

**NEW DEVONIAN RUGOSE CORALS OF PROBABLE LATE
DALEJAN AGE FROM THE BIRD FIORD FORMATION
OF SOUTHWESTERN ELLESMERE ISLAND, NORTHWEST TERRITORIES**

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Abstract

The Bird Fiord Formation, between Blubber Point and the area north of Muscox Fiord, is divided into four lithological units, informally designated Units 1 to 4. Unit 3 contains a rich benthic, marine fauna, including the corals described in this paper. Its age is deduced to be probably late Dalejan (late Early Devonian), on the basis of conodonts, brachiopods and corals.

The genera *Spongophylloides*, *Actinocystis*, *Grypophyllum*, *Dubrovia*, *Salairophyllum*, *Tonkinaria* and *Neogrypophyllum* are discussed in preparation for the proposal of a new ptenophyllid genus, named *Ellesmerelasma*. Four new species and a new subspecies are introduced. They are *Lekanophyllum foliatum*, *Ellesmerelasma pumile*, *Mansuiphyllum uyenoï avernale*, *M. versicularium* and *M. comsolum*.

Résumé

La formation de Bird Fiord, située entre la pointe Blubber et la région au nord du fjord Muscox, est divisée en quatre unités lithologiques, appelées officieusement unités 1 à 4. L'unité 3 contient une riche faune marine de nature benthique qui comprend les coraux décrits dans le présent rapport. Les conodontes, les brachiopodes et les coraux qu'elle contient permettent d'établir qu'elle date probablement du Dalejan récent (fin du Dévonien ancien).

Les auteurs décrivent les genres *Spongophylloides*, *Actinocystis*, *Grypophyllum*, *Dubrovia*, *Salairophyllum*, *Tonkinaria* et *Neogrypophyllum* avant de présenter le nouveau genre proposé de ptenophyllidés, *Ellesmerelasma*. Ils présentent quatre nouvelles espèces et une nouvelle sous-espèce, soit *Lekanophyllum foliatum*, *Ellesmerelasma pumile*, *Mansuiphyllum uyenoï avernale*, *M. versicularium* et *M. comsolum*.

Introduction

Devonian corals that were collected by Per Schei, while he was on the Second Norwegian Arctic Expedition in the "Fram" (1898-1902), were described originally by Loewe (1913). Many of them came from beds that are now referred to the Bird Fiord Formation. Pedder is revising Loewe's work, and Goodbody is studying the Bird Fiord Formation. The corals described in this work are specimens, collected by Goodbody, of species that are not represented in the Per Schei Collection (Fig. 42.1).

Previous work

Exposures of the Bird Fiord Formation were examined by Schei, at Blubber Point (known to members of the second "Fram" expedition as Spaekkassen or Spaekodden) and around Goose Fiord (Gasse Fjorden). Schei (1903a, b; 1904) divided the Devonian of this part of Ellesmere Island into three series, designated C, D and E. Of these, C was considered to be partly Silurian. Series D was further divided into nine divisions, designated D(a) to D(i). Because of his death, soon after the return of the "Fram", Schei was unable to elaborate his sketchy preliminary account of the stratigraphy of the area. Descriptions of his fossils by other workers, and recent field work, suggest that the Bird Fiord Formation, as it is currently recognized in the Blubber Point and Goose Fiord region, closely approximates to Schei's divisions D(d) to D(i) combined.

Tolmachoff (1926, p. 10-20) collated the early paleontological works on Schei's Devonian units, and reiterated Høltedahl's (1917, p. 12-13) summary of the

opinions of the ages of these units. In this summary, the poorly fossiliferous units D(d), D(e) and D(f) were said to point towards uppermost Lower Devonian and lower Middle Devonian; D(g) was assigned to the Middle Devonian; D(h), the most fossiliferous division, was said to be transitional between Middle and Upper Devonian; and D(i) was considered to be Upper Devonian.

The next publication to appear, concerning the Bird Fiord Formation of southwestern Ellesmere Island, was authored by McLaren (1963, p. 324-328). The formation was named and first described in this work. Faunas listed by McLaren came mostly from that part of the formation that corresponds to Schei's division D(h) and to our Unit 3. McLaren considered that the faunas indicate a Givetian (late Middle Devonian) age.

The current phase of paleontological work on faunas from the Bird Fiord Formation, south of Schei Syncline, began with Ormiston's (1967, p. 94-96, Pl. 12, figs. 9, 10) revision of the holotype of *Dechenella (D.) spaekkassensis* (Tolmachoff), from Schei's D(h) division at Blubber Point, and continued with Brice's (1982) and Jones' (1982) works on brachiopods from Goose Fiord, and Pedder's (1982b) description of corals from Blubber Point.

Stratigraphy

Along the southern limb of Schei Syncline, the Bird Fiord Formation is divisible into four units. The basal unfossiliferous unit of dolostones and interbedded gypsum, varies in thickness from about 150 to 295 m. It is succeeded by a resistant, bluff-forming unit of very bioturbated,

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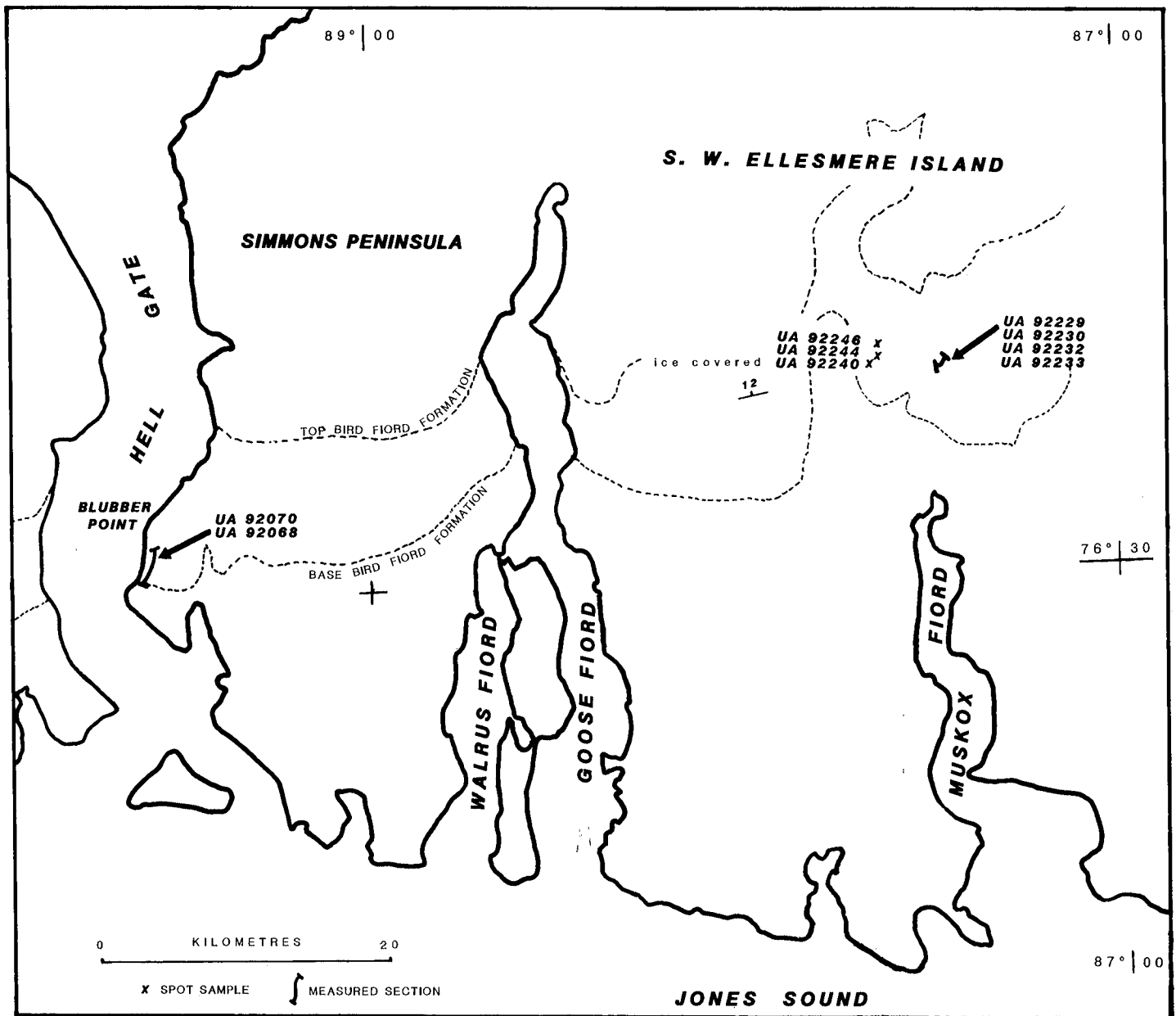


Figure 42.1. Sketch map of southwestern Ellesmere Island showing localities that have provided fossil material used in this paper. Stratigraphic details and faunal lists are given in the Locality Register.

calcareous sandstones and sandy limestones, varying in thickness from about 55 to 113 m. The third unit consists of repetitive shale-calcareous sandstone couplets, and includes biostromal beds at Goose Fiord and north of Muskox Fiord. It varies from about 60 to 100 m in thickness, and is easily identified in outcrop and on air photographs by its striped weathering pattern and recessive profile above the bluffs of Unit 2. The highest division, Unit 4, comprises crossbedded micaceous sandstones, estimated to be in the order of 150 m thick.

The corals described in this paper were collected from calcareous sandstones and biostromes in Unit 3. The accompanying fauna includes heteractinid sponges, stromatoporoids, tabulate corals, brachiopods, bryozoa, trilobites and crinoidal debris, all in variable abundance. It is evidently a shallow marine benthic assemblage that was able to tolerate a substantial influx of clastic material.

The change from the high, intertidal/supratidal environment, in which Unit 1 was deposited (Jones, 1982, p. 1397), to the deeper, open marine environment represented in Unit 3, holds high promise for future event correlations on Ellesmere and nearby islands.

Age of the Unit 3 Coral Fauna

Conodont studies (Uyeno and Klapper, 1980; Uyeno, 1981) have demonstrated that the Blue Fiord and overlying Bird Fiord formations of the Arctic Islands are diachronous, so that any discussion of the ages of these formations must be specific in both geographic and stratigraphic detail. Here, we are discussing the age of Unit 3 of the Bird Fiord Formation, on the southern limb of Schei Syncline. Sections and spot locations, from which the corals of this work were collected, lie along present

structural strike (believed to be close to Devonian sedimentological strike), within 25 km in both directions from Goose Fiord.

Chatterton is quoted by Smith and Stearn (1982, p. 153) as having identified *inversus* Zone (Zlichovian) conodonts 200 m above the base of the Blue Fiord Formation at Goose Fiord. Figures 4 and 5 of these authors show the Blue Fiord Formation to be about 450 m thick at this locality. Chatterton has also identified *Steptotaxis glenisteri* (Klapper), *Pelekysgnathus* sp. n. of Uyeno and Klapper (1980) and *Panderodus* spp. from a sample taken by Jones from near the base of Unit 2 of the Bird Fiord Formation in Jones' (1982) section J at Goose Fiord. The age indicated by this assemblage is early Dalejan, equivalent to the age of either the upper *inversus* Zone or lower *serotinus* Zone. Efforts to obtain conodonts from Unit 3 have been unsuccessful, however, the coral-bearing horizons of Unit 3 are only about 100 m above the upper *inversus* Zone or lower *serotinus* Zone assemblage in Unit 2.

Brachiopods described by Jones (1982) from Goose Fiord are from Units 2 and 3 of the Bird Fiord Formation. "*Elythina*" *sverdrupi* Brice is known to occur with Dalejan *serotinus* Zone conodonts in other places on southwestern Ellesmere Island, but the remaining forms studied by Jones are not known from other datable occurrences.

