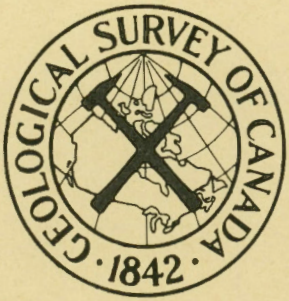

GEOLOGICAL
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DEPARTMENT OF ENERGY,
MINES AND RESOURCES

PAPER 70-13

LOWER AND MIDDLE DEVONIAN STROMATOPOROIDS FROM NORTHWESTERN CANADA

(Report, 2 figures and 6 plates)

C. W. Stearn and P. N. Mehrotra

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ABSTRACT

The stromatoporoid fauna of the Emsian, Eifelian and Givetian carbonates of northern Yukon Territory and northwestern District of Mackenzie are much different from those of the Frasnian rocks of Alberta. The stromatoporoids collected from the lower part of the sequence, the Michelle and Gossage Formations (Lower Devonian to Eifelian), are poorly preserved and difficult to identify. A rich fauna was collected in the Ogilvie Formation (upper Eifelian to Givetian) from which 16 species are described. Notable among these fossils are new species of Tienodictyon (T. jainaraini), Hammatostroma (H. vermiforme), Stictostroma (S. cavosite), Pseudoactinodictyon (P. cranswickense). Stromatoporoids from the Hume Formation also are described.

LOWER AND MIDDLE DEVONIAN STROMATOPOROIDS FROM NORTHWESTERN CANADA

INTRODUCTION

The Devonian System is well exposed and widespread in the northern part of Yukon Territory and adjacent Northwest Territories. During "Operation Porcupine" officers of the Geological Survey of Canada mapped an area of 50,180 square miles (130,000 square kilometers) in this northwestern corner of Canada. This paper is based on the collections of stromatoporoids made by the Geological Survey of Canada from the Devonian rocks in this area. It is a modification of a thesis submitted by the junior author for the M.Sc. degree at McGill University (Mehrotra, 1967).

The stromatoporoid faunas of these beds are of late Early and Middle Devonian ages and distinct from the late Devonian stromatoporoid faunas of Alberta which are well known. The only study of Middle Devonian stromatoporoids from this part of Canada was made by Galloway (1960) who described a collection made by A.C. Lenz from the Mackenzie Valley area. Middle Devonian stromatoporoids from Manitoba were described by McCammon (1960) but this area is 1,560 miles (2,500 kilometers) southeast of the Operation Porcupine area and has an entirely different stromatoporoid fauna.

ACKNOWLEDGEMENTS

The writers are grateful to A.W. Norris of the Geological Survey who collected the bulk of the material studied, prepared the collections for examination, and supplied the stratigraphic information. We also acknowledge the help of A.C. Lenz of the University of Western Ontario for information on the stratigraphy of the Mackenzie Valley. Thanks are due also to E.W. Mountjoy and S. Durovic for assistance in the preparation of the paper. The research was supported by grants from the National Research Council of Canada to the senior author.

STRATIGRAPHIC DISTRIBUTION OF STROMATOPOROIDS

The stratigraphy of the Devonian rocks of the area has been described by Norris (1967, 1968a and 1968b) and is summarized in figure 1. The location of each area from which stromatoporoids were collected is shown on figure 2. The reader is referred to Norris' papers for further details. Of the 31 sections measured by Norris

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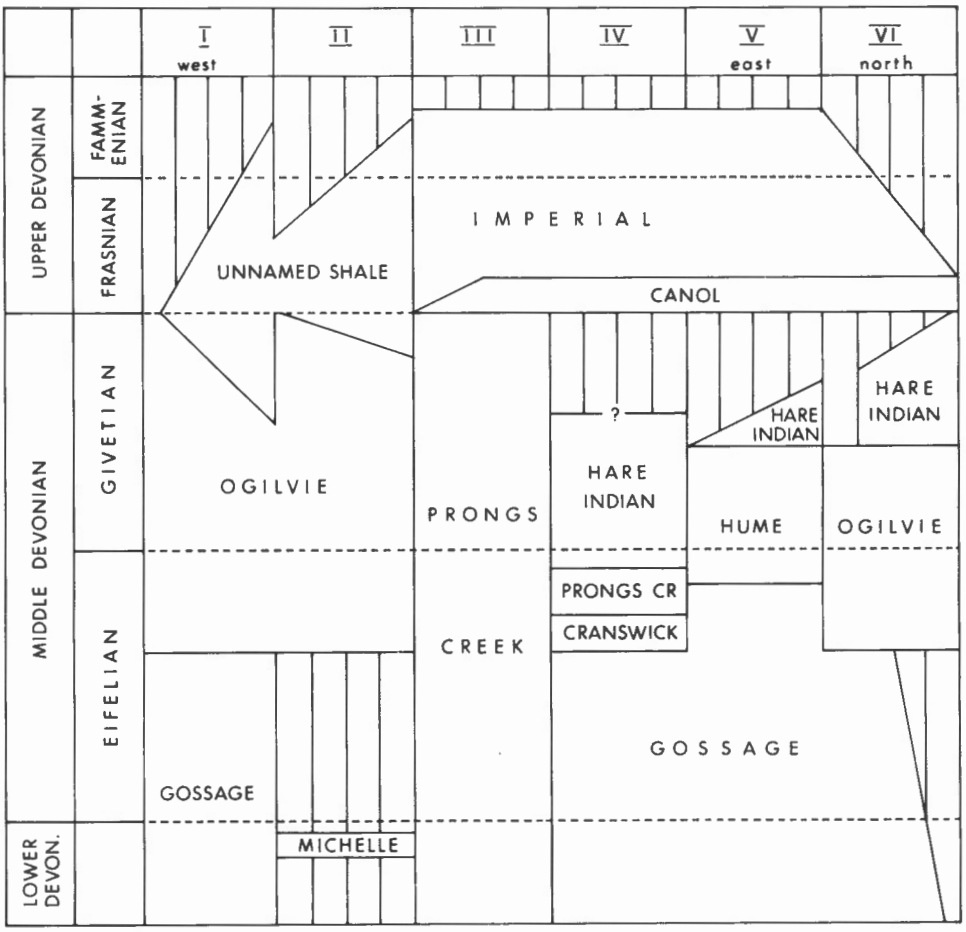

SECTIONS: I - 24,26 ; II - 14,16,17,18,19,21 ; III - 7; IV - 6 ; V - 2,3 ; VI - 31,32,(4) After Norris.

Figure 1. Simplified correlation chart

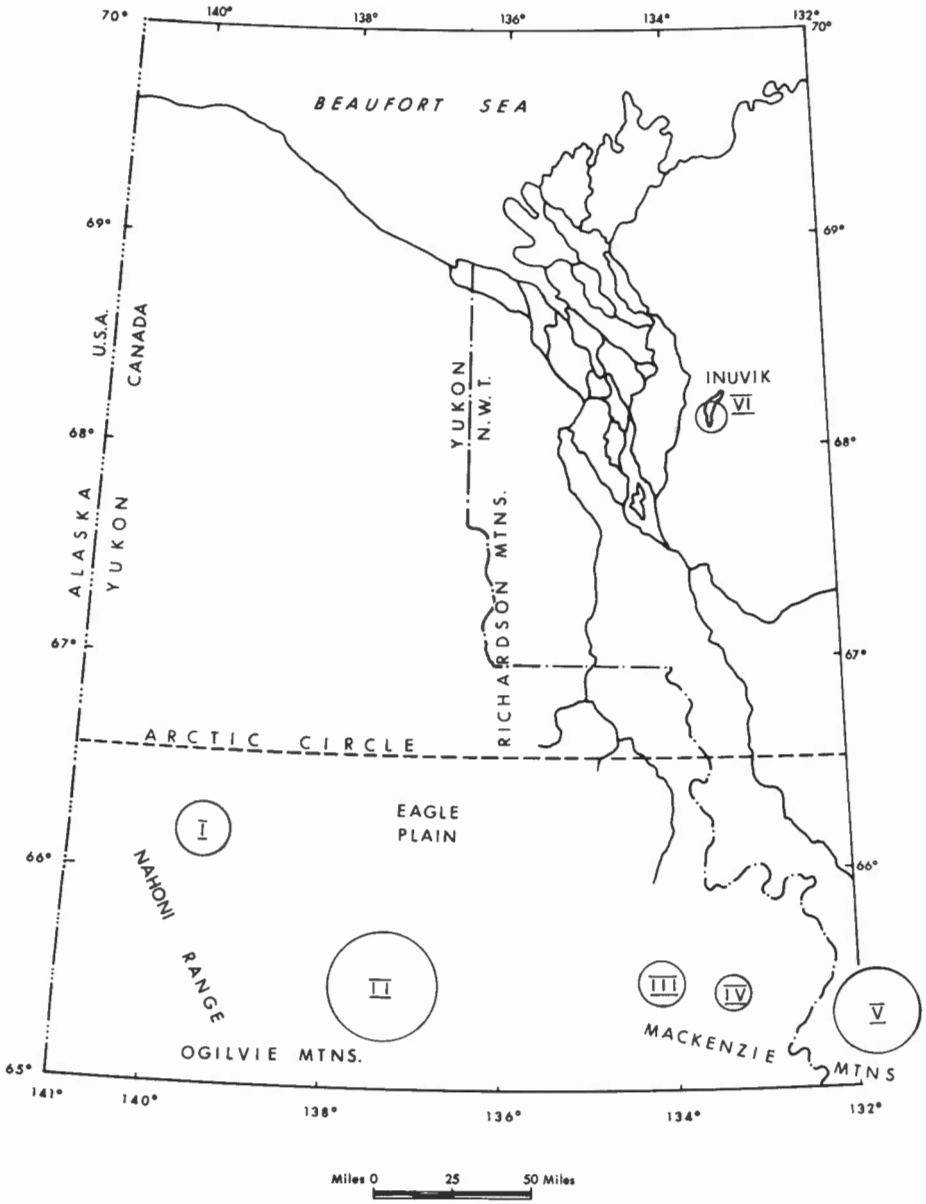

Figure 2. Approximate location of sections shown in Figure 1

only 16 are represented by stromatoporoids in the collections, and the locations of these numbered sections are given in the appendix. Most of the formations of Middle Devonian age can be described as dark-coloured, argillaceous limestones and calcareous shales. Stromatoporoids were collected from the Michelle, Gossage, Ogilvie, Hume, Prongs Creek, and Cranswick Formations. The stromatoporoids from the last two formations are rare and poorly preserved, provided the collections studied are representative. We record only Stromatopora sp. from the Prongs Creek Formation and only Trupetostroma sp. and Ferestromatopora sp. from the Cranswick Formation.

The age of the Gossage Formation is given by Norris (1968a) as late Silurian to early Eifelian but the age of the lower part of the formation is in doubt. Elements of the fauna, other than stromatoporoids, indicate the Emsian age of the Michelle Formation (Norris, pers. com.) Unfortunately, the stromatoporoids from the above two formations also are poorly preserved. Although the formations are believed to be in part correlative, no stromatoporoid species are common to them. The following were identified from the Michelle Formation:

Anostylostroma laxum (Nicholson)
Trupetostroma cf. T. ideale Birkhead
Anostylostroma sp.
Stromatopora cf. S. bucheliensis (Bargatzky)

The following stromatoporoids were identified from the Gossage Formation:

Clathrocoilona cf. C. subclathrata Galloway and St. Jean
Stromatopora sp. A.
Trupetostroma sp.

