. *Alveolites* sp. nov. aff. *lemniscus* described by HILL, PLAYFORD & WOODS (1967, p. 8, Pl. IV, Fig. 3) from the Middle Devonian of Queensland, appears to belong to the *praelemniscus*/*lemniscus* group. Closely related to this species-group is *Alveolites insignis* CHERNYSHEV 1951 from the Eifelian of the Kuznetsk Basin, but differs in having a larger corallite diameter (larger diameter 0.7 to 0.9 mm, smaller diameter 0.35 to 0.42 mm). Comparable with the species mentioned above, are the Frasnian forms *Alveolites tenuissimus* LECOMPTE 1933 (larger diameter 0.6 to 1mm, smaller diameter 0.25 to 0.3 mm and having spines) from the Frasnian of Belgium, and *Alveolites spasskyi* DUBATOLOV 1962 (larger diameter 0.5 to 0.7 mm, smaller diameter 0.25 mm, and having small spines) from the Frasnian of Rudnyi Altai.

The new specimen resembles *Alveolites hemisphericus* (CHERNYSHEV 1937) (see CHEKHOVICH, 1971, p. 163 – with larger diameter 0.5 to 0.6 mm, smaller diameter 0.2 to 0.3 mm), the type-species of *Tuvaelites* CHEKHOVICH 1971 [synonymized by HILL (1981, p. F594, Fig. 402, 1e-h) with *Kitakamiia* SUGIYAMA 1940 – see above] and is also related to the *lemniscus*/*tenuissimus*-group. The neotype of this species *Alveolites* originated from the Late Silurian (Ludlovian) of the Tuva region, and for this reason the specimen described herein from the Middle Devonian (Eifelian/Givetian) cannot be assigned without question to this species. *Alveolites hemisphericus* (CHERNYSHEV 1937) was described and figured from Silurian sediments of Tuva by SOKOLOV & TESAKOV (1984, 1986).

Because of the remarks above and the different morphological features it is not possible to refer the specimen from the Moore Creek Limestone without doubt to any other known species. Because the new specimen resembles *A. hemisphericus* it is here assigned as *Alveolites* sp. nov. aff. *Alveolites hemisphericus* (CHERNYSHEV 1937). For a clear determination additional and better preserved material is required.

Auloporida SOKOLOV 1947
Syringoporidae FROMENTEL 1861
Syringopora GOLDFUSS 1826

Diagnosis (after HILL, 1981, p. 647): Corallum fasciculate with cylindrical corallites, connected by irregularly oriented tubuli. Walls moderately thick. Septal spines arranged in longitudinal rows or absent. Tabulae infundibuliform, forming an axial syrinx in many corallites.

Syringopora auloporoides DE KONINCK 1876

(Pl. 6, Figs. 1–2)

1876 *Syringopora auloporoides* DE KONINCK, p. 76, Pl. 3, Fig. 1.
1898 *Syringopora auloporoides* DE KONINCK – DE KONINCK, p. 59, Pl. 3, Fig. 1.
1899 *Syringopora auloporoides* DE KONINCK – ETHERIDGE, p. 174–176, Pl. 28, Figs. 1, 2.

Diagnosis (after DE KONINCK, 1898, p. 59 and ETHERIDGE, 1899, p. 174–175): Corallum forming large masses, spreading irregularly as anastomosing, creeping network. Corallites short, circular at irregular distances from one another and growing in every direction. Corallites frequently and irregularly dichotomous and rarely connected by lateral tubuli. Diameter of corallites varies from 1.0 mm to 1.5 mm. Walls are relatively thick, 0.15 to 0.2 mm. Tabulae well developed and frequently infundibuliform. Septal spines absent.

Description: The colonies from the Moore Creek Limestone form an irregularly, more or less horizontal, anastomosing network of circular corallites. The corallite tubes grow in every direction with a tendency to dichotomous bifurcation and to develop bud-like corallites to the sides. The corallites are round in cross-section and their diameter varies from 1.0 mm to 1.5 mm. They have 0.15 to 0.2 mm thick walls and frequently the more or less concentric tabulae sections are visible. In longitudinal section the tabulae are infundibuliform. Connecting tubuli are not common. Septal spines are not discernible in the studied specimens.