Brice (1982) described three species of brachiopods from beds at Goose Fiord that pertain to Unit 3 of our divisions of the Bird Fiord Formation. Eleven brachiopod taxa have been identified by Jones from Unit 3 collections made by Goodbody, and in all, there are seven recognizable species in the unit. On the basis of ages established by conodonts at other arctic island localities, four species, *Cupularostrum* (?) *ellesmerense* Brice, *Atrypa* sp. B of Jones (1982), *Perryspirifer scheii* (Meyer) and "*Elythina*" *sverdrupi* Brice, are not known to range higher than the Dalejan *serotinus* Zone. The other three species, *Schizophoria sulcata* Johnson and Perry, *Spinatrypa borealis* (Warren) and *Costacranaena marlenae* Johnson and Perry, are known from an assemblage that occurs repetitively from 355 to 579 m below the top of a 765 m section, just south of South Dundee Bight, Bathurst Island (Johnson and Perry, 1976). The section was assigned to the Bird Fiord Formation in Johnson and Perry's paper, but it lies directly on the Eids Formation, and is evidently partly equivalent to the Blue Fiord Formation of Uyeno (1981). Raasch (1982, p. 165) has since identified *Dechenella* (D.) *neotesca* Ormiston and, 72 m higher, *D. (D.) bathurstensis* Ormiston from the same section. Johnson and Perry (1976, p. 618) reported that Klapper had identified a specimen of *Polygnathus parawebbi* Chatterton from the 579 m level in the South Dundee Bight section. The earliest recorded occurrence of this Eifelian and Givetian conodont in western Canada is in the Funeral Formation, near Mount Dahadinni, in the front range of the Mackenzie Mountains (Chatterton, 1979, Fig. 6, section 12). This occurrence is presumably below the *pedderi* conodont faunal unit, and possibly correlates with part of the *costatus* Zone of other regions. If the *Polygnathus parawebbi* occurrence in the South Dundee Bight section were as old as the *costatus costatus* Zone, it would be consistent with Uyeno's (1981) claim that the highest Devonian carbonate unit on central Bathurst Island ranges from the *patulus* to *costatus costatus* Zones. In summary, it is suggested, by four of the seven brachiopod species, that Unit 3 is no younger than middle Dalejan (*serotinus* Zone), and by the three remaining species, that it is no older than early Eifelian (*costatus costatus* or *partitus* Zone).

As it is presently known, the rugose coral fauna of Unit 3 comprises twelve species. One of these belongs to the genus *Taimyrophyllum*, and may be a subspecies of *T. nolani* Merriam, which was first described from possible Dalejan age

(Pedder, 1982a, p. 73) rocks in Nevada. Another is a subspecies of *Mansuyphyllum uyenoii* (Pedder), which occurs in Zlichovian beds on the northern flank of Schei Syncline. The remaining corals in Unit 3 are known only from their type localities. There is no species of either *Spongonaria* or *Digonophyllum* in the Unit 3 fauna. The significance of this is possibly that *Spongonaria* (a genus known to include species that were tolerant of clastic-rich environments) became extinct near the top of the *serotinus* Zone, and *Digonophyllum*, which is the most abundant rugose coral genus in many early and later Eifelian faunas of western and arctic Canada, is extremely rare below the *partitus* Zone.

Although none of the foregoing arguments is unassailable, independent lines of evidence from conodonts, brachiopods and corals consistently point to a late or post-*serotinus* Zone, and a pre-*partitus* Zone age for the corals of Unit 3. That is, they point to a late *serotinus* Zone or *patulus* Zone age, which is the age of the upper part of the Dalejan stratotype in Czechoslovakia (Chlupáč, 1982, Table 1).

Systematic Paleontology

Type specimens and locality numbers referred to in this paper are registered in the Paleontological Collections, Department of Geology, The University of Alberta, Edmonton, Alberta, Canada, T6G 2E3. UA and PCC are abbreviations for the University of Alberta and Paleontological Collections Catalogue.

Family CYSTIPHYLLIDAE Milne Edwards and Haime, 1850

Subfamily DIGONOPHYLLINAE Wedekind, 1923

Genus *Lekanophyllum* Wedekind, 1924

Lekanophyllum Wedekind, 1924, p. 29-34 [in part, includes a species of *Mesophyllum*].

Type species. *Lekanophyllum punctatum* Wedekind, 1924, p. 30, 34, figs. 36-38. Junkerberg Formation, Eifelian; Auberg, Gerolsteiner Mulde, Germany (Birenheide, 1968, p. 23).

Remarks. A synonymy and diagnosis of the genus *Lekanophyllum* was given by Pedder and McLean (1982, p. 75). The sixty-four species currently assigned to the genus are listed in McLean (1976, p. 19) and Pedder (1982b, p. 84).

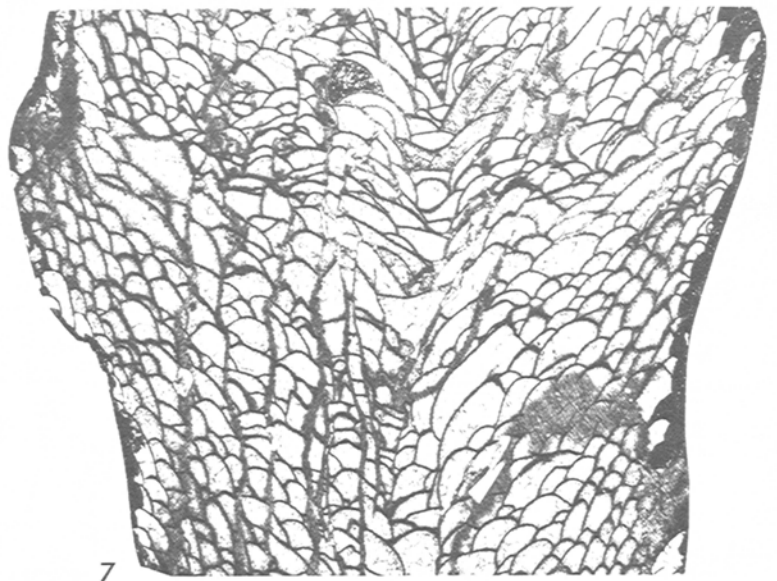
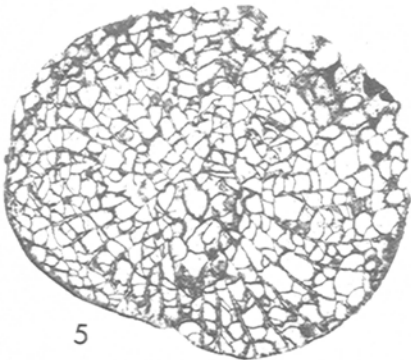
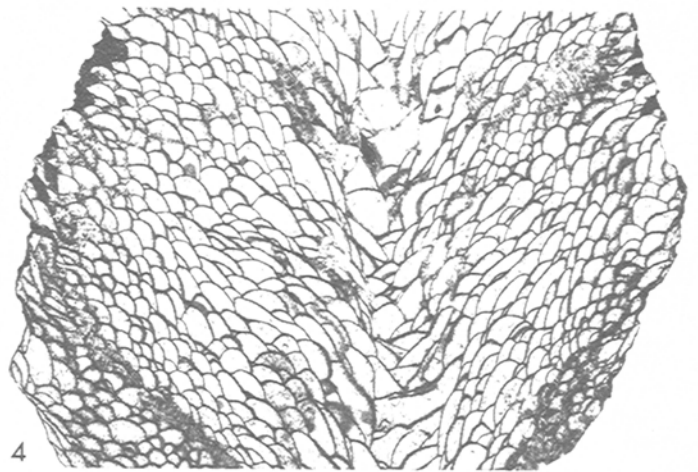
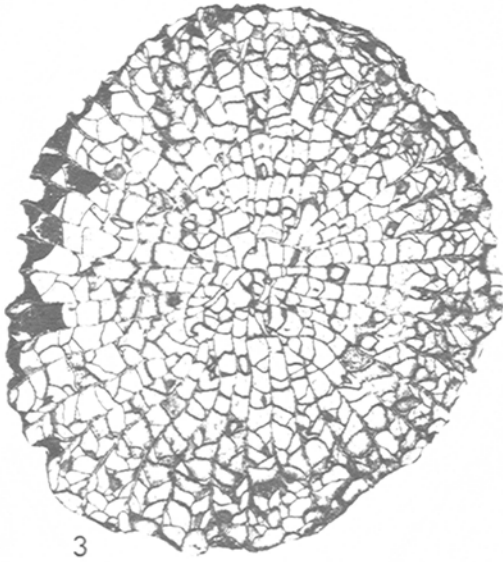
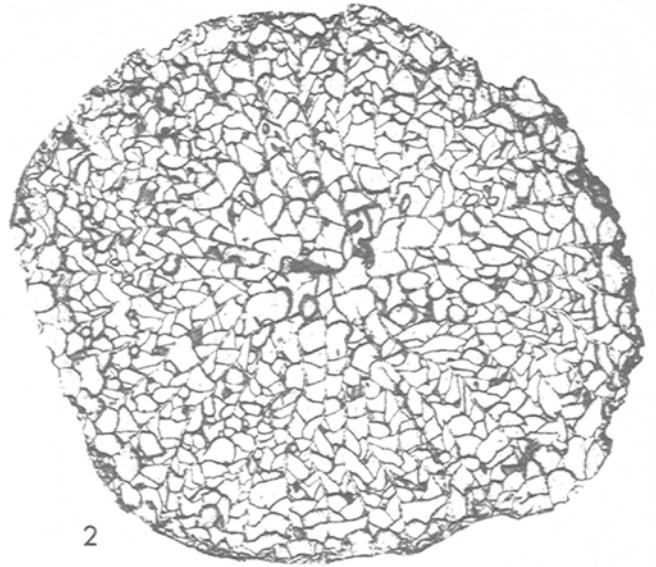
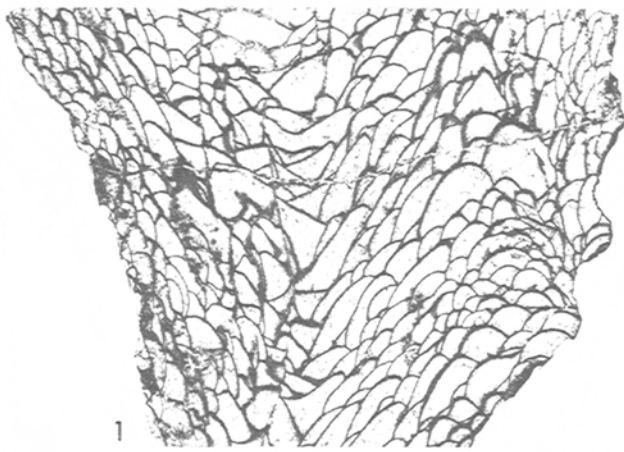
Lekanophyllum foliatum sp. n.

Plate 42.1, figures 1-7; Plate 42.1, figures 8-15

Type series. Holotype, UA 7029, UA locality PCC 92246. Paratypes, UA 7030-7034, UA locality PCC 92246; UA 7035, 7036, UA locality PCC 92229; UA 7037, 7038, UA locality PCC 92233; UA 7039, UA locality PCC 92240; UA 7040, UA locality PCC 92244.

Diagnosis. Solitary species of *Lekanophyllum* with known maximum mean diameter of 40 mm. Major septal crests unequally long, some entirely lamellar from outer wall to axial region, and only slightly fusiform. Typically, at maturity, they number 35 to 52 and are arranged in a crudely bilateral fashion. Minor septal crests suppressed. Dissepiments and less numerous presepiments form inwardly inclined dissepimental surfaces. Lateral dissepiments absent.