Anostylostroma laxum is a widespread species that has been described from Eifelian, Givetian and Frasnian rocks. Stromatopora bucheliensis is a Middle Devonian species but has been described from the Lower Devonian of Australia. The specimen described here, however, may not be conspecific with the European forms. Trupetostroma ideale is recorded by Birkhead (1967) from rocks of Givetian to Frasnian age. Clathrocoilona subclathrata is described by Galloway and St. Jean (1957) from Eifelian rocks but Birkhead (1967) has recognized it in Frasnian beds. Because two of these species occur also in the beds of the overlying Ogilvie Formation, there is little evidence in these collections that a distinctive stromatoporoid fauna will be found to characterize the Gossage-Michelle interval.

The most diverse fauna, consisting of 16 species, was collected from the Ogilvie Formation. Norris (1968b) dates this formation as ranging from Givetian to Eifelian in age; the stromatoporoid faunas contain elements of both these stages and, also, some that suggest a Frasnian age. Although the species that suggest a Frasnian age were collected mainly from the top of the Ogilvie Formation, sampling is so scattered that a division of the formation on the basis of the stromatoporoids in this collection is impractical. The following stromatoporoids were identified from the collections from the Ogilvie Formation:

Anostylostroma intermedium Klovan
Anostylostroma cf. A. humile Galloway and St. Jean
Anostylostroma sp.
Stictostroma cavosite n. sp.

having little idea of the variation in characters that succeeding paleontologists will find as they collect and identify other members of the population, or whether he should make a tentative identification with a species already described. Some specimens, however, are so far removed morphologically from described species or so remarkable that they demand recognition as new species. In the following descriptions we have taken a conservative position, avoiding the description of single specimens as new species unless thay are so remarkable as to require this sort of recognition.

As Flügel and Flügel-Kahler have recently (1968) provided synonymies of all the species of Paleozoic stromatoporoids, the synonymies given below are restricted to the first reference to the species, changes in generic assignment, and subsequent references from the Devonian of Western Canada.

The genera here are not divided into families because no current classification expresses their relationship satisfactorily. The genera are listed in an order that expresses their affinity but they are not formally grouped. The appendix gives the location of numbered sections.

The prefix GSC refers to specimens in the Geological Survey of Canada type collection in Ottawa.

Genus ANOSTYLOSTROMA Parks

Coenosteum of regular, persistent laminae and short pillars. Laminae composed of a single layer of compact tissue that, in some states of preservation, appears to be transversely fibrous and in some to be transversely porous. Compact pillars, confined to a single interlaminar space, tending to divide at the top either simply or complexly.

ANOSTYLOSTROMA PONDEROSUM (Nicholson)

Pl. I Figs. 1, 2

Stromatopora ponderosa (Nicholson), 1875, p. 246, Pl. 24, p. 4.
Clathrodictyon ponderosum (Nicholson), Parks, 1936, p. 42, Pl. 5, p. 5-6.
Anostylostroma ponderosum (Nicholson), Galloway and St. Jean, 1957, p. 111, Pl. 4, Fagerstrom, 1962, p. 425, Pl. 65, pp. 1-8.

The single massive coenosteum is 2.5 cm high by 8.5 cm wide by 5 cm thick. The surface is covered with low mamelons.

Vertical sections show thin, continuous, regular, undulating laminae inflected into low mamelons that are separated by short pillars. Laminae are compact to flocculent, about 140 microns thick and spaced from 7 to 9 in 2 mm. The pillars are thick, short and confined to a single interlaminar space. They rarely are superposed, spool-shaped, expand at the top, or are incomplete. The microstructure of the pillars is compact. Five to 8 pillars with an average thickness of about 100 microns occur in 2 mm. The pillars are inconspicuous in the mamelons. The astrorhizal canals are small and inconspicuous, occurring largely in the mamelons. Dissepiments are common. Locally, the tissue of the laminae and pillars is thickened apparently by secondary deposits.

Tangential sections show thin, concentric laminae surrounding mamelon centers. Most pillars are dot-like in section but some are bar-shaped. Most are isolated. The microstructure of pillars and laminae is compact to flocculent. Mamelons are abundant, range from 1 to 2 mm in diameter, and their centers are spaced 3 to 6 mm apart. Astrorhizal canals are present but inconspicuous.

Discussion: Anostylostroma ponderosum is distinguished by its shallow mamelons, a few centimeters in diameter, which do not make continuous mamelon columns; its relatively thick laminae; and its simple pillars which form dots in tangential sections and tend to be superposed. Fagerstrom (1962) has illustrated several variations in this species and some of his specimens are very close to those from our collections.

Occurrence: The single specimen is from GSC locality 50228, section 2, loose, unit 3, 31-42 m (103-138 ft.) above the base of the Hume Formation (Norris, 1967, p. 9).

ANOSTYLOSTROMA INTERMEDIUM Klovan

Pl. I Figs. 3, 4, 5, 6

Anostylostroma intermedium Klovan, 1966, p. 6, Pl. I, Figs. 2a, 2b.

This species is represented by three fragmentary coenostea. The largest of the laminar coenostea is 8 cm high and 4 cm across. The surface is smooth; undulating laminae show on polished vertical surfaces.

Vertical sections show thin, continuous, slightly undulating, regular laminae composed of transversely fibrous tissue, 120 microns thick, and spaced from 2 to 3 in 2 mm. The pillars are extremely irregular, only a few extend from lamina to lamina, most are incomplete, and a few appear in vertical section as small protrusions from the laminae; locally they are Y-shaped and joined horizontally. In vertical section much of the pillar tissue appears as isolated masses and dots concentrated at the bottom of interlaminar space. The pillars are spaced from 3 to 4 in 2 mm and are about 130 microns thick. Astrorhizal canals are not common. Dissepiments are abundant, and most are long and of slight curvature forming secondary laminae in the galleries.

Tangential sections show thick concentric laminae and pillars emerging as dots or bars, locally with a distinct dark center. A few pillars are joined in an irregular structure, particularly at the bottom of the galleries. Mamelons and astrorhizae appear to be absent. Dissepiments form vague lines crossing the galleries.

Discussion: The specimens seem typical of A. intermedium described by Klovan from the Leduc Formation at Redwater but the Yukon specimens show a dark center in the dot-like pillars. The tangential sections show the incipient knotted structure that prompted Klovan (1966) to place this species between Anostylostroma and Hammatostroma although vertical sections show more of the characters of the former genus than of the latter.

Occurrence: Section 24, GSC locality 54255, 400 m (1,394-1,406.3 ft.) above the base of the Ogilvie Formation (Norris 1968b, p. 189); GSC locality 54928, 440 m (1,539.9 ft.) above the base of the Ogilvie Formation (Norris 1968b, p. 188); GSC locality 54931, 465 m (1,586.2-1,587.2 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 187).

ANOSTYLOSTROMA LAXUM (Nicholson)

Pl. I Figs. 7, 8

Clathrodictyon laxum Nicholson, 1887, p. 12, Pl. 3, Figs. 4, 5.
Anostylostroma laxum (Nicholson) Galloway and St. Jean, 1957, p. 116-118, Pl. 5, Fig. 2: Klovan, 1966, p. 6, Pl. 1, Fig. 1.

The collections contain three large coenostea from three different localities. The surfaces of the specimens are smooth. Their maximum height is 4 cm.

Vertical sections show thin, continuous, regular, gently curved to undulating laminae locally curved upward to form small mamelons. The laminae range in thickness from 80 to 120 microns and are spaced from 5 to 7 in 2 mm. The microstructure of the laminae is compact to transversely fibrous.

The pillars are confined to an interlaminar space, and about one-fifth of them are short and incomplete. A few are Y-shaped, a few are spool-shaped, and a few expand at the top; most are of uniform thickness and are perpendicular to the laminae. In one specimen the laminae bend slightly downward at the heads of the pillars. Three to 7 pillars occupy 2 mm. They are from 80 to 120 microns thick. Astrorhizal canals are not conspicuous. The galleries are low, broad, and rectangular. Dissepiments are not common but may be present in small mamelons.

Tangential sections show thick, concentric, regular laminae. The pillars are nearly all dot-like and isolated; a few are bar-shaped and joined to their neighbours. The tissue of both pillars and laminae is compact. Mamelon centers rarely are present in some specimens, and are absent in others. Astrorhizal canals are scattered, small, and do not form well developed systems.

Discussion: Short, rod-like pillars, continuous, thin, simple laminae, and the absence of mamelon columns characterize A. laxum. In two of the specimens the laminae are somewhat thicker than are those described by other authors, but one specimen is very close to the description of the specimens from central Alberta by Klovan (1966). The thickness of the structural elements and their spacing have a wide range in this species.

Occurrence: Section 3, GSC locality 50235, unit 31, 80-83 m (263-274.5 ft.) above the base of the Hume Formation (Norris, 1968b, p. 105). GSC locality 50237, unit 35, 90-95 m (295.4-311.4 ft.) above the base of the Hume Formation (Norris, 1968b, p. 104).

Section 17, GSC locality 50274, unit 10, loose, 42-55 m (137.5-179.5 ft.) above the base of the Michelle Formation (Norris, 1967, p. 128).

ANOSTYLOSTROMA cf. A. HUMILE Galloway and St. Jean

Pl. II Figs. 1, 2

Anostylostroma humile Galloway and St. Jean, 1957, p. 115, Pl. 5, Fig. 1.

The collections contain a single coenosteum 6 cm long, 3.8 cm wide, and 2.5 cm high. The surface is smooth. Latilaminae are visible on broken vertical planes.

Vertical sections show dark, thick, curved, irregularly spaced laminae composed of transversely fibrous tissue, in places with a central light-coloured zone; these are spaced from 3 to 6, and rarely to 8 in 2 mm, and are about 170 microns thick. The pillars branch upward in places, are thick or thin, superposed locally, and spaced from 4 to 5 in 2 mm. The microstructure of the pillars is transversely fibrous, flocculent to melanospheric. Astrorhizal canals are lacking. The galleries are equant to vertically elongate, and locally superposed. Dissepiments are abundant in some zones, but absent in others.

Tangential sections show thick, concentric, continuous laminae apparently without pores. The pillars emerge as dots, mostly isolated, but with a few joined to their neighbours. The microstructure of both pillars and laminae seems compact. Astrorhizae are absent.

Discussion: The specimen is characterized by thick, gently curved laminae, short pillars having a range of thickness, and superposed in places; some pillars expand upward. The specimen differs from the types described from the Logansport Limestone of Indiana in having thicker laminae and in the microstructure of the pillars (which may be owing to different states of preservation). The specimen is similar also to Anostylostroma paramygdaloides (Lecompte) but can be distinguished by the spacing of the structural elements and the paucity of upwardly branching pillars.

Occurrence: Section 24, GSC locality 54922, unit 100, 329-337 m (1,183.4-1,203.4 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 190).

Genus STICTOSTROMA Parks

Coenosteum composed of persistent laminae with a central light- or dark-coloured zone or ordinicellular; pillars short, spool-shaped, composed of compact tissue confined to an interlaminar space, and rarely superposed. Pillars in tangential section appear normally as round dots.

STICTOSTROMA CAVOSITE n. sp.

Pl. II Figs. 3, 4

The collection contains fragments of three coenostea from the same locality. The largest is hemispherical, 10 cm in diameter and 4 cm high. The surface is smooth; weathered vertical surfaces show gently undulating laminae.