Remarks: The specimens correspond well with the observations and the original description of *Syringopora auloporoides* given by DE KONINCK (1898, p. 59): “Corallum forming masses of considerable size. Corallites short, at irregular distances from one another, and growing in every direction, very seldom united by lateral processes.They usually commence by being rather creeping, and when they attain a length of five to six millimetres buds are given forth which grow longer and rise more or less vertically, but their growth is never great, nor does it exceed three centimetres.” In all probability the original material of DE KONINCK came from the Crown Reserve locality of Moore Creek, north of Tamworth. The description of ETHERIDGE (1899, p. 174–175) was also based on material from this locality. There are severall different species of *Syringopora* in the Devonian of Europe and Eurasia but they are not comparable to the Australian form, because their corallite dimensions are much smaller. For example, *S. yavorskyi* CHERNYSHEV 1951 from the Eifelian of the Kuznetsk Basin differs in having smaller corallite diameters (0.6 to 0.7 mm) and less thickened walls (0.1 mm). These forms are frequently intergrown with stromatoporoids (see discussion under biofacies).

Aulocystidae SOKOLOV 1950
Remesia KETTNER 1934

Diagnosis: Corallum bushy with irregularly arranged slender, cylindrical corallites which are commonly straight. Corallites with laterally smaller offsets. Walls thick with septal spinules. Tabulae concave and infundibuliform, but rare.

Remesia porteri (ETHERIDGE 1899)

(Pl. 6, Figs. 3–4)

1899 *Syringopora porteri* ETHERIDGE, p. 176, Pl. 18, Fig. 3; Pl. 31, Figs. 1, 2.

Diagnosis: Predominantly encrusting colony of *Remesia* with short, circular corallites measuring 1.5 to 2.5 mm in diameter. Walls are relatively thick (0.5 to 0.8 mm). Tabulae scarce, but when present infundibuliform. Walls with numerous small septal spines.

Description: Fragmentary colonies consist of bushy, irregularly arranged, cylindrical corallite tubuli. The calices are mostly rounded. Corallites average 2 to 2.5 mm in diameter. In longitudinal sections of the holotype (compare ETHERIDGE [1899, p. 176]) the thick walls and the more or less long, thin septal spines are well developed. The infundibuliform tabulae are also well developed in the original material.

Remarks: The specimens collected from the Moore Creek Limestone and the original material of ETHERIDGE (1899) are representatives of the genus *Remesia* KETTNER 1934. *Remesia crispa* (SCHLÜTER 1885) from the early Givetian of Europe is closely comparable with *Remesia porteri* (ETHERIDGE 1899). Both species correspond well in diameter and septal development, but the present material is not sufficient to synonymize the two species. Without additional material the Australian species should be regarded as an independent taxon.

Plate 1

***Heliolites porosus* (GOLDFUSS 1826).**

Fig. 1: Corallum MC2a from Crown Reserve. Transverse section (AM 13497) with cross-sections of circular corallite tubes with well developed septa.
Fig. 2: Same as Fig. 1. Longitudinal section (AM 13498) with tubes of corallites and tissue of coenenchymal tubes.
Fig. 3: Corallum described and figured by ETHERIDGE (1899, p. 173, Pl. XXV, Fig. 1–2) from the Moore Creek Limestone at Moore Creek deposited in the Australian Museum, Sydney. Transverse section. AM 4629.
Fig. 4: Same as Fig. 3. Longitudinal section. AM 4930.

All scales: 1 mm.