Description. Corallum solitary, trochoid or less commonly ceratoid in early stages, subsequently becoming erect and subcylindrical. Rejuvenescences generally do not reduce the diameter of the corallum significantly. Before sectioning, one paratype (UA 7032) displayed a steady contraction in diameter during late growth. Most specimens of the type series would have been 55 to 65 mm long, and have had a maximum mean diameter of 25 to 35 mm. One paratype



(UA 7039) has a maximum mean diameter of 40 mm; another (UA 7038) was at least 95 mm long, even though its diameter was only about 29 mm. The calice is shallow, typically less than 10 mm deep, and has gently sloping sides. Calices lack distinct platforms, although some developed temporarily everted marginaria. Cardinal fossula variable, commonly shallow and more prominent in the tabularial, than in the dissepimentarial region. Dissepimented radiciform process are typically present; some were formed after the corallum had acquired its adult diameter.

The periphery of most of the type specimens is damaged by abrasion and crushing; where preserved, the outer wall generally has a thickness of 0.2 to 0.5 mm in early stages, and 0.1 to 0.2 mm in later stages. In adult stages, especially, the septal apparatus is highly differentiated and commonly crudely bilateral in arrangement, although fossulae are not present consistently. About half of the major septal crests extend, unbroken, from the outer wall to the axial or periaxial region; many of the remaining major septal crests are separated from the outer wall by only one to three presepiments. In the inner dissepimentarium, major septal crests are somewhat wavy, weakly to moderately carinate and slightly fusiform. Adaxially, they are thin to slightly dilated, smooth to weakly carinate; they may also be conspicuously bent so as to abut each other locally. Where there is a well developed cardinal fossula, the cardinal septum is short, but if the cardinal fossula is not well developed, the cardinal septum is not necessarily the shortest of the major septal crests, and may not be identifiable. Microstructure of the major septal crests is not well preserved, but appears to comprise fine contiguous monacanth. At corallite diameters of 9 to 21 mm, there are 25 to 35 major septal crests; adult corallites with diameters of 25 to 40 mm have 35 to 52 major septal crests. In early stages, major septa are withdrawn from the axis relatively more than they are at maturity. UA 7041, from PCC 92070, retains this juvenile feature to a diameter of at least 31 mm, and for this reason, is excluded from the type series. Minor septal crests are either entirely suppressed, or occur as short strands or discrete trabeculae.

Commonly, the adult dissepimentarium consists of about 8 to 14 rows of dissepiments and less numerous presepiments, but longitudinal sections that cut the plane of bilateral symmetry at right angles, may reveal as many as 25 rows of plates on both sides of a narrow tabularium. Dissepimentarial surfaces slope inwards without forming a platform, except at levels from which peripheral dissepimented radiciform processes protrude, where the inner dissepimentarium is everted. Most dissepiments fail to cross the wide interseptal loculi, but lateral dissepiments are not normally present. The tabularium is variable, although it is usually narrow. An irregular tabular fossula is present in some specimens. Sclerenchyme may cover the horizontal elements around the fossula, and commonly coats the dissepiments and walls of the radiciform processes. It is absent essentially from other regions of the corallum.

Plate 42.1

Figures 1-7. *Lekanophyllum foliatum* sp. n.

- 1, 2. Holotype, UA 7029, longitudinal and transverse thin sections, x3; UA locality PCC 92246.
- 3-5. Paratype, UA 7032, two transverse and a longitudinal thin section, x3; UA locality PCC 92246.
6. Paratype, UA 7035, longitudinal thin section showing a radiciform process, on right side, reaching out over the old calicinal rim, following a rejuvenescence, x3; UA locality PCC 92229.
7. Paratype, UA 7040, longitudinal thin section, x3; UA locality PCC 02244.

Remarks. The very long, thin and crudely bilaterally arranged major septal crests, suppressed minor septal crests, wide interseptal loculi, and absence of lateral dissepiments make this a highly distinctive species of *Lekanophyllum*. A poorly illustrated specimen, named *Dialythophyllum astraeiforme kerlegeshicum* by Ivaniya (1965, p. 74, 75, Pl. 1, figs. 3-5), from the Givetian Safonov Beds of the Kuznets Basin, is perhaps, morphologically, the closest of previously named species or subspecies. However, it has dilated major septal crests, less reduced minor septal crests, is not strongly bilaterally symmetrical, and should not be confused with the new species.

The trivial name, which is the Latin adjective for leafy or leaved, is chosen to draw attention to the strongly lamellar septal crests.

Family PTENOPHYLLIDAE Wedekind, 1923

Remarks. Birenheide (1978, p. 122-151) and Pedder (1982a, p. 72) recognized the Spongophyllinae and Ptenophyllinae as subfamilies of the Spongophyllidae. Hill (1981, p. 231-246) separated the Ptenophyllidae from the Spongophyllidae and split the Ptenophyllidae into the Ptenophyllinae and Actinocystinae. Both classifications are acceptable, but since Hill's 1981 work is the current standard treatise on the Rugosa, we are also elevating the Ptenophyllidae to full family rank.

The Actinocystinae closely resemble the Ptenophyllinae. Hill diagnosed them as "solitary Ptenophyllidae with septa strongly flexuous to zigzag and flanged in inner parts of dissepimentarium and in tabularium, thickened in some". However, the three most typical genera-*Actinocystis* (= ? *Spongophylloides*), *Cymatelasma* and *Cymatella*-are characterized by having fully dilated septa in early stages. This feature should be stressed in the diagnosis more than the flexing and flanging of the septa.

Difficulties in recognizing a solitary versus colonial growth form, as a generic criterion in the Ptenophyllidae, have been discussed by Strusz (1968, p. 16). Strusz advocated a separation between species that are exclusively fasciculate, forming colonies by repeated budding, and those that either never bud, or do so only occasionally to form small clumps of a few radiating corallites. A similar position is taken in this work, although it is recognized that the distinction is difficult to draw in practice, because many of the named species have not been fully described.

No less than 33 generic names have been proposed for solitary and fasciculate ptenophyllinid and actinocystinid corals of Silurian and Devonian age. It is not possible to review fully the problems arising from this profusion of names, but a limited discussion of some of the genera is necessary to justify yet another genus that we are proposing.

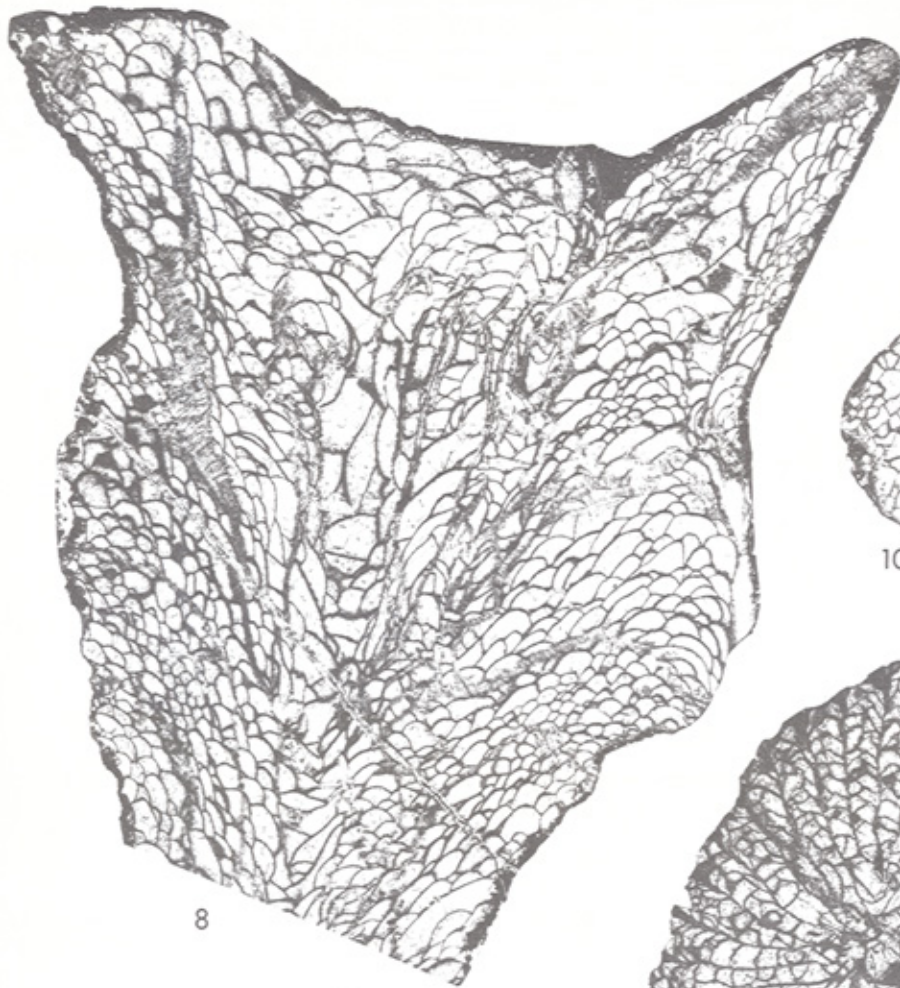
Subfamily ACTINOCYSTINAE Wedekind, 1927

Genus *Spongophylloides* Meyer, 1881

Spongophylloides Meyer, 1881, p. 109.

Type species. *Spongophylloides schumanni* Meyer, 1881, p. 109, 110, Pl. 5, figs. 12a-c. Drift; East Prussia.

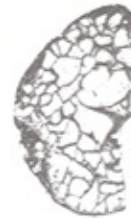
Remarks. *Spongophylloides schumanni* is too poorly described and illustrated to act as a type species in modern taxonomic work. Unfortunately, the type specimen is lost, and since it is, or was, a poorly located drift specimen, there is no possibility of recollecting authentic material. Authors have circumvented the need for a neotype by assuming *Spongophylloides schumanni* to be synonymous with *Cystiphyllum grayi* Milne Edwards and Haime, which is a comparatively well known species. This may be the case, but now that Soviet workers have combined two seemingly



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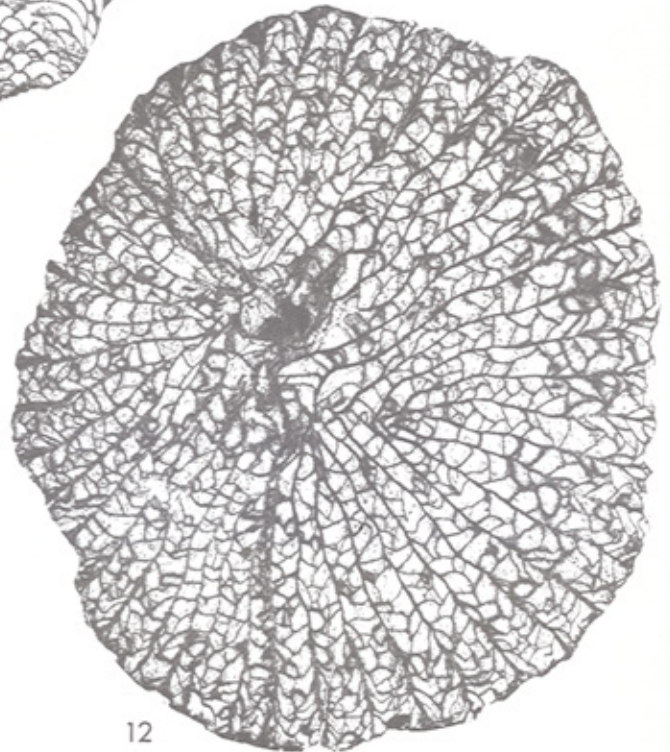
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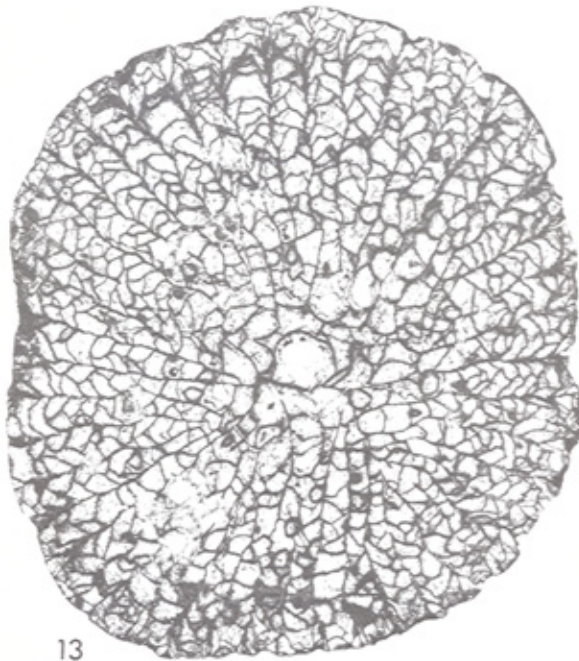
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different junior genera -*Actinocystis* Lindström, 1882, and *Dubrovia* Zheltonogova, 1961- under the name *Spongophylloides*, it is essential to clarify and make known the morphology of *Spongophylloides schumanni*. This could be done by designating and sectioning a neotype, but it would be better to make a formal application for *Cystiphyllum grayi* to become the type species of *Spongophylloides*. In this way *Actinocystis* would become an absolute synonym of *Spongophylloides*.