Vertical sections show thick, continuous, regularly spaced (4 to 5 in 2 mm) undulating laminae not inflected into mamelons. The laminae are composed of three layers, commonly with a central light-coloured zone bordered by layers of lighter tissue, less commonly with a central dark-coloured zone; not obviously ordinicellular. Tissue largely flocculent, in part melanospheric. Gallery boundaries largely diffused by the migration of specks. True thickness of laminae is difficult to measure but is estimated to be about 250 microns. Pillars apparently are compact, or flocculent, expanding at the top; most are complete and simple, and are confined to an interlaminar space. Some pillars are oblique and joined to others. Some appear to be incomplete but may be oblique pillars passing out of the plane of section. Pillars are irregularly spaced from 3 to 6 in 2 mm with an average thickness of 180 microns. Galleries irregular, dissepiments rare, and astrorhizal canals are not visible in vertical section.

Tangential sections show thick, solid concentric laminae of flocculent to compact tissue in which a central dark-coloured zone is commonly visible. Pillars are represented by dots, rarely joined to their neighbours in bars and irregular shapes, some show central light-coloured spots, some are distinctly cellular showing 4 or 5 cellules in cross-section, others appear to be compact. Astrorhizal canals and mamelons appear to be lacking.

Discussion: The three-layered laminae and simple pillars that are dot-like in cross-section are characteristic of the genus Stictostroma. The tendency for the pillars to have a lumen at the top, or to be cellular, is suggestive of Anostylostroma or Stromatoporella. However, the hollow-headed pillars do not appear to be ring pillars of the latter genus and apparently are not formed by bending of the laminae. S. cavosite is characterized by the widely spaced tripartite laminae, simple pillars with cavities or cellules in their heads, and lack of both dissepiments and astrorhizae.

Occurrence: Section 14, GSC locality 50558, loose, unit 49, 352 m (1,157.5 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 143). The holotype is GSC No. 26138.

STICTOSTROMA sp. A.

Pl. II Figs. 5, 6

The collections contain one large coenosteum. Small mamelons are present on the surface, and some mamelons have small radiating grooves around them. Astrorhizae are well preserved.

Vertical sections show gently undulant, continuous laminae commonly inflected into very impersistent mamelons. The laminae are tripartite with a central light-coloured zone (locally ordinicellular), 130 microns thick, and are closely spaced from 7 to 8 in 2 mm. The pillars are restricted to an interlaminar space, and are expanded at the top; a few are Y-shaped, and a few are spool-shaped. The pillars are spaced from 7 to 9 in 2 mm, and are 130 microns thick with considerable diffusion of specks at the borders of galleries. The microstructure of the pillars is compact. The tissue occupies 50 per cent of the coenosteum; astrorhizal canals are conspicuous in the mamelon columns; and mamelons are shallow inflections persisting through 4 or 5 laminae. Galleries are circular to irregular in shape, and dissepiments are absent.

Tangential sections show one or two concentric laminae surrounding mamelons. The pillars are commonly joined to neighbours to produce irregular shapes or a crude network; they are rarely dot-like. The tissue is speckled, compact, and, in places, melanospheric. Mamelons are abundant, 2 to 3 mm in diameter, some with a central oval to elongate astrorhizal canal. Radiating astrorhizal canals are abundant, short to long, and are crossed by tabulae.

Discussion: Although there are a few Y-shaped pillars, the presence of tripartite laminae places this species in the genus Stictostroma. Stictostroma sp. A is close to S. longitubiferum Fagerstrom in general dimensions and microstructure of the pillars but differs in its mamelons and lack of dissepiments. It resembles also S. huronense Parks but this species has downwardly inflected laminae forming ring pillars in tangential section; also, it has dissepiments. It can be distinguished from S. ozarkense Birkhead by its thicker and more widely spaced laminae, its small mamelons, and the complete absence of dissepiments. As only a single specimen is present in the collections, no specific name is given here but further collecting may result in the definition of a new species for this form.

Occurrence: Section 19, GSC locality 54566, strata of the Ogilvie Formation above a presumed fault not described in Norris (1967, pp. 131-142).

Genus CLATHROCOILONA Yavorsky

Coenosteum composed of thick laminae and pillars which enclose small galleries. Laminae laterally persistent, divided by a narrow axial light-coloured zone into three layers. Pillars confined to a single interlaminar space, spool-like, and not commonly superposed. Galleries small and rounded, not as high as the laminae are wide.

Stearn (1966a) presented arguments for the compact nature of the tissue in this genus although Galloway and St. Jean (1957) regarded it as maculate (?cellular). The species described here appears to be cellular in its tissue and is much like the species C. subclathrata described by Galloway and St. Jean as maculate. If Stearn's concept of the microstructure of the genus is correct, this species perhaps should be transferred to another genus.

CLATHROCOILONA cf. C. SUBCLATHRATA Galloway and St. Jean

Pl. II Figs. 7, 8

Clathrocoilona subclathrata Galloway and St. Jean, 1957, p. 224, Pl. 21, Fig. 4.

The collections contain two specimens referred to this species. They are massive to tabular with smooth surfaces. The largest is 7 cm high. Latilaminae are evident on weathered surfaces.

Vertical sections show thick, continuous, more or less regular undulating laminae in places inflected into small mamelons. Laminae have a central microlamina clothed in layers of cellular to melanospheric tissue. Locally, several rows of cellules appear to form a lamina, whereas in other places there is only a single row. Laminae

are spaced from 5 to 7 in 2 cm. The pillars are short, restricted to interlaminar spaces, spool-shaped, commonly superposed, spaced from 4 to 6 in 2 mm, and are about 150 microns thick. They are composed of tissue that appears compact, melanospheric, or cellular in different states of preservation. Astrorhizal canals are large and common in the area of the mamelons, and are crossed by tabulae. Dissepiments are abundant.

Tangential sections show thick, concentric, continuous laminae. The pillars are dot-like to bar-shaped, only a few are isolated, and most are joined to their neighbours. The tissue is flocculent to melanospheric. Astrorhizal canals are uncommon but, where present, are thin, long, in places branching, and crossed by tabulae.

Discussion: Clathrocoilona cf. C. subclathrata is characterized by multilayered but largely tripartite laminae, cellular tissue, abundant dissepiments, small mamelons, and commonly superposed pillars. The specimens from the Yukon show less superposition of the pillars and thinner laminae than those described by Galloway and St. Jean from the Logansport Limestone of Indiana. They are generally very poorly preserved and the microstructure is visible only in patches of coenosteum.

Occurrence: Section 2, GSC locality 50599, unit 16, 86-89 m (282.6-283.6 ft.) above the base of the Hume Formation (Norris, 1967, p. 6).

Section 24, GSC locality 54787, unit 7, 47 m (154.7 ft.) above the base of the Gossage Formation (Norris, 1967, p. 233).

Genus TIENODICTYON Yabe and Sugiyama

Coenosteum composed of thick, widely spaced, fibrous laminae and irregular pillars confined to an interlaminar space. Pillars tangled to form a network in the lower part of the space, but regular and columnar in upper part, fibrous.

The confusion between the genera Tienodictyon, Intexodictyon, and Hammatostroma has been examined recently by Stearn (1969). Stearn believes that Tienodictyon is distinguished from Hammatostroma by the difference of the pillars in the upper and lower part of interlaminar space.

TIENODICTYON JAINARAINI n. sp.

Pl. III Figs. 1, 2, 3, 4

The collections contain a single massive coenosteum 9 cm long by 6 cm wide by 3 cm high and three other coenostea that are less well preserved and, therefore, only provisionally assigned to the species.

Vertical sections show thin, continuous, regular laminae inflecting into low mamelons and pillars confined to an interlaminar space. The laminae are spaced from 2 to 3 in 2 mm and are 140 microns thick. They consist of a central dark-coloured zone of transversely fibrous tissue clothed with light-coloured, compact yellowish tissue. The pillars form a tangled mass and, rarely, a crude network in the lower half of the

interlaminar space. The upper half is occupied by yellowish pillars that are lighter coloured than the tissue below and which emerge from the tangled mass below and join directly to the lamina above. They show all stages of development and spacing and, locally, may be absent altogether. Some of the larger galleries may represent astrorhizal canals in vertical section. Long, low, flat dissepiments are common. A few shorter, more convex dissepiments also are present.

Tangential sections show well-defined, dark, meandering lines representing the laminae. They appear to be solid and not pierced by pores. The tissue of the pillars is very irregular. In sections cut in the upper part of the interlaminar space the pillars appear as round dots; where cut in the bottom part, they form an irregular network or irregular mass of tissue. Locally, in this zone, subparallel fibers are randomly joined to their neighbours by short cross fibers to form a trellis-like structure. Astrorhizal canals were not observed.

Discussion: This species appears to be intermediate between Hammatostroma and Tienodictyon. The features of Tienodictyon that are shown by the species include: the complex pillar structure consisting of an upper zone of simple pillars and a lower zone of complexly intertwined fibers; fibrous, widely spaced laminae; long, low dissepiments; and lack of astrorhizae. The species can be distinguished from the type species T. zonatum by the closer spacing of the laminae and the poorer development of the lower pillar zone. It resembles Hammatostroma albertense but the different pillar types in the interlaminar space are distinctive. The species is named in honour of the father of the junior author.

Occurrence: Section 24, GSC locality 54933, unit 127, 475-476 m (1,660-1,664.2 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 187). Comparable forms come from the same formation and section, GSC locality 54910, unit 86, 257-272 m (943.3-992.3 ft.) above the base of the formation.

The holotype is GSC No. 26141.

Genus HAMMATOSTROMA Stearn

Coenosteum is composed of persistent laminae and incomplete pillars confined to an interlaminar space. The laminae are a single layer of transversely fibrous tissue. The pillars arise from the laminae and form a tangled irregular mass of strands between the laminae. The tissue of the pillars is compact to fibrous.

HAMMATOSTROMA VERMIFORME n. sp.

Pl. IV Figs. 5, 6

The collections contain a single coenosteum which is laminar, has a smooth surface, and is about 1 cm high. Each pair of laminae is separated by a thin layer of chert or calcarenite which, owing to weathering, stands out in relief on that particular surface.

Vertical sections show units of laminae and pillars separated by spaces filled with calcarenite or chert. Each unit consists of bounding laminae, enclosing gallery space, pillars and dissepiments. The area within the units is filled with a mosaic of calcite crystals which seems independent of the stromatoporoid structure. The area between the units, here referred to as interlaminar space, is occupied by a fine mosaic of quartz crystals perpendicular to the laminae around the rim and unoriented in the axial zones. Some units end in the interlaminar space where the upper and lower laminae join to form a loop. Locally, a lamina branches to form the boundary of another unit or meets again with the same lamina from which it branches. The general appearance of the structure is that of a mass of worms.

The microstructure of the laminae is compact to fibrous; the laminae are about 80 microns thick. Pillars appear, in vertical section, largely as isolated dots joined to their neighbours as irregular masses of tissue. Only rarely do they cross the galleries directly; generally they project as spurs from the inner surface of the laminae. They appear to be fibrous. Astrorhizae are absent, but dissepiments are abundant, large and convex.

Tangential sections have the same irregular form of laminae and pillars and show microstructures similar to the vertical sections. The pillars are dot-like locally with a dark centre, and commonly joined to their neighbours by dissepiments. Mamelons and astrorhizae are absent.