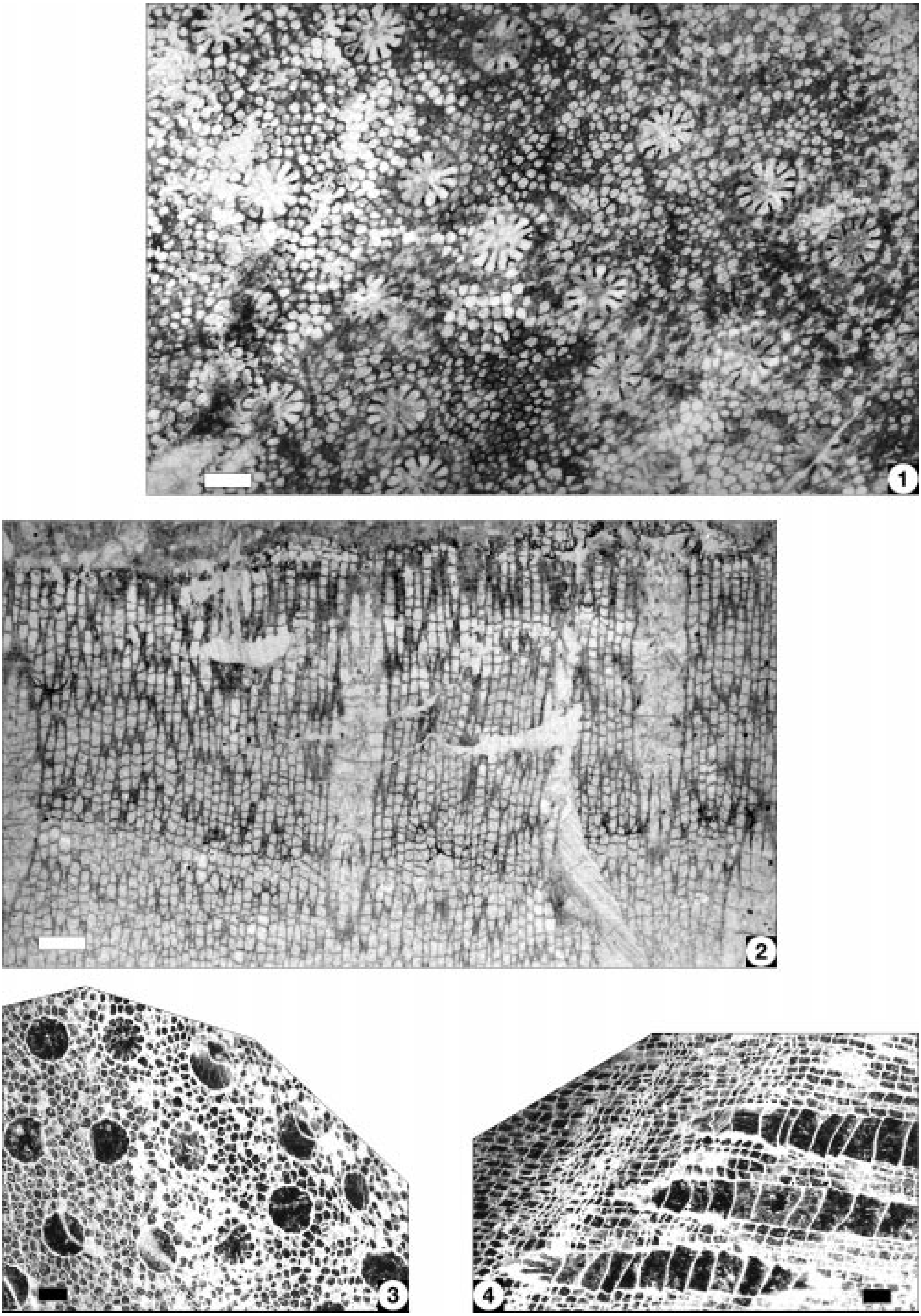
1
2
3
4

Plate 2

Thamnopora crummeri **(ETHERIDGE 1899).**

Fig. 1: Corallum MC14e (AM 13499) from Crown Reserve.
Transverse section with cross-sections of two branches.
Scale: 1 mm.

Fig. 2: Corallum MC 14c (AM 13500) from Crown Reserve.
Fig. 2a: Transverse section of one branch with polygonal corallites well rounded in their inner parts by secondary deposits.
Scale 1: mm.
Fig. 2b: Longitudinal section of the branch.
Axial zone recrystallized by diagenetic processes.
Scale: 1 mm.

Fig. 3: Corallum MC 5b (AM 13501) from Crown Reserve.
Longitudinal section of a branch.
Scale: 1 mm.