Genus *Actinocystis* Lindström, 1882

Actinocystis Lindström, 1882, p. 21.

Type species. *Cystiphyllum grayi* Milne Edwards and Haime, 1851, p. 465; 1855, p. 297, 298, Pl. 72, fig. 3 (not ? fig. 3a). Silurian, "supérieur", Dudley, England. Topotypic material of this species has been monographed by Lang and Smith (1927, p. 480-482, Pl. 37, figs. 1, 2), who chose the original specimen illustrated in figure 3 of Milne Edwards and Haime's 1855 plate 72 as lectotype, and by Butler (1934, p. 541-545, Pl. 17, figs. 1a-2e; Pl. 18, figs. 1, 2). Butler noted that all the English specimens known to him came from the Wenlock Limestone of Dudley Castle Hill or Wren's Nest, Worcestershire.

Assigned species. In addition to the type species, the following belong to the genus: *Actinocystis cylindrica* Wedekind (1927, p. 45, Pl. 1, figs. 14, 15), Klinteberg Beds (equivalent to Wenlock to lower Ludlow Series), Gotland; *A. spinosa* Wedekind (1927, p. 45, Pl. 21, fig. 12), a synonym of *A. grayi* from the Klinteberg Beds, Gotland; *A. perfecta* Wedekind (1927, p. 45, Pl. 26, figs. 15-18), Klinteberg Beds, Gotland; *Spongophylloides pusillus* Butler (1934, p. 545-548, Pl. 17, figs. 3a-e; Pl. 18, figs. 3-8), Wenlock Limestone (upper Wenlock Series), Wenlock Edge, Shropshire, England; *Spongophylloides cockei* Sutherland (1965, p. 16-18, Pl. 4, figs. 1a-2e; Pl. 5, figs. 1a-4c; Pl. 6, figs. 2a-6b), Henryhouse Formation (equivalent to the lower Ludlow Series), southern Oklahoma, U.S.A.

Diagnosis. Solitary, ceratoid to subtrubinate genus of actinocystinid corals with a deep, conical calice. In early stages, the septa are strongly dilated and commonly in lateral contact. Subsequently, the septa attenuate in the tabularium, although a variable marginal stereozone may be retained. In mature stages, the major septa are unequally long, reaching, or almost reaching the axis; peripherally, they are typically well withdrawn from a weak outer wall. Septa of both orders are zigzag and flanged, or waved parallel to their upper edges. The dissepimentarium comprises numerous small presipiments and dissepiments, but these may be, in part, displaced by a marginal stereozone, or obscured by secondary sclerenchyme.

Remarks. Lindström (1896, p. 48) believed *Actinocystis* to be synonymous with *Spongophylloides*, and was aware that *Spongophylloides* had priority. However, he considered

Plate 42.1

Figures 8-15. *Lekanophyllum foliatum* sp. n.

8, 10, 11. Paratype, UA 7031, two transverse and a longitudinal thin section, x3; UA locality PCC 92246.

9, 12. Paratype, UA 7037, exterior calicular view, x1, and a transverse thin section, x3; UA locality PCC 92233.

13. Paratype, UA 7036, transverse thin section, x3; UA locality PCC 92229.

14. Paratype, UA 7033, longitudinal thin section, x3; UA locality PCC 92246.

15. Paratype, UA 7035, transverse thin section showing radiform process on upper right side, x3; UA locality PCC 92229.

Spongophylloides to be invalid, on the grounds that Linnaeus reserved generic names ending in *-oides* for botanical nomenclature. Later workers, who correctly have rejected this argument, may, nevertheless, have been incorrect in assuming the type species of the two genera to be congeneric.

Subfamily PTENOPHYLLINAE Wedekind, 1923

Genus *Grypophyllum* Wedekind, 1922

Grypophyllum Wedekind, 1922, p. 13 [in part, includes the type species of *Parasociophyllum*].

Hooeiphyllum Taylor, 1951, p. 173, 174.

Type species of *Grypophyllum*. *Grypophyllum denckmanni* Wedekind, 1922, p. 13, 14, text-figs. 13, 14. Bücheler Schichten (Givetian); Hand near Bergisch-Gladbach, Paffrath Syncline, Rhenish Mountains, Germany. This species has been redescribed by Engel and von Schouppé (1958, p. 103-107, Pl. 9, figs. 18-25) and by Birenheide (1978, p. 136, text-figs. 80a-c). Wedekind's (1925, p. 14) subsequent designation of *Grypophyllum isactis* (Frech) as the type species of *Grypophyllum* is invalid.

Type species of *Hooeiphyllum*. *Grypophyllum normale* Wedekind, 1925, p. 22, Pl. 5, figs. 25, 26. Upper Middle Devonian (Givetian); Hand near Bergish-Gladbach, Paffrath Syncline, Rhenish Mountains, Germany. This species has approximately the same type stratum (Bücheler Schichten) and locality as *Grypophyllum denckmanni* Wedekind, and is considered to be conspecific with it (Engel and von Schouppé, 1958, p. 103).

Assigned species. Most of the species listed by Pedder (1973, p. 100).

Diagnosis. See Birenheide (1972, p. 407) and Hill (1981, p. 236-238).

Remarks. *Grypophyllum* is currently restricted to solitary ptenophyllinid species having a conical calice and thin septa formed of fine, well-aligned trabeculae.

Genus *Dubrovia* Zheltonogova, 1961

Dubrovia Zheltonogova, 1961, p. 80, 81.

Type species. *Dubrovia dubroviensis* Zheltonogova, 1961, p. 81, Pl. 5-19, figs. 3a, b. Tom'chumysh Beds (according to plate legend), "Upper Silurian"; River Baskuskan, near Dubrovo, Salair, Soviet Union. Topotypic material has been redescribed by Besprozvannykh (1968, p. 112, Pl. 49, figs. 5a-6b). The Tom'chumysh and underlying Sukhaya Beds are both now known to be Lochkovian (Elkin and others, 1982).

Assigned species. The type species is interpreted to be congeneric with the following species and forms: *Grypophyllum vilvense* Spasskiy (1955, p. 131, 132, Pl. 20, figs. 3a-4), Koyva Beds (Dalejan or early Eifelian), western slope of the southern Urals; *Grypophyllum salairicum* Bul'vanker (1958, p. 145, 146, Pl. 51, figs. 1a-2), Upper Shanda Beds (late Dalejan), Kuznets Basin; *Grypophyllum carinatum* of authors (Soshkina, 1949, Pl. 52, figs. 3a-4b; Pl. 53, figs. 1a-c. Degtyarev, 1951, Pl. 1, figs. 3a, b. Spasskiy, 1955, Pl. 20, figs. 2a-v), Dalejan or Eifelian, western slope (Koyva, Kosva, Tanchikha and Vilva Rivers) of the central Urals; *Grypophyllum mirabile* Sytova (1968, p. 65, 66, Pl. 4, figs. 1a-v) lower and middle subhorizons of the Borshchov Horizon (Lochkovian), Podolia.

The holotype of *Astrophyllum carinatum* Soshkina (1936, p. 60-62, figs. 68-70), from Mal'j Patok River in the northern Urals, and specimens, identified as *Grypophyllum carinatum* (Soshkina, 1949, Pl. 52, figs. 6-8), from Katav River in the southern Urals, are unrecognizable.

Diagnosis. Solitary, predominantly ceratoid to subcylindrical genus of ptenophyllinid corals with a deep, conical calice. Early stages of topotypic specimens of type species not known; specimens from the Guby Belush'ya Beds (probably equivalent to the upper Ludlow series) on Vaigach Island, western Soviet Arctic, that have been identified as being conspecific with *Dubrovia dubroviensis* by Sytova (1970, Pl. 8, figs. 1a, b), do not show early septal dilation. In late stages, the septa are sinuous, locally strongly flanged, and are commonly disrupted peripherally by a few presepiments. Dissepiments are mostly elongate, but vary in size. Outer wall thin. Dissepimentarial surfaces are invariably inwardly sloping. Tabulae closely spaced, forming weakly to strongly axially depressed tabularial surfaces.

Remarks. In addition to occurrences in Lochkovian strata of Salair and the Upper Silurian on Vaigach Island, western Soviet Arctic, the type species has been identified in the Borovushkin Suite (Pridolian?) of the Rudnyy Altay (Sytova, 1966, p. 99, Pl. 3, figs. 4a, b), and in the Lower Tagil Beds (Lochkovian) of the eastern Urals (Shurygina, 1968, p. 127, Pl. 54, figs. 1a, b).

Two interpretations of the genus *Dubrovia* are possible. The one given by Hill (1981, p. 246), which is tentatively followed here, assumes that it is differentiated from *Actinocystis* (= ? *Spongophylloides*) by lacking strong septal dilation in early stages. The other interpretation, which is advocated by Soviet workers, including, now, Zheltonogova (1973, p. 119, 120) herself, is that *Dubrovia* is synonymous with *Spongophylloides*.

Genus *Salairophyllum* Besprozvanykh, 1968

Salairophyllum Besprozvanykh, 1968, p. 111.

Type species. *Pilophyllum angustum* Zheltonogova, 1961, p. 78, Pl. S-17, fig. 5; Pl. S-18, fig. 1. Tom'chumysh Beds, "Upper Silurian"; River Tom'chumysh below Tomsk, Salair, Soviet Union. Topotypic specimens have been monographed by Besprozvanykh, 1968, p. 111, 112, Pl. 49, figs. 4a, b. The Tom'chumysh Beds are known now to be Lochkovian (Early Devonian) (Elkin and others, 1982).

Diagnosis. Solitary subcylindrical genus of ptenophyllinid corals. Septa flanged adaxially; dilated peripherally, locally forming a dense stereozone. Dissepimentarium inwardly sloping, in places largely displaced by the stereozone. Presepiments very rare or absent. Tabulae closely spaced. Tabularial surfaces mostly weakly depressed in figured topotypic material of the type species, but more strongly depressed in specimens, identified as *Salairophyllum angustum*, from the Lower Podotdel Beds (Lochkovian) of the eastern Urals (Shurygina, 1968, Pl. 55, figs. 2, 3b).

Remarks. The type species is possibly the only named species that should be referred to the genus, although the holotype of *Briantelasma mainense* Oliver (1960, Pl. 1, figs. 6, 7) appears to conform to the diagnosis of *Salairophyllum*, given above.

Specimens identified as *Salairophyllum* sp. e, from the Upper Silurian of Kuiu Island, southeastern Alaska (Merriam in Oliver and others, 1975, Pl. 22, figs. 13-16), may be fasciculate. Furthermore, they have septa that are strongly carinate in the marginarium, as well as marginally elevated and moderately spaced tabularial surfaces. They are unlikely to be ptenophyllids. A specimen identified as *Salairophyllum* ? sp., from the Lochkovian coral zone E of Nevada (Merriam, 1974, Pl. 12, figs. 6-8), has a ptenophyllid tabularium. It may be a species of *Salairophyllum*, but has exceptionally carinate septa and a few presepiments.