Discussion: This species shows a unique growth form. Periodic growth of the pillar-laminae units appears to have been interrupted by sedimentation of layers of pelleted carbonates which were subsequently replaced by chert. Although some stromatoporoids incorporate sediment within their coenostea, especially the labechioids in the Ordovician, this regular pattern of interrupted growth is unique to this species and justifies the establishment of a new species.

The species could be assigned to Anostylostroma as the tangling of the pillars is not in an advanced stage typical of Hammatostroma. However, the lack of simple, Y-shaped pillars, and the preponderance of irregular, incomplete pillars places this species closer to Hammatostroma. The lack of astrorhizae and the long low dissepiments also are features suggestive of Hammatostroma. The tangling of the pillar tissue is much simpler than in the type species H. albertense and is nearer to the pillar structure of H. carnicum (Charlesworth). Its structure is simpler even than that of this species and it can be distinguished also from it by the peculiar growth habit. The specimens have a superficial resemblance to Euryamphipora platyformis Klovan but the structure between the laminae is much simpler and no marginal vesicles are present.

Occurrence: The single specimen, the holotype, (GSC No. 26142) is from section 17, GSC locality 50364, unit 21, loose, 209-212 m (685-695 ft.) above the base of the Ogilvie Formation.

Genus PSEUDOACTINODICTYON Flügel

Coenosteum composed of persistent, thin laminae and short rod-like pillars, some of which are confined to an interlaminar space, others cross several laminae. High interlaminar spaces crowded with large overlapping dissepiments. Laminae consist of a single layer of compact tissue with isolated foramina. Pillars compact or flocculent.

PSEUDOACTINODICTYON CRANSWICKENSE n sp.

Pl. III Figs. 7, 8

This species is represented in the collections by a single massive coenosteum 5 cm across and about 1 1/2 cm high. The surface is more or less smooth.

Vertical sections show dark, thin, continuous undulating laminae inflected into low mamelons; locally they show a dark- or light-coloured axial zone, are widely spaced from 3 to 5 in 2 mm, and are about 100 microns thick. The compact pillars are short, confined to an interlaminar space, not superposed, irregular, oblique and bent, incomplete, in places joining neighbours, 100 microns thick, and a few expand at the top but do not divide. The structural elements occupy about 40 per cent of coenostea. Astrorhizal canals appear to be absent. Galleries are irregular, and tend to be higher than long. Low, long dissepiments common, only two or three cross an interlaminar space.

Tangential sections show well-defined dark lines representing laminae. The pillars emerge as discrete dots; a few are isolated, and most are joined to their neighbours by processes. The microstructure of the pillars and the laminae is compact. Scattered low mamelons are evident but astrorhizal canals are not apparent.

Discussion: This species differs from the type species P. juxi Flügel in the closer spacing of its structural elements but otherwise it is very similar. The structure of the laminae and pillars is much more regular than in P. vagans Parks. It can be distinguished from P. bullulosum Stearn by its well-defined laminae and lack of astrorhizal canals. The new species is characterized by well-developed laminae, and by thick, irregular, short pillars some of which expand but do not divide at the top as in P. juxi. The trivial name refers to the type locality which is near the headwaters of the Cranswick River in the Mackenzie Mountains.

Occurrence: Section 4, GSC locality 54483, unit 8, 314-315 m (380-385 ft.) above the base of the Ogilvie Formation (Norris, 1967, p. 28).

Genus ACTINOSTROMA Nicholson

Coenosteum consists of regular, compact, single layered, discontinuous laminae in the form of a network crossed by long, through-going, compact pillars forming a grid. At regular intervals a group of processes branch from the pillars and join to form the network of the laminae.

ACTINOSTROMA cf. A. CLATHRATUM Nicholson

Pl. IV Figs. 5, 6

Actinostroma clathratum Nicholson, 1886, p. 76, Pl. 1, Figs. 8-13, Pl. 2, Fig. 11.

The collection contains one large coenosteum which is 8 cm by 4.5 cm by 2.5 cm. The surface appears to be smooth. Latilaminae are indistinct.

Vertical sections show thin, discontinuous, curved laminae and through-going pillars forming a regular network. The microstructure of the laminae is flocculent, and specks are scattered. The laminae are from 90 to 180 microns thick (average about 120 microns), spaced from 5 to 7 in 2 mm and, locally, appear to be made up of a series of segments. The pillars are long, up to 6 mm, subparallel, of compact tissue, 140 to 270 microns thick (average about 180 microns), and spaced from 3 to 6 in 2 mm. Tissue occupies about 70 per cent of sections. Astrorhizal canals are present, 180 to 270 microns in width. Galleries are round to irregular. Short, curved dissepiments are scattered throughout the coenosteum.

Tangential sections show broad concentric laminae, are essentially solid locally where the processes from the pillars have coalesced, are locally porous, and are formed of a hexactinellid network. The pillars emerge as dots 200 microns in diameter between the laminae. The tissue is compact to flocculent. Astrorhizal canals are rare, obscure, and do not form a well developed system. Dissepiments are very rare.

Discussion: The difficulties of recognizing species of Actinostroma have been discussed by Flügel (1959), and Stearn (1966b). The specimen described here is close to those from the Upper Devonian of Alberta described as A. clathratum but has thicker laminae and pillars, and more widely spaced structural elements. The spacings are much wider than those of A. tyrrelli Nicholson, the only other species of this genus described from the Middle Devonian of northwestern Canada (Galloway 1960). Further collecting will be needed to establish the classification of the Actinostromas in this area.

Occurrence: Section 26, GSC locality 54857, loose, unit 27, 111 m (365.8 ft.) above the base of Ogilvie Formation (Norris, 1968b, p. 221).

Genus TRUPETOSTROMA Parks

Coenosteum composed of laminae with a central clear or dark axis thickened above and below by clothing tissue (Stearn, 1966b) which may be vacuolate. Pillars are confined to an interlaminar space, regularly superposed, and spool-shaped. Tissue is compact.

TRUPETOSTROMA cf. T. IDEALE Birkhead

Pl. V Figs. 1, 2

Trupetostroma ideale Birkhead, 1967, pp. 60-62, Pl. 3, Fig. 6, Pl. 12, Fig. 2.

The collections contain a single coenosteum 4 cm high. The surface is covered with very low mamelons with well preserved radiating astrorhizae. Latilaminae are visible on polished surfaces.

Vertical sections show thin, continuous, regular, slightly undulating laminae and vertically persistent, but very shallow mamelon columns. Locally, the laminae are marked by a central darker-coloured zone; in places they are transversely fibrous, but normally they are compact to melanospheric. Laminae are 75 microns thick and closely spaced at from 10 to 13 in 2 mm. Pillars are thicker than the laminae (average

125 microns), confined to an interlaminar space, commonly superposed, spool-shaped, commonly wider at the top, diverging very slightly in the mamelons, and spaced from 7 to 9 in 2 mm. The microstructure of the pillars is compact to flocculent, and locally is melanospheric like the laminae. Astrorhizal canals are abundant in the mamelon columns. Galleries are narrow and high and occupy 25 to 30 per cent of sections. Foramina pierce the laminae locally. Mamelon columns are conspicuous, with very little relief. Dissepiments are absent.

Tangential sections show thick, regular, concentric lines representing laminae and marking the position of the mamelons. Some pillars appear as round dots, but most are bar-like or irregular in cross section and locally, anastomose to form a network. The tissue is generally compact, but in places is flocculent. Branching astrorhizal canals are abundant; they radiate from the mamelons and, locally, join their neighbours to form a well-developed system. Mamelons are abundant, about 1 mm in diameter, and spaced from 6 to 7 mm apart.

Discussion: This species resembles Trupetostroma papulosum Stearn in the spacing of the structural elements but has thinner pillars and lacks dissepiments. Lack of fibrous structure in the pillars and the presence of conspicuous mamelon columns distinguish the specimen from T. cimacense Lecompte. It differs from T. bassleri Lecompte in its lack of dissepiments and its mamelon columns. It can be distinguished from T. nux (Winchell) by its lack of large vacuoles in the pillars and the characteristics of the mamelons. The closest described species appears to be T. ideale Birkhead but the laminae in the Michelle specimen are more closely spaced than in the Missouri specimens. The Michelle specimen also differs from the Missouri specimens in having a better developed astrorhizal system and lacking the central light-coloured zone in the laminae. For these reasons its assignment to Birkhead's species is doubtful.

Occurrence: Section 16, GSC locality 50296, loose, unit 10, 41.5-45.5 m (132.5-144.5 ft.) above the base of the Michelle Formation (Norris, 1967, p. 116).

Genus STACHYODES Bargatzky

Coenosteum dendroid, cylindrical, commonly with an axial canal crossed by tabulae. Composed of striated tissue not clearly differentiated into laminae and pillars, but traversed by canals radiating outward and upward from the axis and perpendicular to it. Laminae are marked by fine dark lines in peripheral parts of coenostea, and are not separated by galleries; pillars are thick and defined by radial canals in the peripheral zones of coenostea.

STACHYODES THOMASCLARKI Stearn

Pl. IV Figs. 2, 3

Stachyodes thomasclarki Stearn, 1963, p. 661, Pl. 86, Figs. 9-11, Pl. 67, Fig. 1.

The collections contain a single specimen containing many coenostea mixed with coenostea of S. costulata. The cylindrical coenostea are commonly simple, rarely branched, and are about 2.5 mm in diameter. Their surfaces are not exposed but embedded in the limestone.

Cross-sections show the axial zone to be 1 to 2 mm in diameter, composed of dense tissue which contains a few small canals. Several large axial canals commonly are present; a single axial canal is rare. The peripheral zone is marked by abundant radial canals 90 to 180 microns in diameter which may branch several times; they extend to the axis and emerge along the periphery. "Pillars" formed by the radial canals near the periphery are from 140 to 200 microns across, and are distinctly striated and bordered by a dark line. The striations appear to be formed by the radial alignment of fine specks in the tissue but are vague at magnifications of more than 10 times. Laminae are not prominent but, locally, they are represented by thin dark lines which resemble growth lines and are interrupted by the canals.

Axial sections show large canals in the axes of coenostea and smaller canals spreading upward and outward from them. Traces of laminae are rare but where present they arch parabolically upward as is characteristic of the genus.

Discussion: The abundance of the radial canals which extend nearly to the axis of the coenosteum, the poorly defined laminae and the well-defined peripheral pillars (between the canals) are features of Stachyodes thomasclarki. The Yukon specimens have better defined laminae than the holotype from the Slave Point Limestone at Evie Lake. These specimens differ from S. crebrum Stearn in the prominence of the radial elements and the larger size of their coenostea.

Occurrence: Section 24, GSC locality 54945, 622 m (2,043.5 ft.) above the base of Ogilvie Formation (Norris, 1968b, p. 183).

STACHYODES COSTULATA Lecompte

Pl. IV Figs. 3, 4

Stachyodes costulata Lecompte, 1952, p. 309, Pl. 64, Fig. 3, Pl. 65, Figs. 1-4; Stearn 1963, p. 660, Pl. 86, Figs. 4, 5; Klovan, 1966, p. 31, Pl. 11, Figs. 1-6.

Several coenostea are associated with those of Stachyodes thomasclarki in the specimen described above. They are fragments of stems ranging in thickness from 4 to 6 mm which, generally, is thicker than those of S. thomaslcarki.