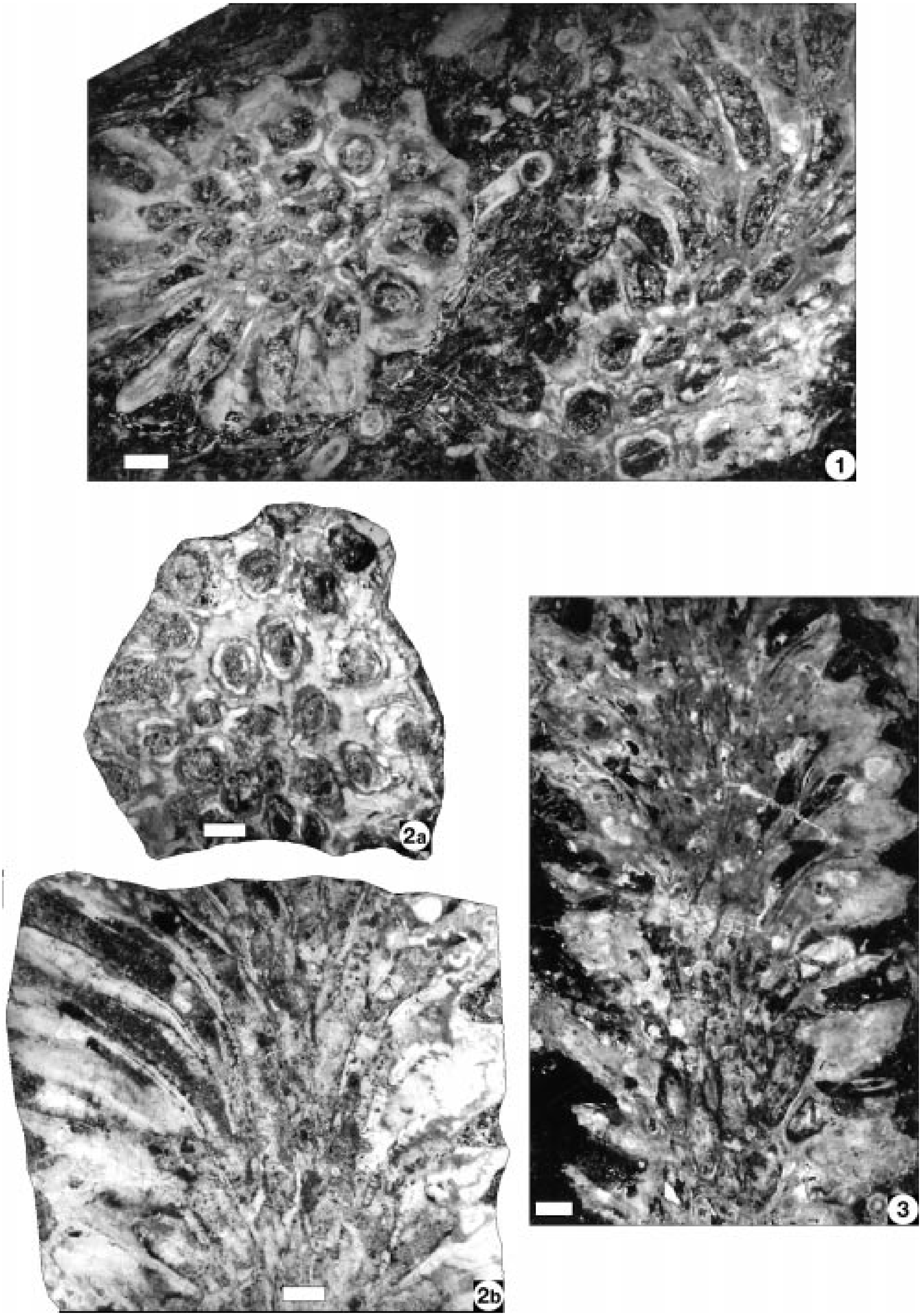
1
2a
2b
3

Plate 3

***Cladopora* sp.**

Fig. 1: Thin-section MC 37 (AM 13502) from Crown Reserve.
Transverse and longitudinal sections of several small branches.
Scale: 1 mm.

Fig. 2: Corallum MC 5b (AM 13501).
Longitudinal section of a small branch.
Scale: 1 mm.

Fig. 3: Corallum MC 34 (AM 13503).
Transverse and longitudinal section of branches.
Scale: 1 mm.

Fig. 4: Transverse sections of two small branches (thin-section MC 37; AM 13504) with irregular polygonal and rounded corallites in axial zone.
Scale: 1 mm.