Tonkinaria Merriam, 1974, p. 51, 52.

Type species. *Tonkinaria simpsoni* Merriam, 1974, p. 52, Pl. 7, figs. 1-8. "Late Silurian", coral zone D; upper beds of Unit 3 of the Roberts Mountains Formation; type section of the Roberts Mountains Formation, northwestern side of Roberts Creek Mountain, Roberts Creek Mountains Quadrangle, Nevada, U.S.A. Johnson and Oliver (1977, p. 1464) have shown that the type horizon is Lochkovian (Early Devonian) age.

Assigned species. The species founded under the name of *Grypophyllum antiquum* by Sytova (1968, p. 65, Pl. 5, figs. 4-5b), from the Lower Borschov Subhorizon (Lochkovian) of Podolia, is assigned tentatively to the genus.

Diagnosis. Solitary, and possibly parricidally budding (apparently seen in only one unsectioned specimen, provisionally assigned to the type species by Merriam), subcylindrical to turbinatate genus of ptenophyllinid corals. The calice may become flared at maturity. Outer wall narrow. Major septa long, thin, somewhat wavy but not noticeably flanged; minor septa reduced, represented by short lamellae inside the outer wall and possibly, also, by discontinuous interior fragments. Relatively large, elongate dissepiments predominate over presepiments in the unexpanded part of the corallum; less inwardly inclined presepiments predominate in flared parts. Tabulae closely spaced, forming concave tabularial surfaces.

Remarks. *Tonkinaria simpsoni* is based on about 20 silicified specimens from two localities in Nevada. Transverse and longitudinal thin sections of a topotypic paratype have been illustrated, but the holotype has not been sectioned. The diagnosis, given here, is based primarily on the sectioned paratype of *T. simpsoni* and the published figure of *T. (?) antiqua*. In these circumstances it must be regarded as provisional.

The septal and calicular morphology of *Tonkinaria* appear to relate it to the fasciculate Pridolian (late Silurian) genus *Imennovia* Shurygina (1968, p. 133).

Genus *Neogrypophyllum* Jia, 1977

Neogrypophyllum Jia in Jia and others, 1977, p. 163.

Type species. *Neogrypophyllum zhongguoense* Jia in Jia and others, 1977, p. 163, Pl. 55, figs. 5a, b. Upper part of the Donggangling Formation, Middle Devonian; holotype from either Bohong or Waituo, Tianyang County, Guangxi, China. The upper part of the Donggangling Formation (formerly transliterated as Tungkanling Formation) is Givetian age.

Original description. Solitary cylindrical corallum. The septa are thin, their peripheral ends are separated from the outer wall by presepiments. Major septa reach the centre of the corallum. Minor septa are rather long. The zone of presepiments is wide, with many rows of large, vertically arranged, hemielliptical presepiments. Tabulae incomplete, small, inwardly sloping, forming concave tabularial surfaces (edited version of a translation from the original Chinese, provided by the Translation Bureau of the Department of the Secretary of State, Canada).

Remarks. According to Jia, *Neogrypophyllum* is distinguished from *Grypophyllum* by its large presepiments that completely dominate the marginarium, and it is separated from *Neomphyma* by its better developed septa, especially minor septa, and by its concave tabulae. In addition to the type species, *Grypophyllum salairicum* Bul'vanker, from the late Dalejan Upper Shanda Beds of the Kuznets Basin, was referred to *Neogrypophyllum* by Jia. However, Bul'vanker's species has wavy septa and inconsistently developed presepiments, and is better referred to *Dubrovia*.

Neogrypophyllum must be regarded as nomen dubium, until its type species is more fully described and illustrated. Hill (1981, p. 236) considered it be questionably synonymous with **Grypophyllum**.

Genus **Ellesmerelasma** nov.

Type species. **Ellesmerelasma pumile** sp. n.

Assigned species. The only species placed in the genus, other than the type, is **Lyrielasma pinghuangshanense** Kong (in Kong and Huang, 1978, p. 123, Pl. 40, figs. 9a, b), from the Longdonshui Formation (Eifelian), Dushan region of Guizhou, southern China.

Diagnosis. Solitary ceratoid to subcylindrical genus of ptenophyllinid corals with a deep, conical calice. Septa moderately flexuous and flanged, weakly rhopaloid, peripherally discontinuous but forming a narrow, irregular septal stereozone. Inwardly sloping dissepimentarium comprises both dissepiments and presepiments. Tabulae closely spaced, incomplete, arranged to form axially depressed tabularial surfaces.

Remarks. Prior to Birenheide's (1972) revision of **Grypophyllum**, species of **Ellesmerelasma** might have been placed in that genus. Now, they are distinguished from species of **Grypophyllum** by having a broader, less regular stereozone and relatively much coarser and less well aligned trabeculae. According to Hill's (1981) concept of **Dubrovia**, that genus is distinguished from **Ellesmerelasma** by lacking a septal stereozone. **Salairophyllum** has a septal stereozone, but lacks presepiments. **Tonkinaria** has a flared calice, and in **Neogrypophyllum**, both the septa and outer wall are thin.

The name is compounded from Ellesmere (Island), and the Greek noun **elasma**, meaning a plate. The elision is deliberate.

Ellesmerelasma pumile sp. n.

Plate 42.1, figures 16-30

Type series. Holotype, UA 7042, and paratypes UA 7043-7048, all from UA locality PCC 92246.

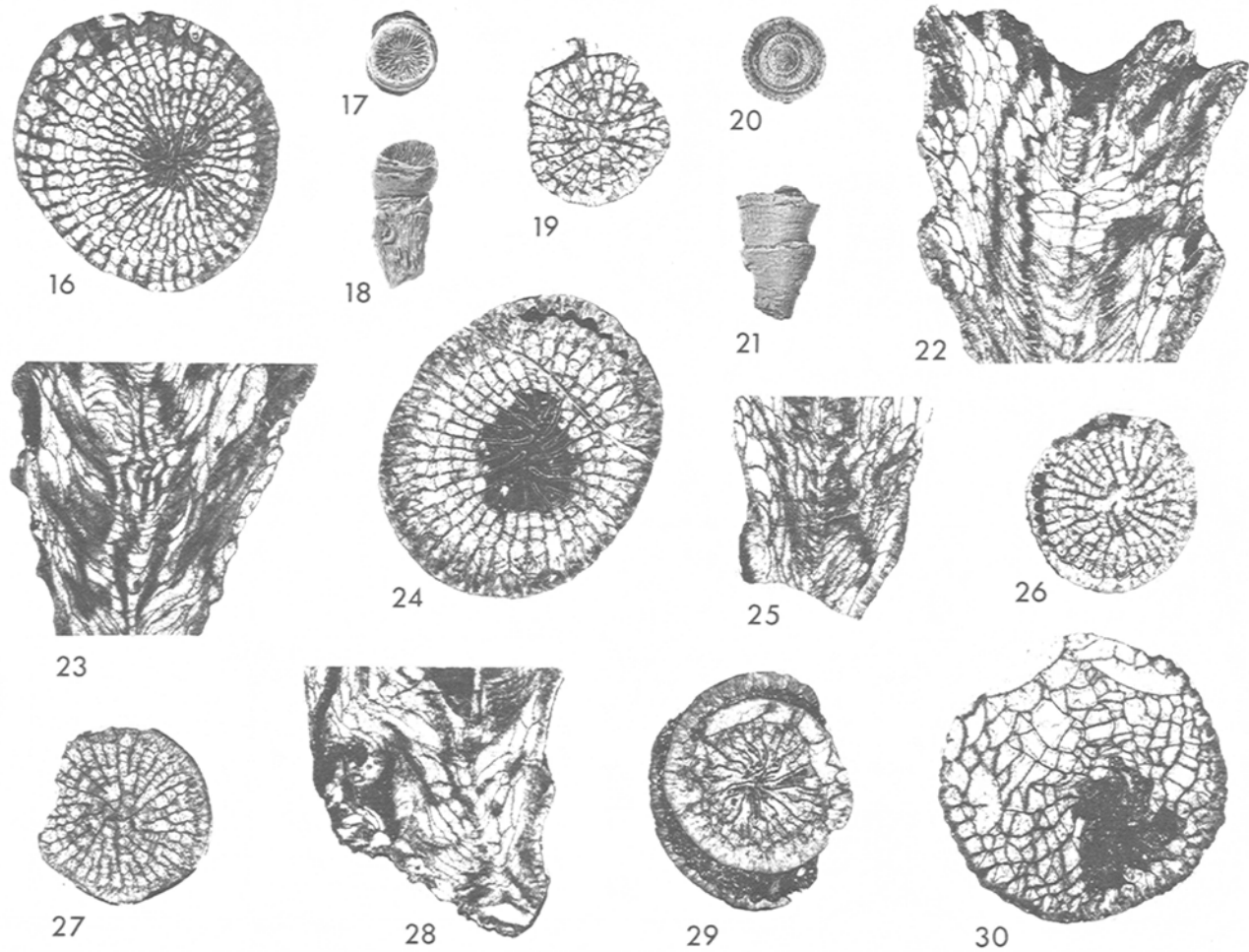


Plate 42.1

Figures 16-30. **Ellesmerelasma pumile** gen. et sp. n.

16-18, 23. Holotype, UA 7042, transverse and longitudinal thin sections, x4, and two exterior views before sectioning, x1; UA locality PCC 92246.

19. Paratype, UA 7046, transverse thin section, x4; UA locality PCC 92246.

20-22, 26. Paratype, UA 7043, two exterior views before sectioning, x1, and longitudinal and transverse thin sections, x4; UA locality PCC 92246.

24, 28. Paratype, UA 7044, transverse and longitudinal thin sections, x4; UA locality PCC 92246.

25, 29. Paratype, UA 7045, longitudinal and transverse thin sections, x4; UA locality PCC 92246.

27. Paratype, UA 7047, transverse thin section, x4; UA locality PCC 92246.

30. Paratype, UA 7048, transverse thin section, x4; UA locality PCC 92246.

Diagnosis. Small (maximum length and mean diameter about 25 and 10 mm) species of *Ellesmerelasma* with 19x2 to 23x2 septa at maturity, and a dissepimentarium that includes some exceptionally elongate dissepiments and presepiments.

Description. Corallum solitary, growth form ceratoid, tending towards subcylindrical, with relatively prominent juvenescences. When complete, probably none of the specimens in the type series exceeded 25 mm in length, or 10 mm in maximum mean diameter. Upper edges of the flexuous and flanged septa are much higher than the most distal tabularial surface, so that the calice of unprepared specimens appears to be considerably shallower than it would be in longitudinal section. In longitudinal section, the calice appears to be almost as deep as it is wide and to have the form of an upside-down cone. There is no calicular platform. Growth rings, septal furrows and interseptal ridges are not prominent.

The outer wall, which is abraded, to some extent, in all the type specimens, varies in thickness. The maximum thickness is 1.3 mm; the mean thickness is estimated to be about 0.7 mm. Along its thickest parts, the wall is a septal stereozone. Septa of both orders are well developed. Over most of their length, they are flexuous and moderately thick, and, in places, are withdrawn from the periphery. Major septa are unequally long; the longest terminate near the axis. They are commonly somewhat dilated adaxially, but show almost no tendency to rotate. Most minor septa are a half to three quarters of the length of the major septa. At diameters of 5.5 to 6.5 mm, there are 18x2 to 20x2 septa; at the maximum mean diameter of 9.0 to 10.0 mm, the septal count is 19x2 to 23x2.

In early stages, that is when the diameter is less than 5.0 mm, dissepiments may be absent, or limited to one or two rows. At maturity, there are normally four to six rows of elongate to very elongate, steeply inwardly inclined dissepiments and presepiments. Tabulae are closely spaced, incomplete and form typical axially depressed, ptenophyllinid tabularial surfaces. Many of the outermost tabulae are inwardly inclined almost as much as the dissepiments and presepiments.