Cross-sections show a very dense structure of radially striated tissue with a few small canals. The axis is commonly, but not always, occupied by a central large canal; radial canals also are present, but are small and inconspicuous. Pillars are not defined within the mass of tissue and laminae. Growth lines are not conspicuous.

Axial sections may or may not show an axial canal. About 98 per cent of coenostea are occupied by tissue marked by a striated microstructure spreading outward from the axis. Canals are scattered, some radial, some parallel to the vertical walls of the coenosteum. Parabolic laminae resembling growth lines are conspicuous.

Discussion: The dense structure of this species is easily recognized. It is one of the commonest species of this genus in the Devonian of Western Canada. The specimens here described appear somewhat smaller than those described from the Swan Hills by Stearn (1963).

Occurrence: Section 24, GSC locality 54945, unit 157, 622 m (2,043.5 ft.) above the base of Ogilvie Formation (Norris, 1968b, p. 183).

Genus AMPHIPORA Schulz

AMPHIPORA RAMOSA (Phillips)

Pl. IV Fig. 1

Caunopora ramosa Phillips, 1841, p. 19, Pl. 8, Fig. 22

Amphipora ramosa (Phillips), Schulz, 1883, Pl. 22, Figs. 5-7. Stearn, 1961, p. 946, Pl. 107, Figs. 9, 10; 1962, p. 279; 1963, p. 663, Pl. 87, Fig. 2; 1966b, p. 63, Pl. 24, Fig. 2.

The species is represented in the collections by a single sample containing many coenostea. The specimens are cylindrical and have a diameter ranging from 3 to 5 mm. The coenostea of this much described species have a wide range of features including an axial canal, marginal vesicles, transversely fibrous tissue, and anastomosing galleries and tissue. The average diameter of the axial canal, where present, is 0.5 mm. The peripheral lamina is 100 to 150 microns thick and the fibers of the internal structure, which show excellent fibrosity, are from 70 to 90 microns thick.

Occurrence: Section 24, GSC locality 54924, unit 102, loose, 346 m (1,236.9 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 190).

Genus FERESTROMATOPORA Yavorsky

Coenosteum composed of an irregular network of amalgamated cellular tissue in which horizontal elements are prominent but rarely continuously developed, and in which galleries are irregular, oblique, but rarely vertically elongate as in Stromatopora. Pseudozooidal tubes missing.

FERESTROMATOPORA LAMINOSA (Lecompte)

Pl. V Figs. 3, 4

Stromatopora laminosa (Lecompte) 1952, p. 276, Pl. 55, Fig. 3, Pl. 56, Figs. 1-2.

The collections contain four coenostea of this species.

Vertical sections show a largely laminated structure with well-developed laminae and short pillars which, locally, passes into an amalgamated structure. In some specimens the laminae are continuous, only slightly undulant and, in some areas, marked by a central light-coloured zone. In other specimens laminae are marked by a dark line and, in favourably preserved areas, an ordinicellular or reticulate microstructure (formed of one or more tiers of cellules). Pillars generally are short, confined to a single interlaminar space and, locally, are superposed or anastomosing with the laminae to form an amalgamated network; they are spool-shaped or expand

upward, are spaced from 6 to 9 in 2 mm, and appear coarsely cellular where the microstructure is preserved. The galleries are round to longitudinally elongate, forming about 30 per cent of vertical sections. Pseudozooidal tubes and dissepiments are rare or absent. Astrorhizal canals generally are not conspicuous.

Tangential sections show amalgamated tissue with concentric darker-coloured zones marking the laminae. The astrorhizal system in one specimen is well-developed with wide tubes radiating from centers but, in another specimen, the canals are difficult to distinguish from the galleries. Tissue is coarse and distinctly cellular.

Discussion: The laminae in this species may be distinct or indistinct. In some specimens described by Lecompte they are as prominent as in species of Stromatoporella, whereas in others they are suppressed and the structure largely is amalgamated. The specimen described by Galloway and St. Jean (1957) from Indiana has poorly developed laminae. The Yukon specimens have well-developed laminae which might indicate an assignment to Stromatoporella if any trace of the ring-pillars characteristic of that genus were found in tangential section.

Occurrence: Section 19, GSC locality 54580, sample presumably above fault and not included in description of the Ogilvie Formation (Norris, 1967, p. 131).

Section 24, GSC locality 54927, loose, unit 112, 424 m (1,457.1 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 188).

Section 2, GSC locality 50227, unit 2, 29.8-31.4 m (97-103 ft.) above the base of the Hume Formation (Norris, 1967, p. 9).

Section 2, GSC locality 50461, unit 28, 102-107 m (331.9-341.9 ft.) above the base of the Hume Formation (Norris, 1967, p. 4).

FERESTROMATOPORA JACQUESENSIS Galloway

Pl. V Figs. 5, 6

Ferestromatopora jacquesensis Galloway, 1960, p. 627, Pl. 74, Fig. 1.

Not Ferestromatopora jacquesensis Galloway, Stearn, 1961, p. 943, Pl. 107, Figs. 4, 5.

A single saucer-shaped coenosteum about 10 cm across is referred to this species. Another specimen is slightly different and tentatively is referred to the species.

Vertical sections show an amalgamated structure dominated by horizontal elements and lacking pseudozooidal tubes. The fibers of the amalgamated structure are thick (about 130 microns) and distinctly cellular. The spacing of the horizontal elements is irregular but averages 7 in 2 mm. The fibers of the structure have a tendency to take on a chevron-like folding similar to the laminae in Ecclimadictyon but this is indistinct. No distinct pillars are present. Astrorhizal canals are not conspicuous and are difficult to distinguish from the generally round galleries. Dissepiments and mamelons are absent.

Tangential sections show broad bands of the laminae crossing the section. Vertical fibers are intersected as irregular blobs of tissue or form, with the laminae, an amalgamated network. Astrorhizal canals are not apparent. Tissue cellular.

Discussion: The specimen (54852) is in all respects similar to that described by Galloway (1960). Another specimen (54459) has similar structures, but shows a more latilaminate nature, and has more vertical structures within the latilaminae.

Occurrence: Section 26, GSC locality 54852, loose, unit 20, 78 m (275.6 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 222).

Genus STROMATOPORA Goldfuss

Coenosteum composed of an amalgamated network in which vertical elements dominate, and are separated by high galleries called pseudozooidal tubes. Microlaminae are present in some species. Tangential sections show an irregular, continuous network of tissue. The tissue is cellular or microreticulate.

So many species of this genus have now been described (Flügel and Flügel-Kahler, 1968, list 199 of them) that practically every major variation of the relatively simple structure has been described. Under these circumstances it seems best to describe no more species of the genus until a complete revision of the group is possible and adequate samples of the populations from the Yukon are available. The specimens here are, therefore, compared to species already described.

STROMATOPORA cf. S. ADLERI Yavorsky

Pl. V Figs. 7, 8

Stromatopora adleri Yavorsky, 1955, p. 92, Pl. 49, Fig. 104.

This species is represented by a single, large, domed coenosteum about 11 cm across and 5.5 cm high. The surface of the laminae is rough where the vertical elements of the structure emerge. On the weathered surface the vertical structural fibers can be distinguished easily.

Vertical sections show an amalgamated structure dominated by vertical elements. At intervals these elements are fused with broad horizontal structures or areas of denser tissue which vaguely define a latilamina, but otherwise no distinct laminae are present. The vertical elements branch and join neighbouring elements to form a network. The vertical elements are spaced from 4 to 5 in 2 mm, and are about 200 microns thick. The micro structure is not well preserved and the tissue appears to be compact. Astrorhizae and dissepiments appear to be absent.

Tangential sections show a completely amalgamated network with a few patches of isolated tissue. Astrorhizal canals rarely pass through the structure but no well-developed centers are present. The tissue is recrystallized.

Discussion: In gross structure this specimen is like S. adleri Yavorsky from the Givetian of the Kuznetsk Basin. However, it is too poorly preserved to allow positive identification.

Occurrence: Section 24, GSC locality 54949, loose, unit 166, 620 m (2,132 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 182).

STROMATOPORA cf. S. BUCHELIENSIS (Bargatzky)

Pl. VI Figs. 1, 2

Caunopora bucheliensis Bargatzky, 1881, p. 290.

Stromatopora bucheliensis (Bargatzky), Nicholson, 1886, Pl. 10, Figs. 5-7.

Paralellopora bucheliensis (Bargatzky) Lecompte, 1952, p. 290, Pl. 50, Figs. 3-4.

See Flugel and Flugel-Kahler (1968) for a complete synonymy.

The one specimen in the collection is a hemispherical coenosteum about 6 cm across and 2 1/2 cm high. The surface is not exposed.

Vertical sections show an amalgamated structure in which vertical elements are more prominent than horizontal elements. The structural elements, which make up about 50 per cent of sections, are about 150 microns thick and are spaced from 5 to 6 in 2 mm. The prominent vertical elements are crooked, long, and scattered throughout an irregular network of amalgamated tissue to which they are connected by horizontal processes. Strongly curved dissepiments are common and cross the pseudozooidal tubes (vertically elongated galleries). Astrorhizal canals are obscure but "caunopore" tubes run through the coenosteum. The microstructure is melanospheric to flocculent.

Tangential sections show traces of concentric laminae and an amalgamated network of flocculent to melanospheric tissue. Round and irregular masses of tissue are common. Galleries are narrow and sinuous. Astrorhizal canals apparently are absent.

Discussion: The vertical elements in the coenosteum are not as regular nor as closely spaced as those of typical S. bucheliensis although the general appearance of vertical sections is similar. Additional collecting may bring to light specimens which will justify the description of a new species, but until that time this specimen is best recorded as comparable to S. bucheliensis.

Occurrence: Section 18, GSC locality 50163, unit 34, 103 m (228.6 ft.) above the base of the Michelle Formation (Norris, 1968b, p. 172).

STROMATOPORA sp. A

Pl. VI Figs. 3, 4

This species is represented by a single coenosteum of low-domed form about 8 cm across and 2 cm high. The surface is smooth.

Vertical sections show zones of distinct laminae separated by other zones of amalgamated tissue where vertical elements predominate. Laminae rarely are inflected into shallow mamelons composed of tissue that is recrystallized, apparently compact, spaced from 6 to 7 in 2 mm, and about 140 microns thick. In laminar zones the pillars may be short and spool-shaped or irregular. In the zones of amalgamated tissue the laminae are missing and vertical elements, which form a loose network, are the main structures. The vertical elements also appear to be compact in this specimen. They are spaced from 5 to 7 in 2 mm and are about 100 microns thick. Galleries form poorly defined pseudozooidal tubes in the amalgamated zones but dissepiments appear to be absent. Astrorhizal canals are rare. Mamelon columns are formed by the spreading upward of the vertical elements and are separated distinctly from the rest of the structure.

Tangential sections show many pillars emerging as dots and others as part of an amalgamated network. Laminae, marked by concentric zones of darker-coloured tissue are perforated by large pores. Mamelons are prominent. Non-tabulate astrorhizal canals are very well developed and have fine branching tubes radiating from their centers. The microstructure is recrystallized.

Discussion: In this species zones with persistent laminae like those of Ferestromatopora are combined with zones of typical Stromatopora-like structures although there is no doubt that the two phases were secreted by the same organism. In its laminar nature the species resembles such forms as Ferestromatopora divergens (Galloway and St. Jean) or F. obscura (Galloway and St. Jean).