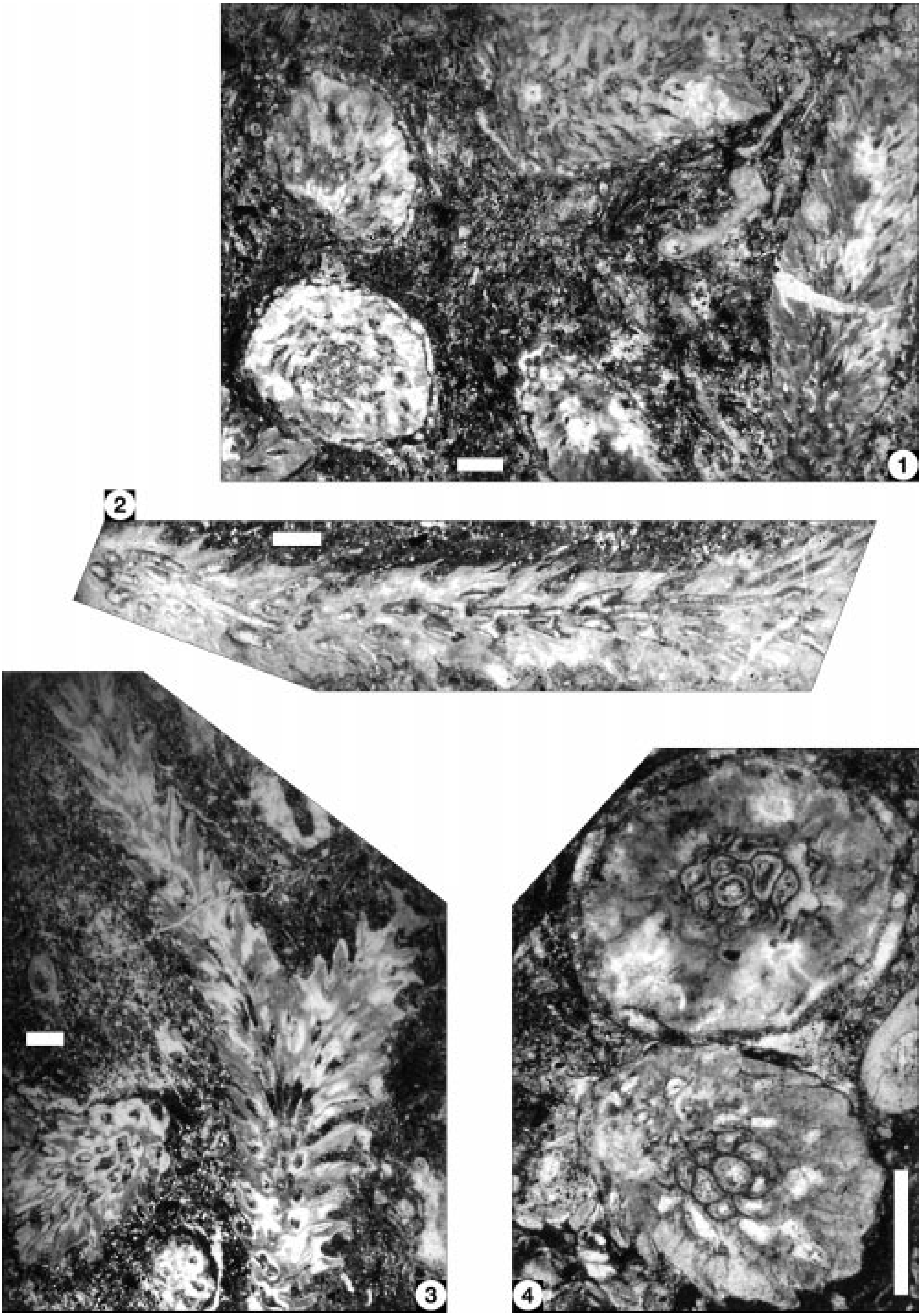
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Plate 4

***Alveolites suborbicularis* LAMARCK 1801.**

Fig. 1: Colony MCS L129.4 (AM 13505) from the Moore Creek Limestone of Spring Creek locality.
Fig. 1a: Tangential section through the corallum to show the plate-like growth-form.
Scale: 5 mm.
Fig. 1b: Transverse and longitudinal sections of corallites.
Scale: 1 mm.
Fig. 1c: Transverse sections of corallites.
Scale: 1 mm.

Fig. 2: Colony MC Top 1 (AM 13506) from Crown Reserve.
Fig. 2a: Transverse sections of corallites.
Scale: 1 mm.
Fig. 2b: Transverse and Longitudinal sections of corallites.
Scale: 1 mm.

Fig. 3: Colony MCS L116.1 (AM 13507) from the Moore Creek Limestone of Spring Creek locality.
Basal layers of the colony with transverse and longitudinal sections of corallites.
Scale: 1 mm.