Remarks. *Ellesmerelasma pinghuangshanense* is a slightly smaller species and has smaller dissepiments, as well as considerably fewer presepiments.

The trivial name is the Latin adjective *pumilis*, meaning dwarfish, little, etc.

Family CYATHOPHYLLIDAE Dana, 1846

Subfamily STERICTOPHYLLINAE Pedder, 1965

Diagnosis. Subfamily of the Cyathophyllidae distinguished principally by its trabeculae, which are contiguous, forming dilated septa, in at least the inner and central parts of the dissepimentarium.

Genus *Mansuyphyllum* Fontaine, 1961

Mansuyphyllum Fontaine, 1961, p. 100, 101.

Type species. *Cyathophyllum annamiticum* Mansuy, 1913, p. 9, 10, Pl. 1, fig. 11; Pl. 2, fig. 2. "Dévonien supérieur", region of Mui Ron, Qui-Dat area, Viet-Nam. This species was redescribed by Fontaine (1961, p. 101, 102, Pl. 17, figs. 1a-2). Fontaine (1961, p. 19) stated that its age is not known, but on page 101 of the same work, gave the stratigraphic range of *Mansuyphyllum* as Middle Devonian.

Diagnosis. Genus of strictophyllinid corals in which the trabeculae are directed upwards and inwards at high angles (typically 55° to 80°) near the periphery.

Description. Corallum solitary, trochoid to ceratoid. Calice with narrow platform and cup-shaped pit that is generally not as deep as it is wide. Septa well developed in two orders, variably carinate with zigzag or offset carinae; they are also variably fusiform. Arrangement of septa radial, to just bilateral about a shortened cardinal septum and elongate counter septum. Trabeculae monacanthate, directed at high angles (typically 55° to 80°) near the periphery, flattening and flexing in the charactophylloid manner adaxially. Dissepiments numerous, small, well inflated, forming more or less horizontal surfaces around the calicular platform, becoming more elongate and inwardly inclined towards the tabularium. Tabulae, in species having abaxially withdrawn septa (includes the type species), are broad and tend to form flat tabularial surfaces. Species having well developed septa generally have incomplete tabulae and concave tabularial surfaces.

Remarks. *Mansuyphyllum* was proposed by Fontaine (1961, p. 100; 1966, p. 58) for solitary corals that, he believed, have the internal morphology of *Disphyllum*. The interpretation given to the genus here is similar to Hill's (1981, p. 302), but must remain tentative until the trabecular structure of the type species is adequately known.

Mansuyphyllum uyenoii (Pedder, 1982a) was at first referred to *Cavanophyllum* Pedder (1965, p. 215, 216). Now it is recognized that true species of *Cavanophyllum* have flatter (inclined at 45° or less at the periphery) and less divergent trabeculae.

Mansuyphyllum uyenoii (Pedder, 1982)

Mansuyphyllum uyenoii uyenoii (Pedder, 1982)

Cavanophyllum sp.; Pedder in Jackson et al., 1978, p. 152, Pl. 41, figs. 2, 4.

Cavanophyllum uyenoii Pedder, 1982a, p. 76, Pl. 9.1b, figs. 5-10.

Remarks. The holotype and one of the paratypes came from the *Polygnathus* aff. *perbonus* conodont unit (Zlichovian) of the Blue Fiord Formation in the Sor Fiord section on the northern limb of the Schei Syncline. The other paratype came from a spot sample collected from the *Polygnathus dehiscens* Zone (Zlichovian part), near or at the base of the Blue Fiord Formation, on the northern limb of the Schei Syncline, close to the Sor Fiord section.

Mansuyphyllum uyenoii avernale subsp. n.

Plate 42.1, figures 31-40

Type series. Holotype, UA 7049, UA locality PCC 92068. Paratypes, UA 7050, 7051, UA locality PCC 92068; UA 7052, UA locality PCC 92070.

Diagnosis. Subspecies of *Mansuyphyllum uyenoii* characterized by its small size (maximum mean diameter of 26.0 mm) and low septal count (31x2 or 32x2 at maturity).

Description. Corallum solitary, trochoid to ceratoid, not known to have produced offsets. Maximum length in type series estimated to be about 45 mm; greatest mean

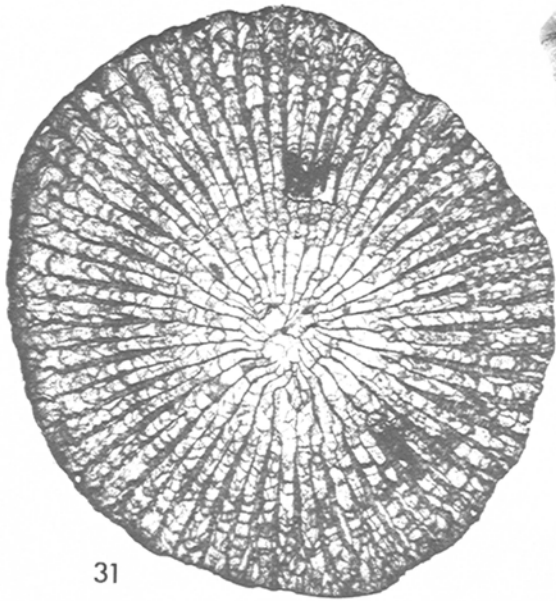
Plate 42.1

Figures 31-40. *Mansuyphyllum uyenoii avernale* subsp. n.

31, 36, 40. Holotype, UA 7049, transverse and longitudinal thin sections, x3, and part of transverse thin section, x10; UA locality PCC 92068.

32, 33, 38, 39. Paratype, UA 7050, two exterior views before sectioning, x1, and longitudinal and transverse thin sections, x3; UA locality PCC 92068.

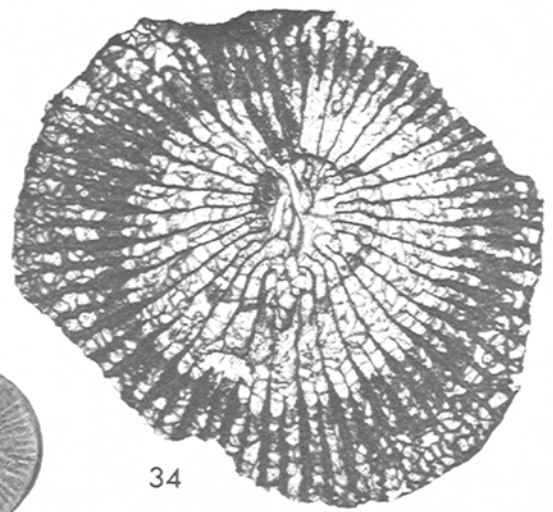
34, 35, 37. Paratype, UA 7052, two transverse and a longitudinal thin section, x3; UA locality PCC 92070.



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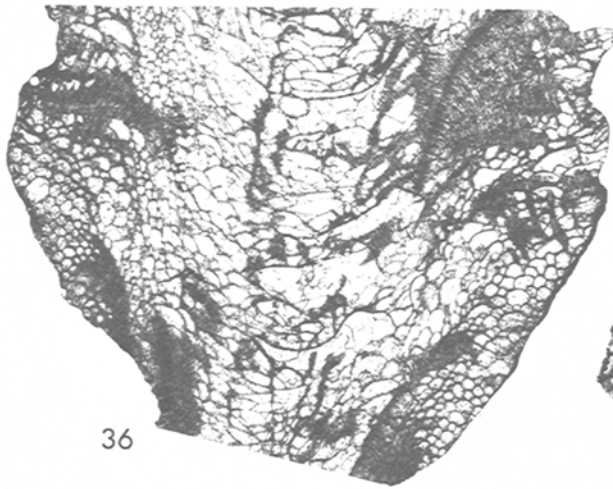
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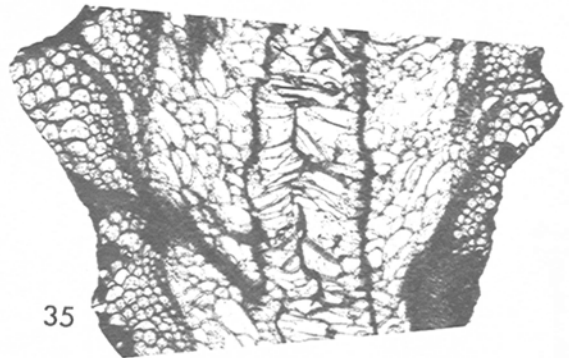
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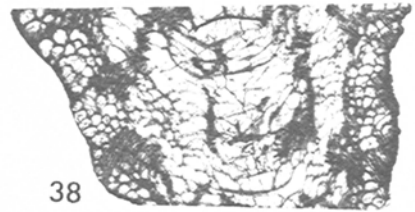
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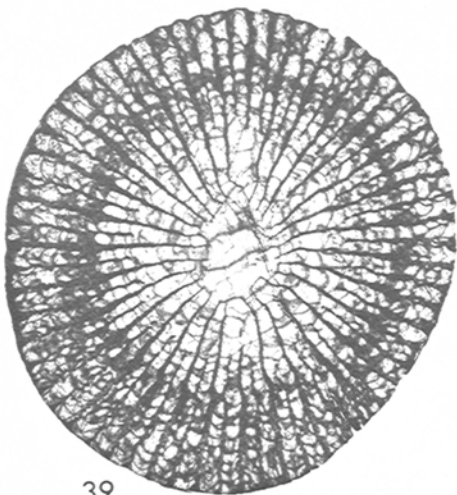
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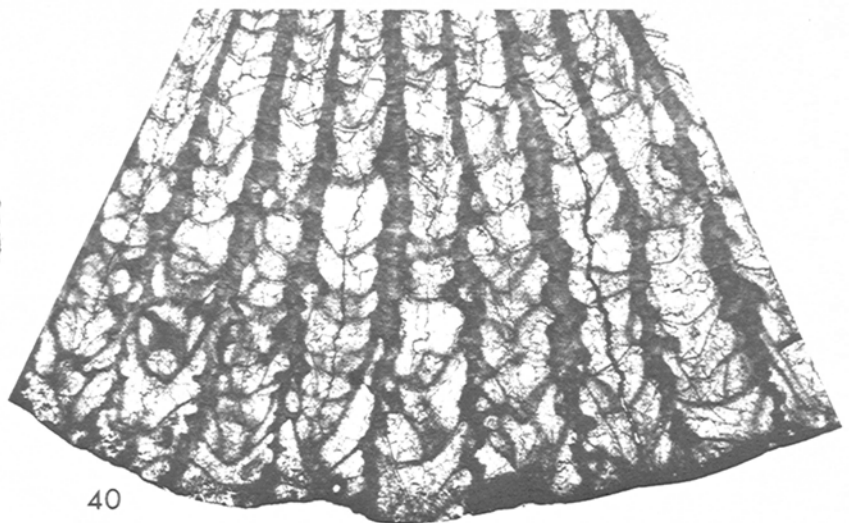
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diameter 26.0 mm. Calice shallow, about 12.0 mm deep; base of calicular pit gently concave, sides not clearly differentiated from the narrow calicular platform. Where preserved, the outer wall is 0.1 to 0.3 mm thick, and bears prominent septal furrows and broad interseptal ridges.

Septa radially arranged around the marginarium, very weakly bilateral, in the tabularium, about a slightly shortened cardinal septum and a typically elongated counter septum. The septal count increases from 29x2 at a diameter of 13.0 mm, to 31x2 or 32x2 at full size. Between prominent zigzag and offset carinae, septa are thin in the peripheral region; in the inner dissepimentarium the septa are thickened, appearing fusiform in transverse section. Major septa project well into the tabularium, but leave an axial region, of about 3.0 mm diameter, that is virtually free of septa. Minor septa terminate in the outer tabularium. Both orders of septa progressively attenuate adaxially from the inner margin of the dissepimentarium. Trabeculae poorly preserved in type material, probably monacanthate, certainly coarse, with diameters mostly of 0.1 to 0.3 mm. Immediately inside the periphery, the trabeculae are commonly not in contact and are directed upwards at angles of 55° to 80°; towards the axis they become contiguous and their angle of inclination decreases. At and near the transition from dissepimentarium to tabularium, they are flexed in the charactophylloid manner. In the paratypes, variable inner walls are formed by sclerenchymal investment of certain inner dissepimentarial surfaces.