Occurrence: Section 32, GSC locality 54392, unit 9, 46 m (152.9 ft.) above the base of the Gossage Formation (Norris, 1967, p. 265).

The holotype is GSC No. 54392.

Genus TALEASTROMA Galloway

Coenosteum of amalgamated structure similar to that of Stromatopora with vertical elements, pseudozooidal tubes and dissepiments dominant. Coenosteum is traversed by short, slender, rod-like pillars that are circular in cross-section. Microstructure of the pillars is compact axially and melanospheric peripherally.

TALEASTROMA VITREUM Galloway

Pl. VI Figs. 5, 6, 7

Taleastroma vitreum Galloway, 1960, p. 631, Pl. 75, Fig. 4, Pl. 76, Fig. 1.

The species is represented in the collection by a single domed coenosteum about 8 cm across and 3 cm high. The surface is not exposed.

Vertical sections show thick discontinuous laminae and pillars forming an extremely irregular network which, in places, grades into amalgamated structure. The laminae are 160 microns thick and are spaced irregularly from 5 to 7 in 2 mm. They appear to be melanospheric and, locally, are composed of one or two microlaminae. Most pillars extend through several laminae, and some are confined to an interlaminar space. They are generally 90 microns in thickness and are spaced from 4 to 6 in 2 mm. The axial regions of the pillars are occupied by light yellow-coloured, dusty, compact tissue and the margins are dark-coloured, granular, and melanospheric. Astrorhizal canals are not conspicuous. Mamelons are not apparent. Galleries are round to irregular, superposed locally, joined by foramina between the laminae, and appear locally as pseudozooidal tubes. Dissepiments are rare.

Tangential sections show the laminae as broad bands of tissue perforated by foramina. The cross-sections of pillars appear as round, clear dots with dark-coloured borders. The pillars are joined to each other between laminae by dark-coloured material. Within the laminae the pillars appear as circular light-coloured areas surrounded by coarse melanospheres. Concentric mamelons are absent but fine-tubed complexly branched astrorhizal systems are well developed.

Discussion: The genus Taleastroma is a controversial one and Stearn (1966a) has suggested that the diagnostic microstructure of its pillars represents a state of preservation. The specimen here described is similar to that described by Galloway except that the low mamelons of his specimen do not show in our thin sections. Galloway's specimen was described as overgrown by a specimen of Paralellopora pellucida (Yavorsky), but examination of the specimen at the University of North Carolina (UNC 307-87) has convinced the senior author that only a single stromatoporoid is present and that it is preserved differently in the upper and lower parts of the coenosteum. On the vertical section of the holotype, laminae can be traced continuously from one "genus" to the other. The Yukon specimen locally shows features that Galloway ascribed to Paralellopora pellucida but, in most respects, its preservation is like that of T. vitreum.

Occurrence: Section 31, GSC locality 54384, unit 13, 69-70 m (225.5-228.5 ft.) above the base of the Ogilvie Formation (Norris, 1967, p. 244). Galloway's specimen was from the "Rensellandia beds" 120 ft. from the base (lower Ramparts Formation) near Fort Good Hope.

SYRINGOSTROMA ? cf. S. CONFERTUM (Stearn)

Pl. VI Fig. 8

Taleastroma ? confertum Stearn, 1962, p. 10, Pl. 5, Figs. 1-3; 1963, p. 667, Pl. 88, Figs. 7, 8.

Syringostroma ? confertum (Stearn), 1966b, p. 62, Pl. 25, Figs. 1, 2; 1967, p. 800, Pl. 4b.

Syringostroma ? sp. Klovan 1966, p. 28, Pl. 9, Figs. 1, 2, 3.

The collection contains three large, dome-shaped specimens of this species, the largest of which is 7 cm across. The specimens throw little light on the nature of this form which is discussed fully by the writers listed in the synonymy. The pillars are closely set, practically excluding galleries, and tend to fan outward and upward in clusters. Preservation is generally poor. Tangential sections are commonly dense but one shows a poorly preserved amalgamated network like that of Stromatopora or Syringostroma. There is no evidence to suggest that these specimens are poorly preserved algae.

Occurrence: Section 24, GSC locality 54903, loose, unit 75, 208-217 m (788.3-811.8 ft.) above the base of the Ogilvie Formation (Norris, 1968b, p. 195).

Section 14, GSC locality 54254, from part of the section above a presumed fault and omitted from the description of the Ogilvie Formation (Norris, 1968b, p. 142).

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APPENDIX

LOCATION OF SECTIONS

The following are the sections examined by Norris (1967, 1968b) from which were obtained the stromatoporoids in the collections we examined:

2 - Immediately west of Arctic Red River - 65°45'N., 131°21.5'W.

3 - Flyaway Creek - 65°27'N., 132°01'W.

4 - Near headwaters of Cranswick River - 65°07.8'N., 132°16'-18'W.

6 - Immediately west of Snake River - 65°26'-29'N., 133°35'-42'W.

7 - Knorr Range - 65°23'N., 134°15'W.

14 - Northern Ogilvie Mountains - 65°38'-38.5'N., 136°45.6'-45.2'W.

16 - Northern Ogilvie Mountains - 65°2.5'N., 137°01'W.

17 - Northern Ogilvie Mountains - 65°25.2'N., 137°06'W.

18 - Northern edge of Ogilvie Mountains - 65°41'-42'N., 137°10.2'-11'W.

19 - Northern edge of Ogilvie Mountains - 65°42'-42.5'N., 137°26.5'-26'W.

21 - Southeast flank of Nahoni Range, 65°33'N., 138°46'-42.5'W.

24 - Mount Burgess - 66°03'N., 139°35.2'-37'W.

26 - Ogilvie Mountains - 66°12.7'-12.5'N., 139°18'-17'W.

27 - Ogilvie Mountains - 66°36.5'-37'N., 139°25.1'-24'W.

31 - East side, south end Campbell Lake - 68°10'N., 133°28'W.

32 - North side, south end Campbell Lake - 68°15.2'-17.1'N., 133°26.4'-21'W.

PLATES I - VI

PLATE I

All figures x 10

Anostylostroma ponderosum (Nicholson)

Figures 1, 2. Vertical and tangential sections of the hypotype No. 26133 (a, b) from GSC locality 50228.

Anostylostroma intermedium Klovan

Figures 3, 4. Vertical and tangential sections of hypotype 26134 (a, b) from GSC locality 54255.

Figures 5, 6. Vertical and tangential sections of another hypotype 26135 (a, b) from GSC locality 54931.

Anostylostroma laxum (Nicholson)

Figures 7, 8. Vertical and tangential sections of hypotype 26136 (a, b) from GSC locality 50237.

PLATE I

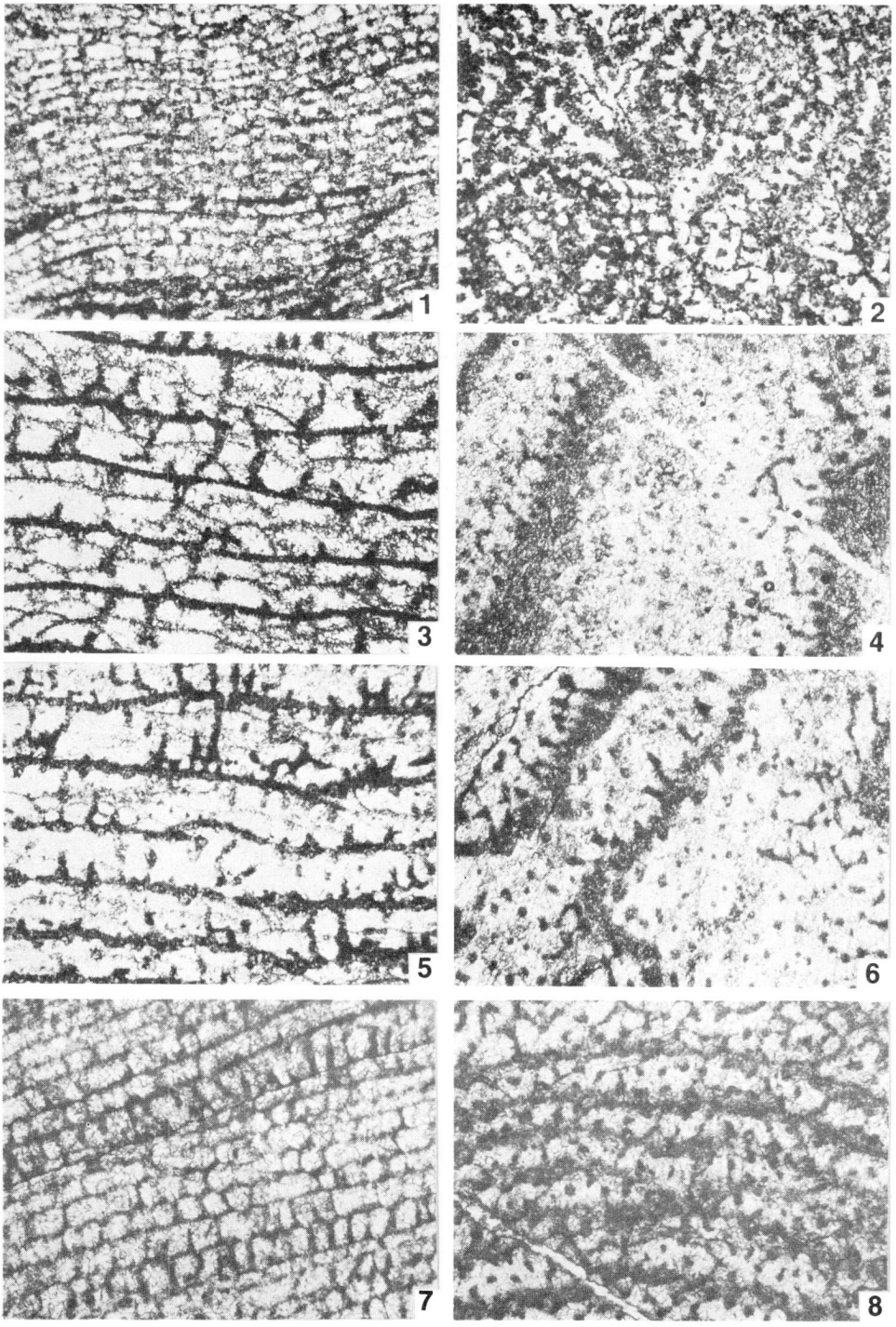


PLATE II

All figures x 10

Anostylostroma cf. A. humile Galloway and St. Jean

Figures 1, 2. Vertical and tangential sections of hypotype 26137 (a, b) from GSC locality 54922.

Stictostroma cavosite n. sp.

Figures 3, 4. Vertical and tangential sections of holotype 26138 (a, b) from GSC locality 50558.

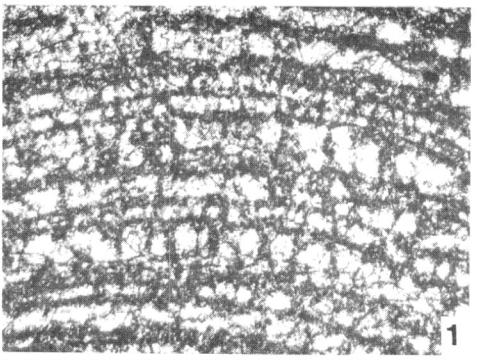
Stictostroma sp. A.