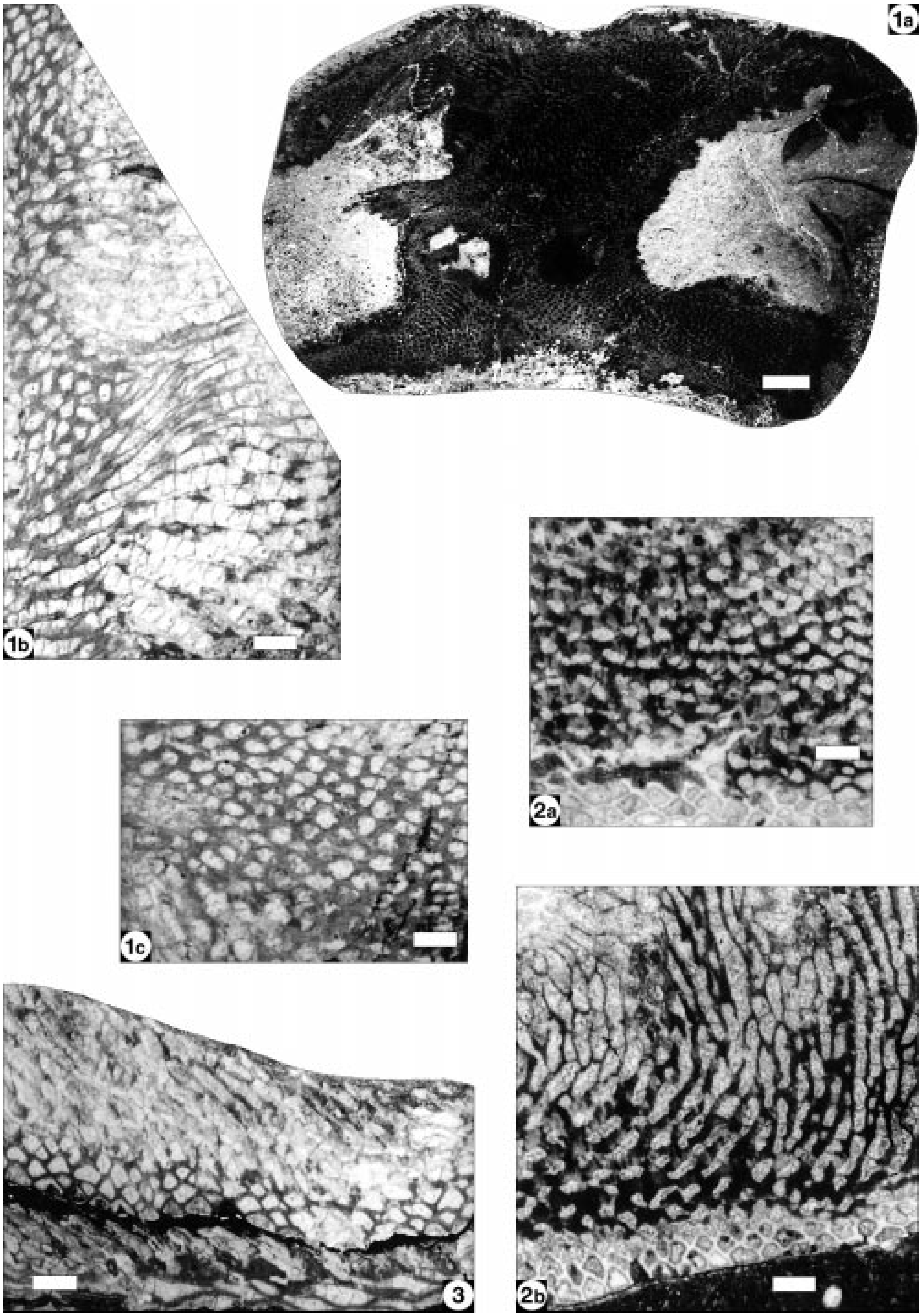
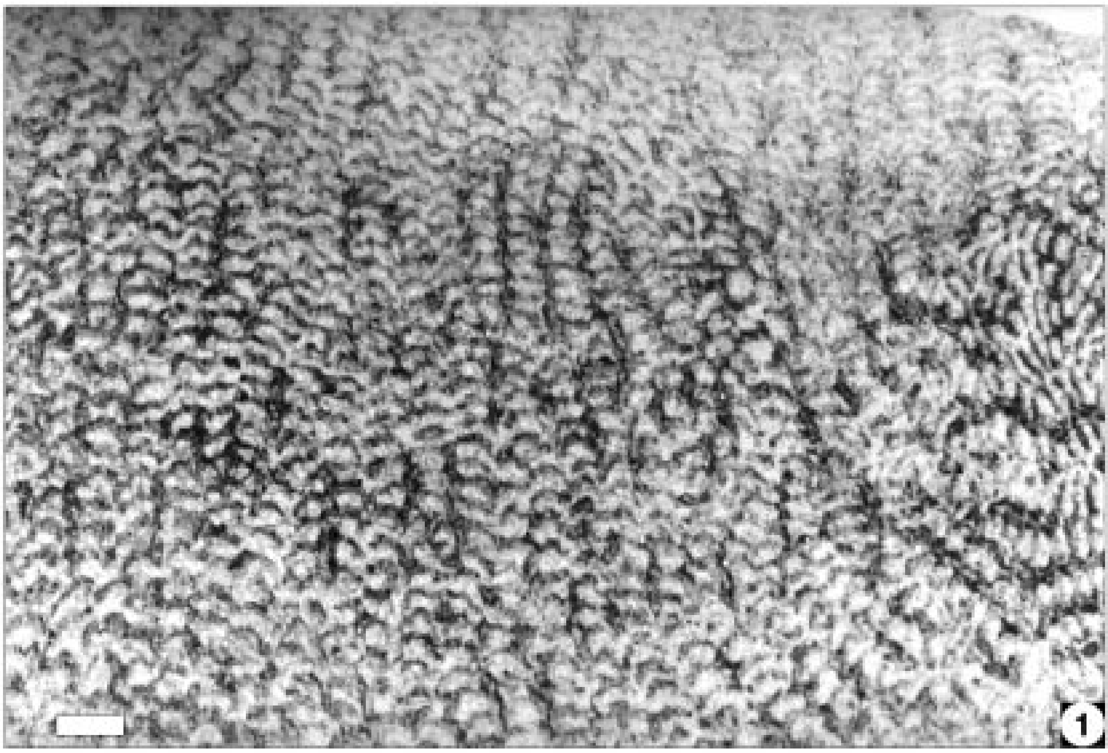