Dissepiments vary in size and shape. Towards the periphery, most are small, but strongly inflated; towards the axis many are elongate and not easily differentiated from marginal tabellae. At maturity, there are typically 12 to 15 rows of dissepiments. Dissepimentarial surfaces, which are more or less horizontal near the periphery, become increasingly more inwardly inclined towards the axis. Tabulae incomplete, concave to convex, typically forming gently concave tabularial surfaces, that may, however, be upturned against the elongated counter septum. Periodically the tabularial surfaces carry a coating of sclerenchyme.

Remarks. The trivial name of this subspecies, which is the Latin adjective *avernalis*, meaning of Avernus, the nether world, refers to the proximity of the type locality to Hell Gate.

***Mansuphyllum versicularium* sp. n.**

Plate 42.1, figures 41-56

Type series. Holotype, UA 7053, UA locality PCC 92246. Paratypes UA 7054-7057, UA locality PCC 92246; UA 7058, UA locality PCC 92240; UA 7059, UA locality PCC 92230.

Diagnosis. Small (maximum length and mean diameter about 32 and 24 mm respectively) species of *Mansuphyllum* with deeply incised septal furrows and as many as 36x2, thin, slightly fusiform and distinctly carinate septa. Tabulae incomplete, forming predominantly gently concave tabularial surfaces.

Description. Corallum solitary, trochoid to ceratoid; no evidence of budding in the type series. Maximum known length, measured along the convex side of the corallum, 32 mm; transverse sections elliptical rather than circular, maximum mean diameter 24 mm, but normally less than 22 mm. Calice shallow, about 9 mm deep; base of calicular pit weakly concave, walls grading to a calicular platform, about 4 mm wide. Outer wall mostly 0.1 to 0.2 mm thick between adjacent septal bases; locally, thickness decreases to as little as 0.05, or increases to as much as 0.3 mm. Convex interseptal ridges and deep setal furrows, such as those shown in figures 44 and 45, are characteristic of the species. Fine growth rings are well preserved on some specimens.

Normally, one septum, situated on the convex side of the corallum, is longer than the other septa. It is assumed to be the counter septum. Another septum, situated more or less opposite the long septum, is shorter than most of the other major septa, and is assumed to be the cardinal septum. The remaining major septa are commonly just bilaterally symmetrical about the assumed cardinal/counter plane, which usually corresponds to the greatest diameter of the corallum at a given level. The septal count increases from about 24x2 at 7.5 mm diameter, to about 33x2 at 19.0 mm, and about 35x2 at 22.0 mm. The largest type has 36x2 septa at its greatest mean diameter of 24.0 mm. Zigzag and offset carinae are weakly to strongly developed. Septa tend to be thinner and more strongly carinate near the periphery than in the inner dissepimentarium, where they are generally slightly fusiform. Major septa leave an axial space, usually 2.0 to 2.2 mm in mean diameter, that is free of septa, except for the elongated counter septum. Minor septa are confined to the dissepimentarium in early stages, subsequently they lengthen, but terminate near the transition from dissepimentarium to tabularium. Trabeculae, which are believed to be monacanthate and to have diameters of 0.05 to 0.2 mm, are mostly in contact, even at the periphery, where they are directed upwards and inwards at angles of 50° to 85°; adaxially, their angle of inclination decreases, and they flex in the charactophylloid manner.

There are about eight or nine rows of dissepiments in fully grown coralla. The outer five or six rows comprise small globular dissepiments, arranged to form a more or less horizontal surface, that corresponds to the calicular platform. Interior dissepiments are more elongate and inwardly inclined than the outer ones, and merge with lateral tabellae. Tabulae vary in shape; a few are almost complete, most are not. Tabularial surfaces are flat in places, but, overall, are concave. Very thin, sclerenchymal layers coat a few of the tabularial surfaces.

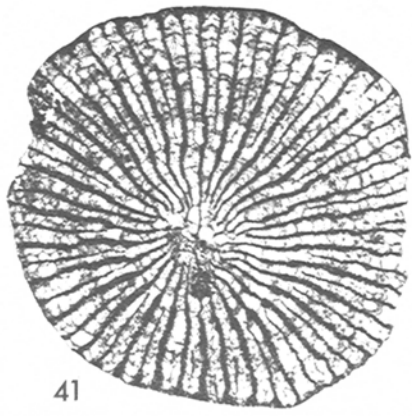
Remarks. Although *Mansuphyllum versicularium* is slightly smaller than *M. uyenoii avernale*, it has more septa. Other distinctions between the two species are that the septa and trabeculae are finer in *M. versicularium*, its trabeculae are mostly contiguous near the periphery, and it has deeper septal furrows and a shallower calice than *M. uyenoii avernale*.

The form named *Mansuphyllum* cf. *pseudosociale* (Soshkina) by Fontaine (1966, p. 60, 61, Pl. 8, fig. 6; Pl. 9, fig. 9), from the Middle Devonian of Yunnan, is similar to *M. versicularium*. It differs in having reduced minor septa, convex tabularial surfaces, and trabeculae that are said to be "fortement inclinées vers l'extérieur". **Tabulophyllum**

Plate 42.1

Figures 41-56. ***Mansuphyllum versicularium* sp. n.**

- 41-43, 50, 54. Holotype, UA 7053, two transverse and a longitudinal thin section, x3, and two exterior views before sectioning, x1; UA locality PCC 92246.
44. Paratype, UA 7054, exterior view before sectioning, x1; UA locality PCC 92246.
45. Paratype, UA 7056, exterior calicular view before sectioning, x1; UA locality PCC 92246.
46, 49, 56. Paratype, UA 7058, transverse and longitudinal thin sections, x3, and part of longitudinal thin section, x10; UA locality PCC 92240.
47, 52. Paratype, UA 7055, longitudinal and transverse thin sections, x3; UA locality PCC 92246.
48, 51, 55. Paratype, UA 7059, transverse and longitudinal thin sections, x3, and part of a transverse thin section, x10; UA locality PCC 92230.
53. Paratype, UA 7057, transverse thin section, x3; UA locality PCC 92246.



41



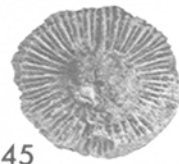
42



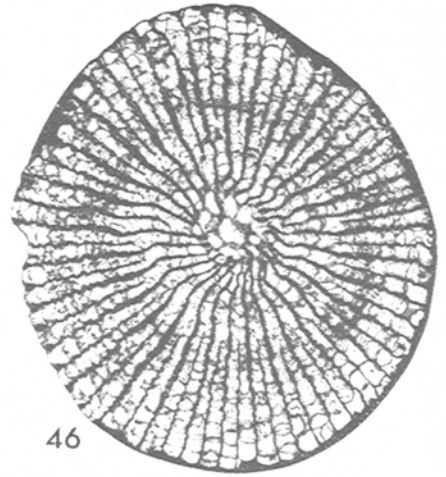
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43



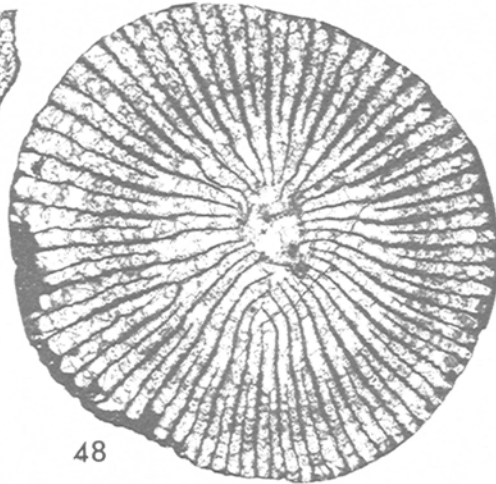
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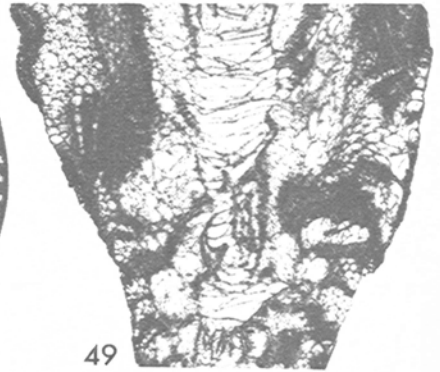
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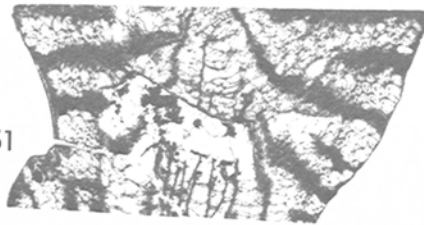
48



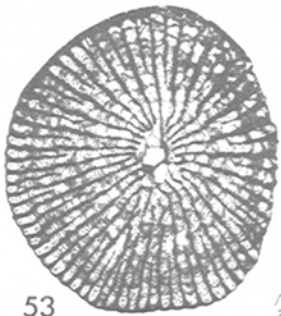
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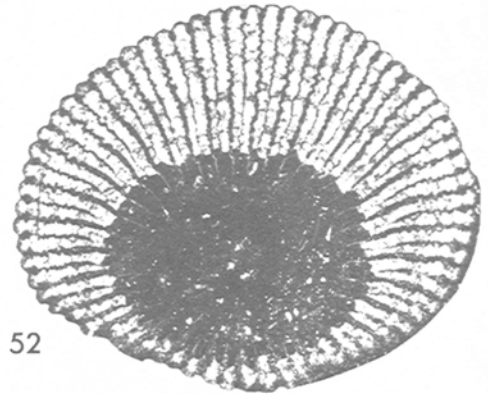
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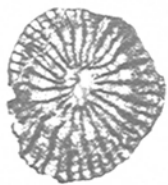
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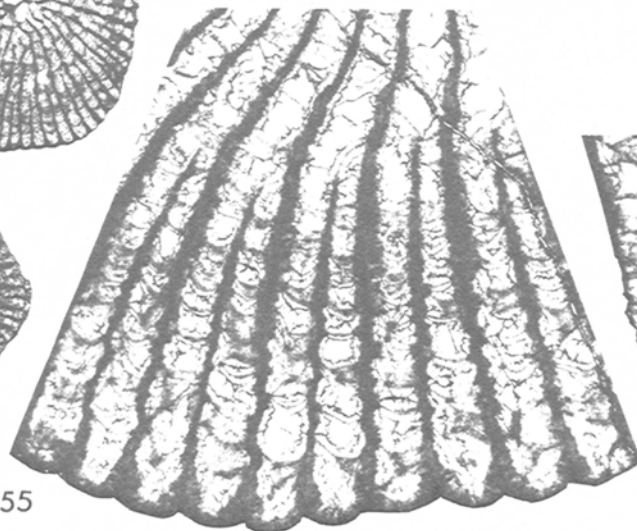
53



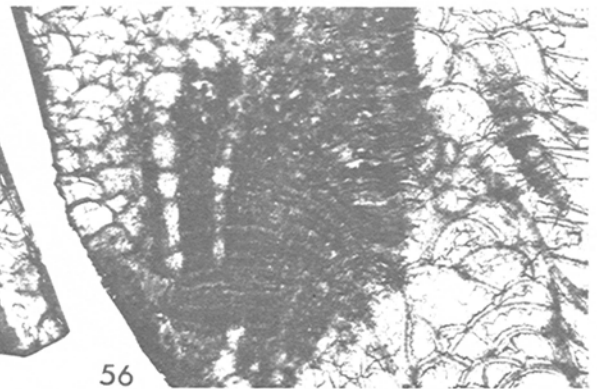
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56

pseudosociale Soshkina (1952, p. 71, text-fig. 100, Pl. 3, fig. 18), strict sense, is an Upper Devonian species from the Russian Platform, that is weakly colonial, and has the interior morphology of *Mictophyllum*.