Figures 5, 6. Vertical and tangential sections of holotype 26139 (a, b) from GSC locality 54566.

Clathrocoilona cf. C. subclathrata Galloway and St. Jean

Figures 7, 8. Vertical and tangential sections of hypotype 26140 from GSC locality 50599.

PLATE II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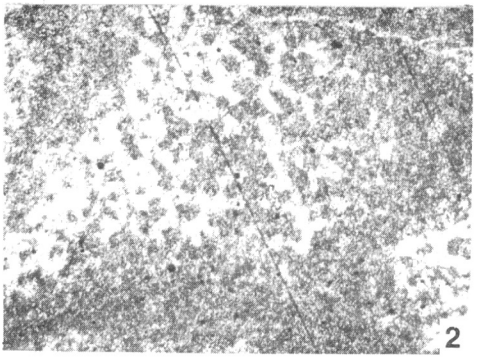
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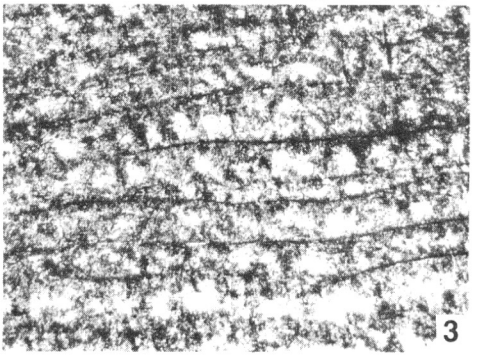
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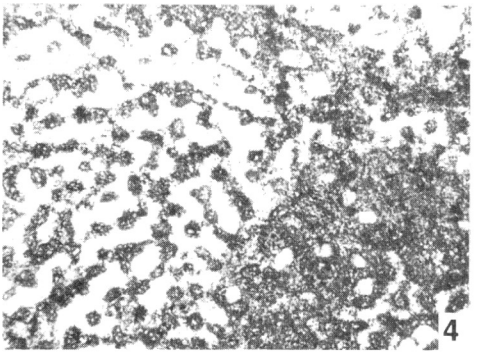
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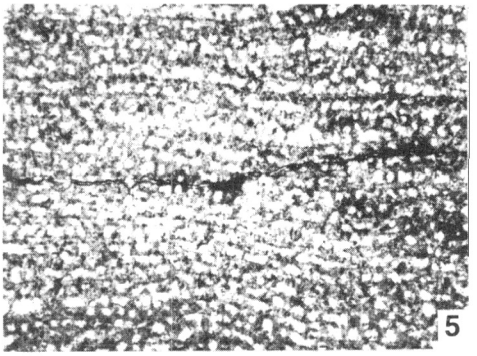
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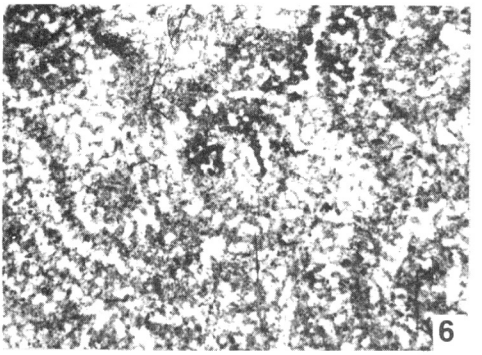
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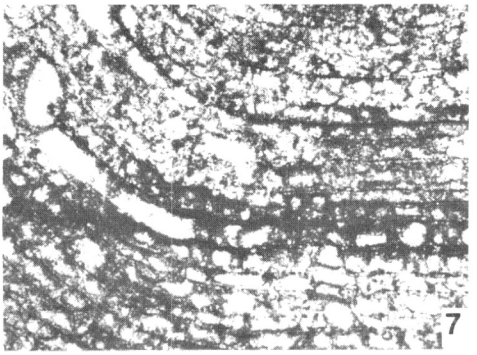
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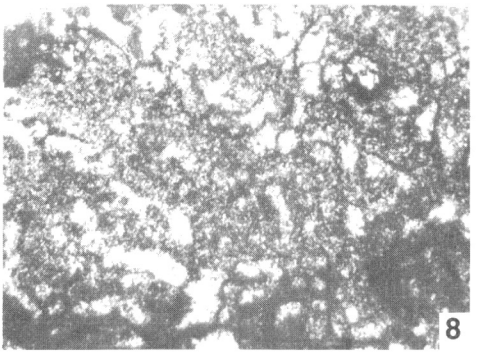
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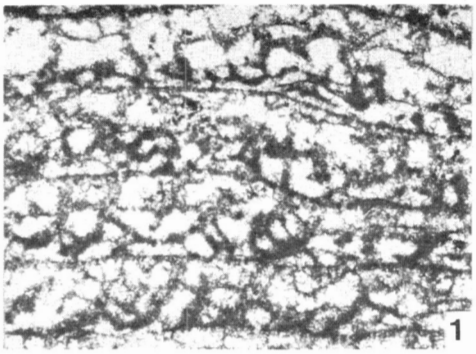
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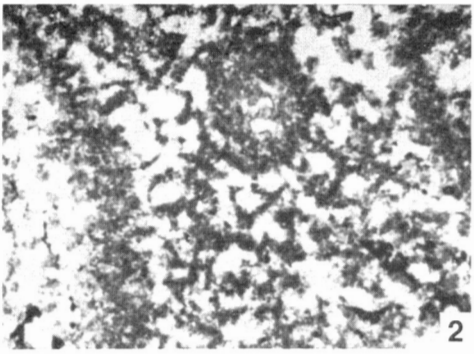
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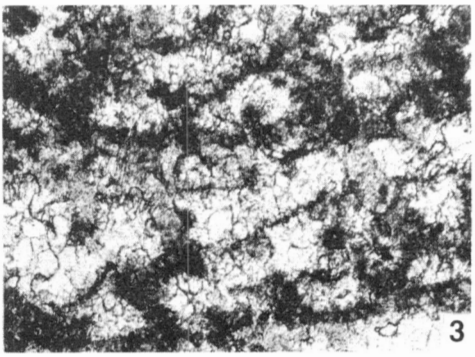
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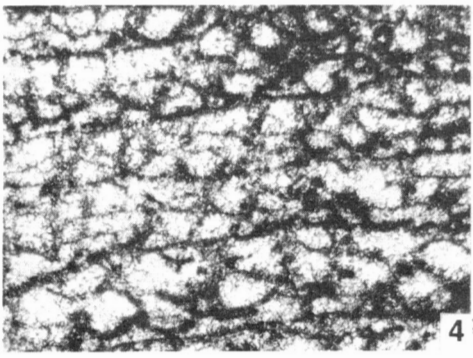
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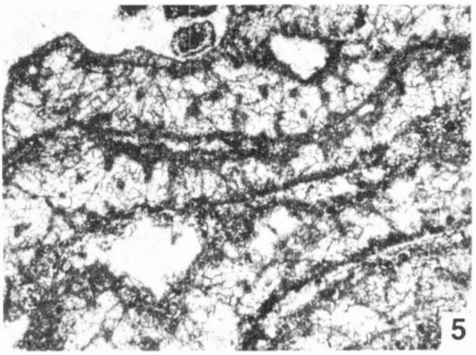
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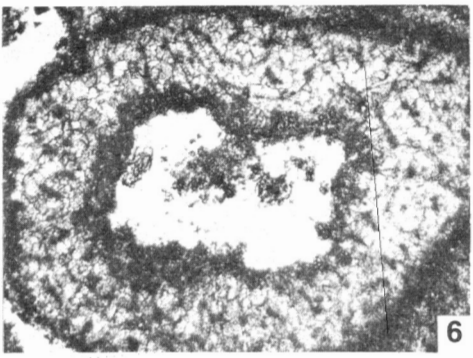
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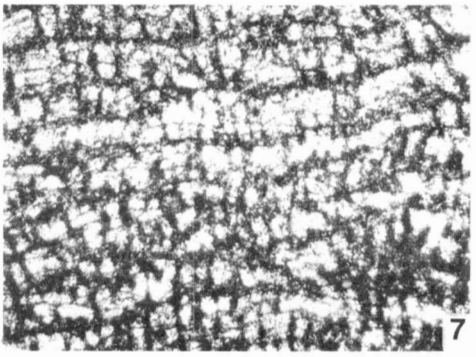
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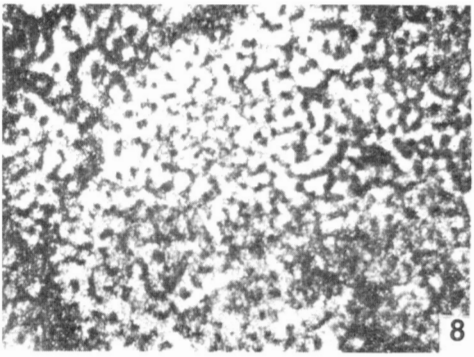
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PLATE IV

All figures x 10

Amphipora ramosa (Phillips)

Figure 1. Cross-section of hypotype 26144 from GSC locality 54924.

Stachyodes thomasclarki Stearn

Figure 2. Cross-section of a coenosteum just below a branching, hypotype 26145 (a) from GSC locality 54945.

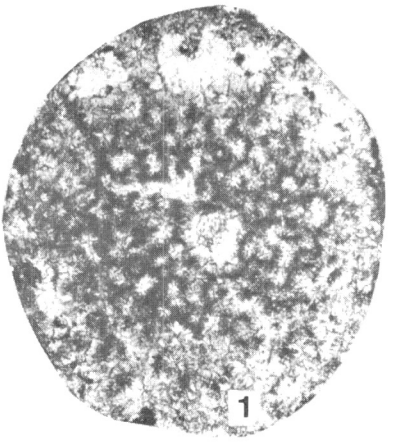
Stachyodes costulata Lecompte

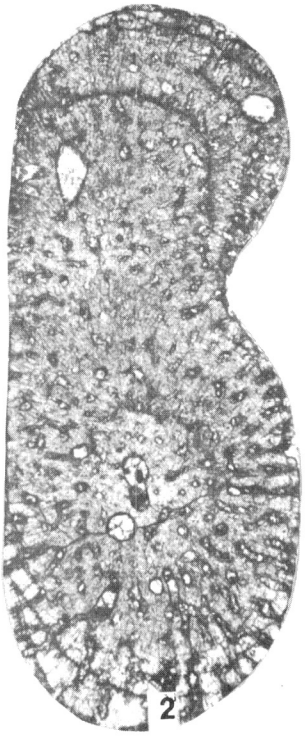
Figures 3, 4. Cross-section associated with S. thomasclarki and oblique section close to axial, hypotype 26145 (b) from GSC locality 54945.

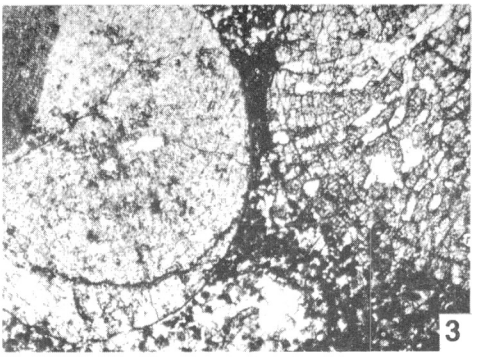
Actinostroma cf. A. clathratum Nicholson

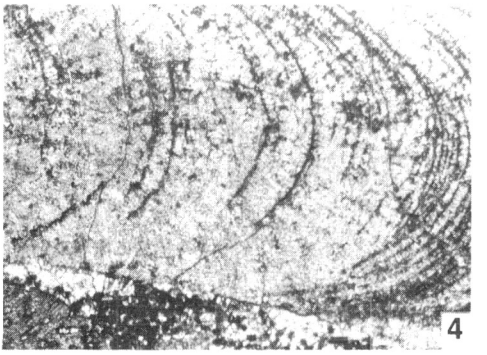
Figures 5, 6. Vertical and tangential sections of hypotype 26146 (a, b) from GSC locality 54857.