1a
1b
1c
2a
2b
3

Plate 5

***Alveolites* sp. nov. aff. *Alveolites hemisphericus* (Chernyshev 1937).**

Fig. 1–2: Corallum MC 14h from Crown Reserve.
Transverse sections (AM 13508) of corallites superposed in vertical series.
Thin-section AM 13509 shows chevron-shaped and crescentic to ovate corallites in cross-section with occasionally a septal spine on the base wall. Mural pores are frequent in the side walls.
Scale: 1 mm.



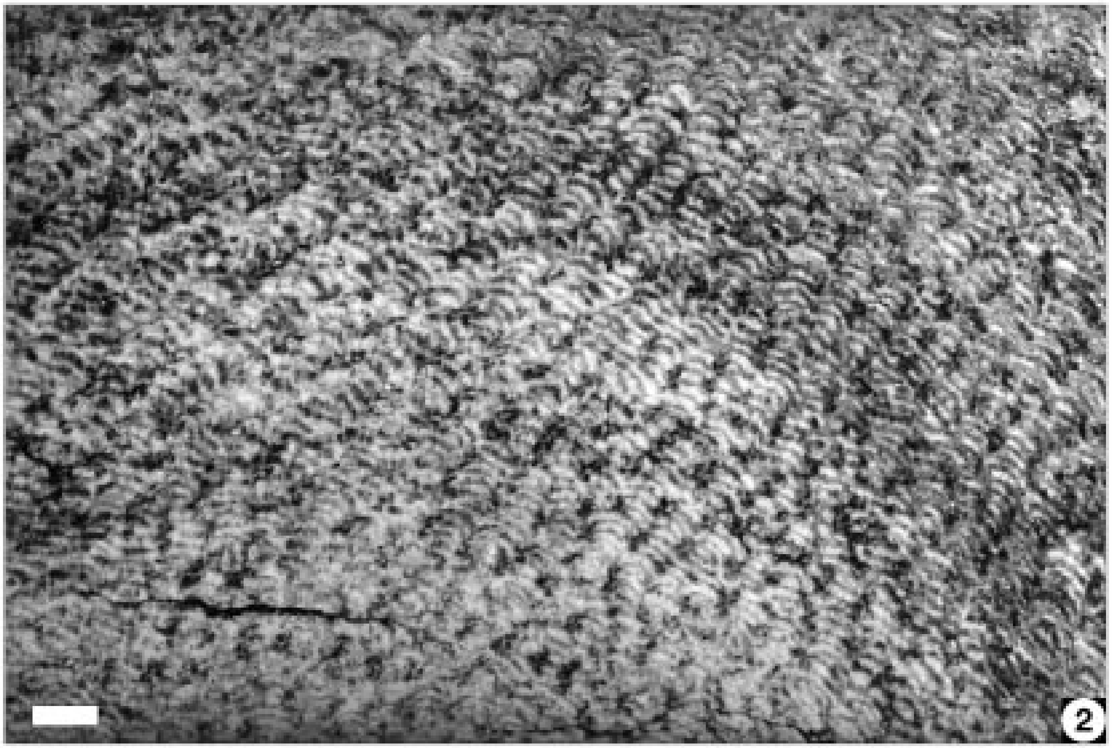


Plate 6

Syringopora auloporoides **DE KONINCK 1876.**

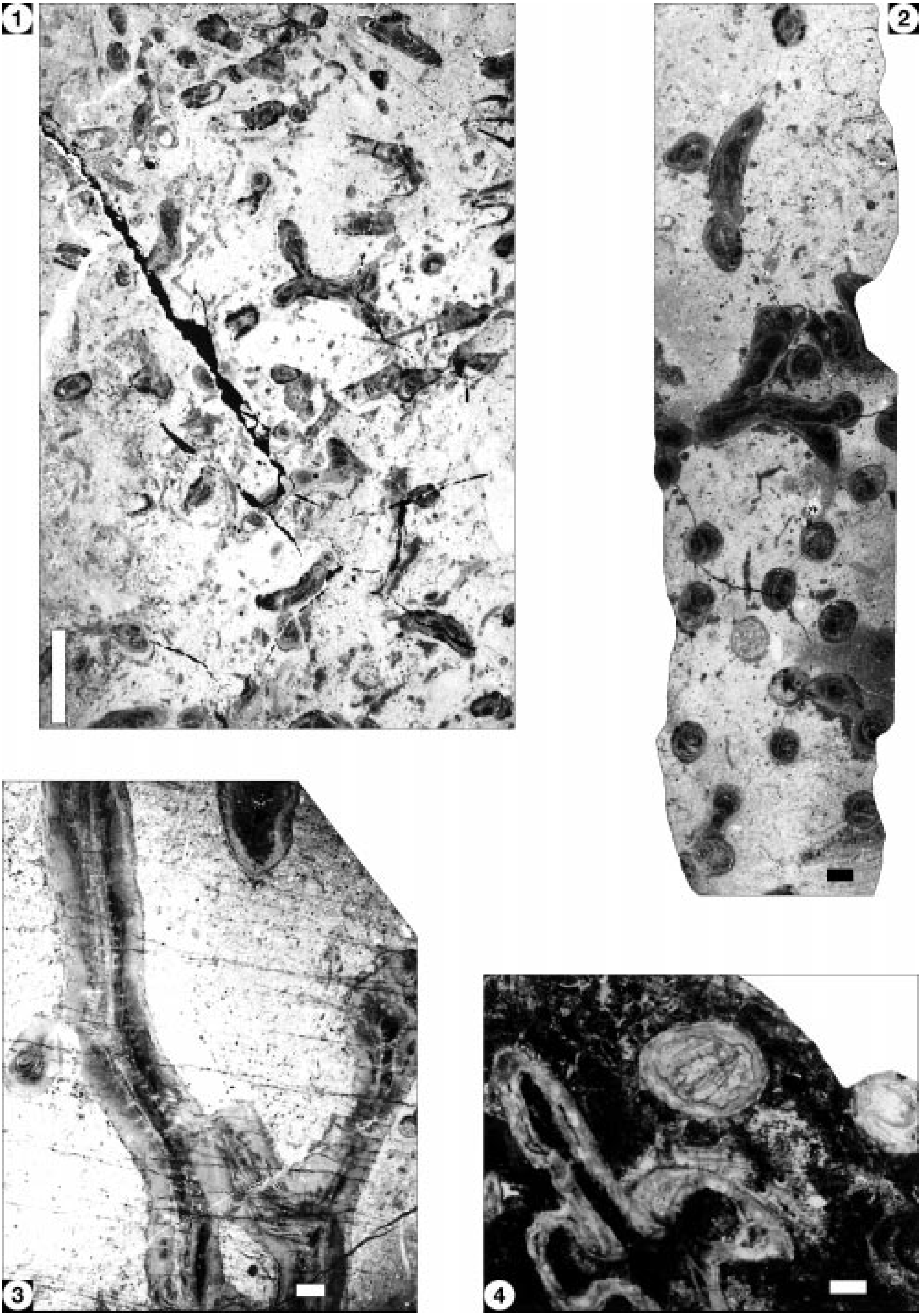
Fig. 1: Colony Cal II 27.3 m (AM 13510) from Moore Creek Limestone from Calal Property.
Transverse and longitudinal sections of corallite tubes with well developed infundibuliform tabulae.
Scale: 5 mm.

Fig. 2: Type material of ETHERIDGE (1899) AM 6512.
Transverse and longitudinal sections of corallite tubes with well developed infundibuliform tabulae.
Scale: 1 mm.

Remesia porteri **(ETHERIDGE 1899).**

Fig. 3: Holotype F 5509 (AM 70) of ETHERIDGE (1899).
Longitudinal section shows the relatively thick walls, the infundibuliform tabulae and septal spines.
Scale: 1 mm.

Fig. 4: Corallum MC 30 (AM 13511) from Moore Creek Limestone.
Transverse section of circular corallite tubes with tabulae sections and septal spines.
Scale: 1 mm.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