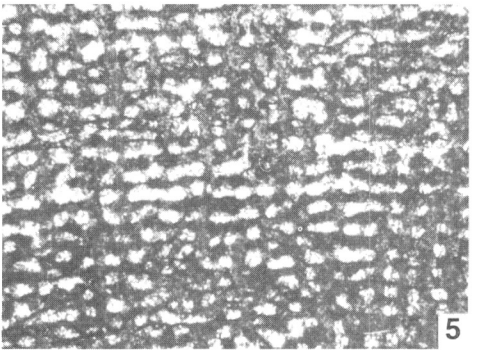
PLATE IV











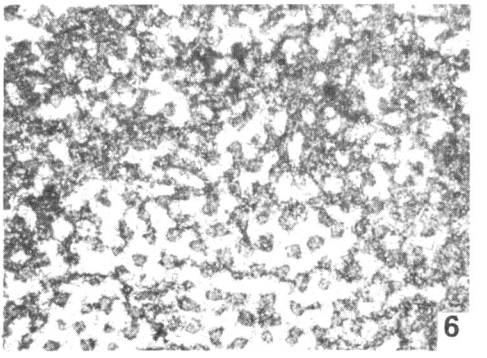


PLATE V

All figures x 10

Trupetostroma cf. T. ideale Birkhead

Figures 1, 2. Vertical and tangential sections of hypotype 26147 (a, b) from GSC locality 50296.

Ferestromatopora laminosa (Lecompte)

Figures 3, 4. Vertical and tangential sections of hypotype 26148 (a, b) from GSC locality 50461.

Ferestromatopora jacquesensis Galloway

Figures 5, 6. Vertical and tangential sections of hypotype 26149 (a, b) from GSC locality 54852.

Stromatopora cf. S. adleri Yavorsky

Figures 7, 8. Vertical and tangential sections of hypotype 26150 (a, b) from GSC locality 54949.

PLATE V

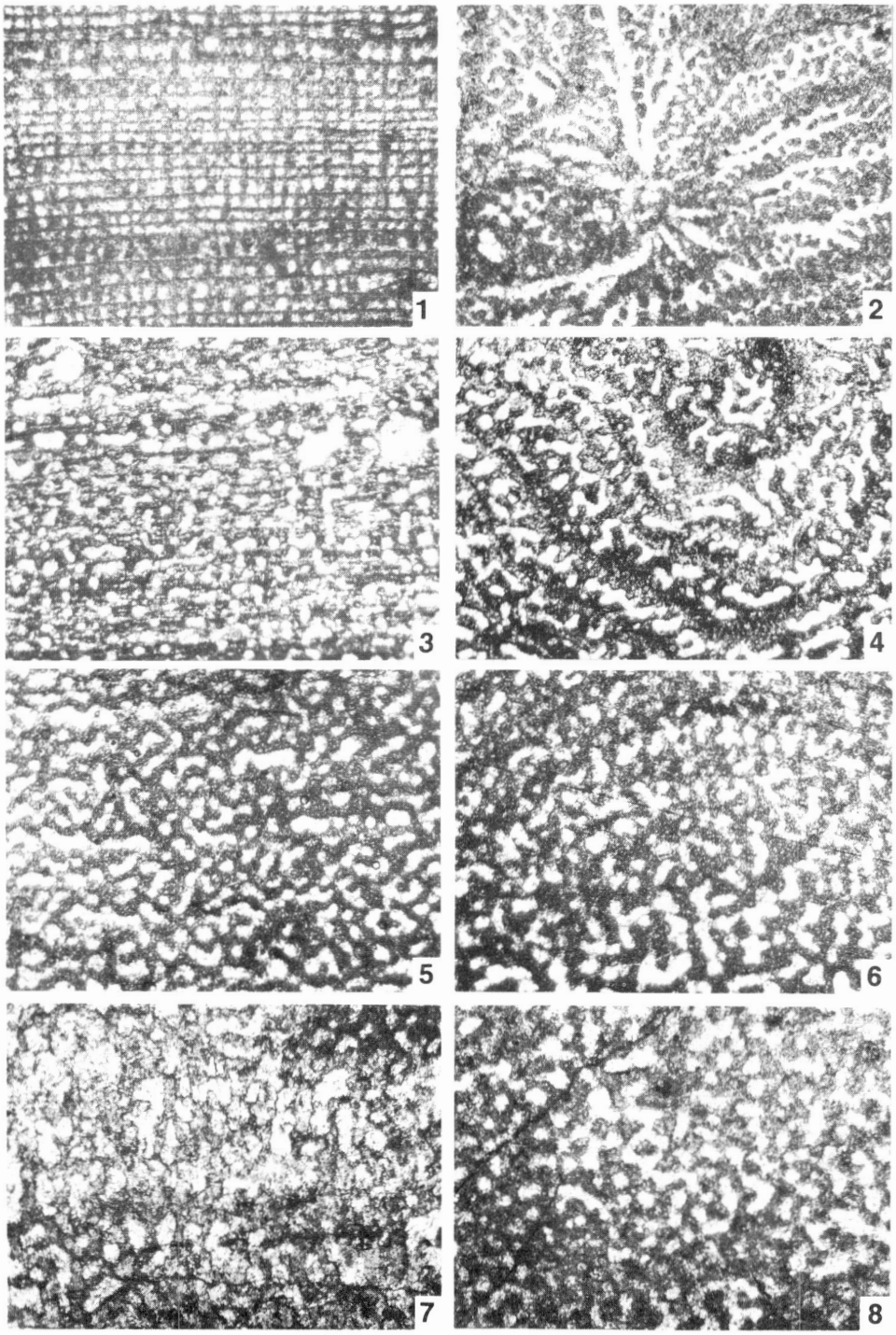


PLATE VI

All figures x 10

Stromatopora cf S. bucheliensis Bargatzky

Figures 1, 2. Vertical and tangential sections of hypotype 26151 (a, b) from GSC locality 50163.

Stromatopora sp. A.

Figures 3, 4. Vertical and tangential sections of holotype 26152 (a, b) from GSC locality 54392.

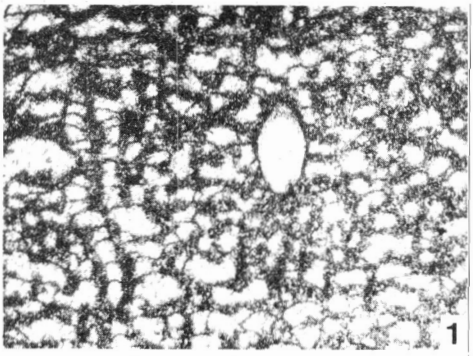
Taleastroma vitreum Galloway

Figures 5, 6, 7. Two vertical (5, 7) and a tangential section of holotype 26153 (a, b) from GSC locality 54384.

Syringostroma? cf. S. confertum Stearn

Figure 8. Vertical section of hypotype 26154 (a) from GSC locality 50322.

PLATE VI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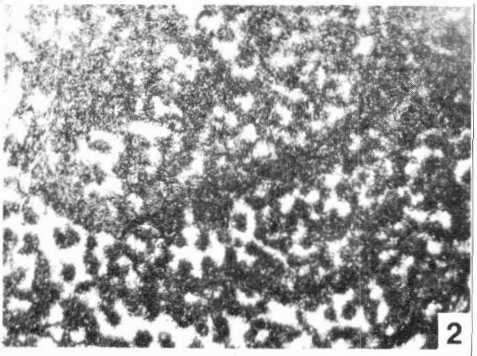
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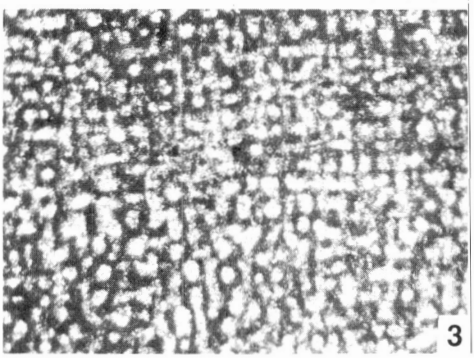
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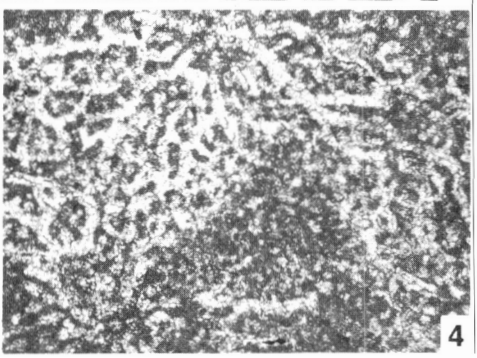
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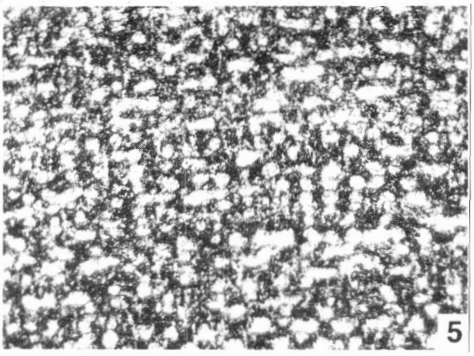
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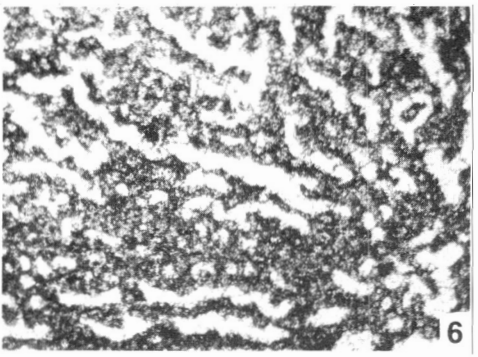
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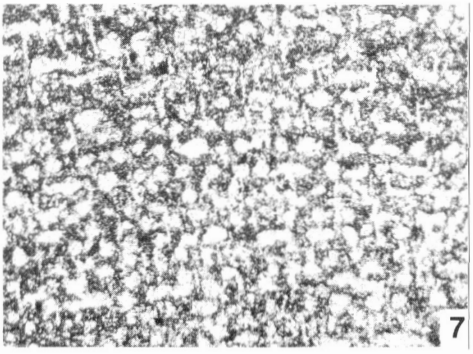
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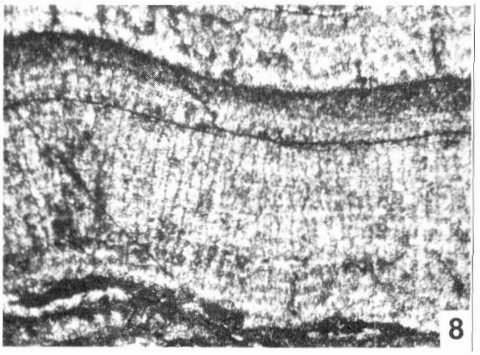
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