The trivial name **versicularius** comes from the Latin **versiculus**, meaning a small furrow, and the suffix **-arius**. It refers to the strong septal furrows of the species.

Mansuyphyllum consolum sp. n.

Plate 42.1, figures 57-63

Type series. Holotype, UA 7060, UA locality PCC 92232. Paratype, UA 7061, UA locality PCC 92246.

Diagnosis. Small (maximum mean diameter about 18.5 mm) species of *Mansuyphyllum*, with about 32x2 abaxially withdrawn septa, that leave an axial region, of about 4.0 mm diameter, free of septa. Dissepimentarium narrow, generally with six, or less, rows of dissepiments. Tabulae broad, forming tabularial surfaces that tend to be flat periaxially and downturned marginally.

Description. Corallum solitary, trochoid to ceratoid, not known to have produced offsets. Maximum mean diameter 18.5 mm; full length unknown, at least 30 mm. Calice not preserved, but longitudinal sections indicate that it would

have a narrow calicular platform and a wide, more or less flat bottomed calicular pit. The outer wall is 0.1 to 0.3 mm thick, and bears deep septal furrows and variably convex interseptal ridges.

Septa radially arranged. In the holotype, the septum that is assumed to be the cardinal septum is slightly shorter than the other major septa; a slightly elongated septum is assumed to be the counter septum. In the paratype, a slightly shortened major septum is assumed to be the cardinal septum; the counter septum does not appear to be differentiated. At a diameter of 13.0 mm, the paratype has 23x2 septa. The holotype has 32.2 septa at 16.5 and 18.4 mm diameter. Septa are variably, but on the whole, moderately carinate in the dissepimentarium; the carinae being of both the zigzag and offset types. Near the periphery, septa are either thin or thick; in the inner dissepimentarium and outer tabularium they are fusiform. Major septa are withdrawn from the axis, leaving an axial region, of about 4.0 mm mean diameter, that is completely free of septa. Minor septa just project into the tabularium. Trabeculae are directed upwards and inwards, mostly at angles of 50° to 60° near the periphery. Adaxially, their angles of inclination decrease, and they become flexed in the charactophylloid manner. Diameters of the trabeculae are about 0.08 to 0.13 mm; their fine structure is not preserved.

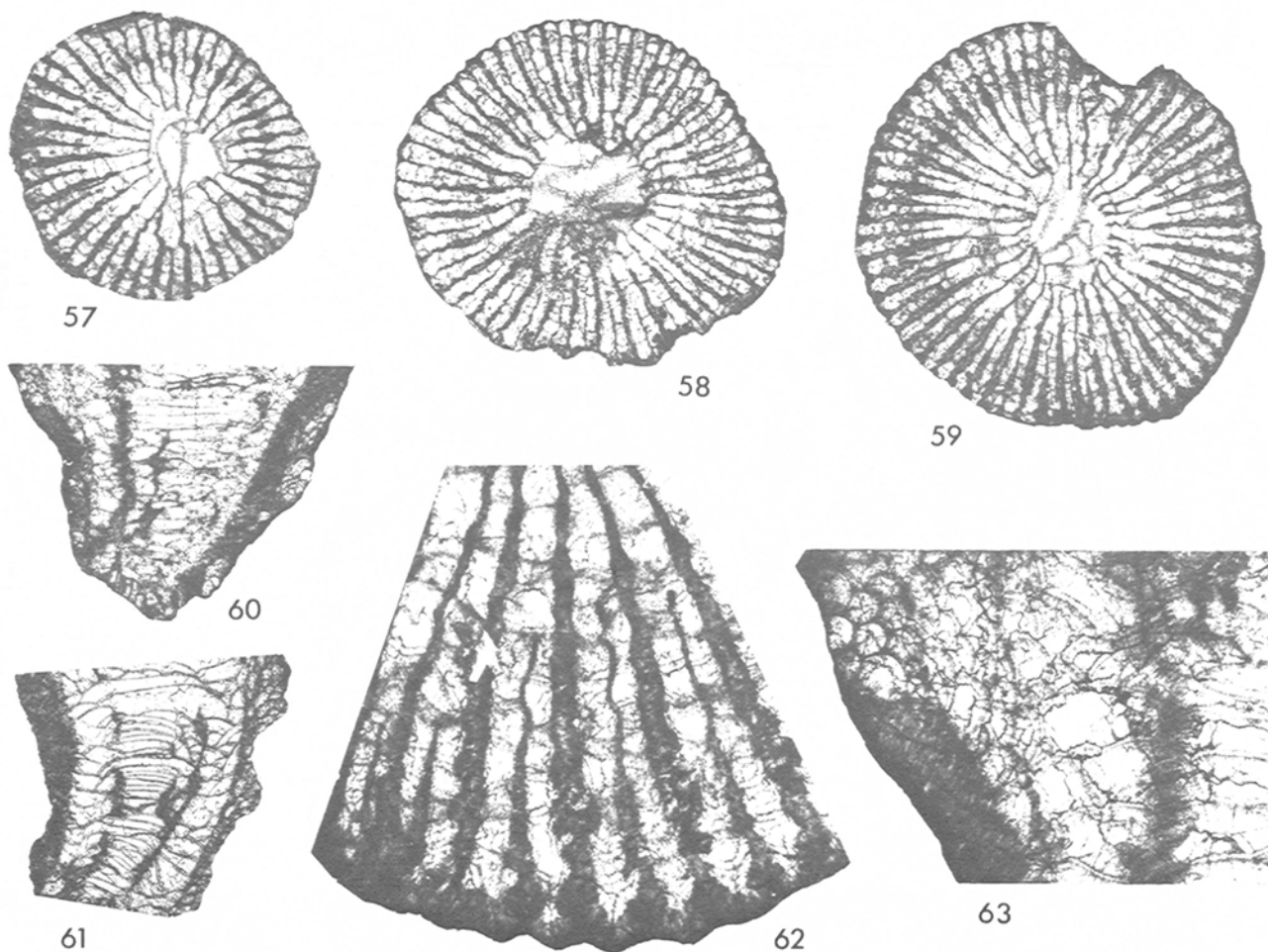


Plate 42.1

Figures 57-63. *Mansuyphyllum consolum* sp. n.

57, 61. Paratype, UA 7061, transverse and longitudinal thin sections, x3; UA locality PCC 92246.

58-60, 62, 63. Holotype, UA 7060, two transverse and a longitudinal thin section, x3, and parts of transverse and longitudinal thin sections, x10; UA locality PCC 92232.

The dissepimentarium is narrow, usually comprising only four to six rows of dissepiments in adult stages. Dissepiments in the outer rows tend to be small and well inflated. Interior dissepiments are more elongate and are steeply inclined. Tabulae are broad, some are quite complete. Tabularial surfaces are commonly more or less flat periaxially, and downturned marginally. Thin layers of sclerenchyme cover many of the more proximally situated tabularial surfaces.

Remarks. *Mansuyphyllum comsolum* resembles *M. versicularium*, and the two species are presumed to be closely related. *M. comsolum* is distinguished by having shorter major septa, a much narrower dissepimentarium, and broad tabulae that tend to form periaxially flat tabularial surfaces.

The trivial name *comsolum* is formed from the Latin noun *solum*, meaning bottom, floor etc., and the prefix *com-*, meaning with. It refers to the relatively wide, almost flat tabularium of the species.

Acknowledgments

Brian Jones, University of Alberta, identified the brachiopods listed in the Locality Register and supervised Goodbody's field work. B.D.E. Chatterton, University of Alberta, isolated and identified conodonts from a sample of Bird Fiord Formation collected by Brian Jones and Goodbody. The age significance of this fauna was also discussed with T.T. Uyeno, Institute of Sedimentary and Petroleum Geology. David Worsley, University Paleontological Museum, Oslo, provided copies of some of Schei's unpublished field notes. The photography is the work of B.C. Rutley and W.B. Sharman, both of the Institute of Sedimentary and Petroleum Geology. R.D. Michie, of the same Institute, assisted in preparing thin sections. Goodbody's field work was supported logistically by the Polar Continental Shelf Project, and financially by the National Sciences and Engineering Research Council of Canada (grant no. A6090 to Brian Jones), the Boreal Institute for Northern Studies, the Arctic Institute of North America, the Geological Society of America and the American Association of Petroleum Geologists.

We are grateful to these individuals and organizations for their considerable aid.

Locality Register

All localities are on southwestern Ellesmere Island in the District of Franklin. Brachiopods of the faunal lists were identified by Brian Jones. UA and PCC are abbreviations for the University of Alberta and Paleontological Collections Catalogue.

UA locality PCC 92068. Bird Fiord Formation, 375.5 m above base, and 125.5 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality. Blubber Point; 76°36'N latitude, 89°35'W longitude. Collected by Q.H. Goodbody, 1981. *Favosites* sp., *Cladopora* sp., *Oculipora*? sp., *Lekanophyllum retiforme* Pedder, *L. rugulosum* Pedder, *Taimyrophyllum* sp., *Mansuyphyllum uyenoii avernale* Pedder and Goodbody, *Schizophoria sulcata* Johnson and Perry, indeterminate strophomenid brachiopod, *Minutostropheodonta*? sp., *Trigonirhynchia*? sp., *Spinatrypa* sp., *Perryspirifer scheii* (Meyer), "Elythina" sverdrupi Brice, indeterminate bivalves.

UA locality PCC 92070. Bird Fiord Formation, 385 m above base, and 135 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality. Same section and collection data as UA locality PCC 92068. *Cladopora* sp., *Alveolites* sp., *Oculipora*? sp., *Syringopora* sp.,

Lekanophyllum foliatum Pedder and Goodbody, *L. retiforme* Pedder, *L. rugulosum* Pedder, *Taimyrophyllum* sp., *Mansuyphyllum uyenoii avernale* Pedder and Goodbody, *M.* sp., *Schizophoria sulcata* Johnson and Perry, indeterminate strophomenid brachiopod, *Minutostropheodonta*? sp., *Spinatrypa* sp., *Perryspirifer scheii* (Meyer), "Elythina" sverdrupi Brice.

UA locality PCC 92229. Bird Fiord Formation, approximately 350 m above base, and 58 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality. Top of the northeastern wall of a cirque, north fork of valley, 9 km north-northwest of the head of Muskox Fiord; 76°42'26"N latitude, 87°28'W longitude. Collected by Q.H. Goodbody, 1982. *Favosites* sp., *Oculipora*? sp., *Lekanophyllum foliatum* Pedder and Goodbody, *L. rugulosum* Pedder, *Schizophoria sulcata* Johnson and Perry, *Atrypa* sp. B of Jones (1982), *Perryspirifer scheii* (Meyer), "Elythina" sverdrupi Brice.

UA locality PCC 92230. Bird Fiord Formation, approximately 352 m above base, and 60 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality. Same section and collection data as UA locality PCC 92229. *Alveolites* sp., *Oculipora*? sp., *Lekanophyllum foliatum* Pedder and Goodbody, *L. retiforme* Pedder, *Mansuyphyllum versicularium* Pedder and Goodbody, *Schizophoria sulcata* Johnson and Perry, *Atrypa* sp. B of Jones (1982), *Perryspirifer scheii* (Meyer), "Elythina" sverdrupi Brice, biaxial crinoid ossicles.

UA locality PCC 92232. Bird Fiord Formation, approximately 368 m above base, and 76 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality. Same section and collection data as UA locality PCC 92229. *Alveolites* sp., undetermined sponge, *Lekanophyllum foliatum* Pedder and Goodbody, *Mansuyphyllum comsolum* Pedder and Goodbody, *Minutostropheodonta*? sp., *Atrypa* sp. B of Jones (1982), *Spinatrypa borealis* (Warren), *Perryspirifer scheii* (Meyer).

UA locality PCC 92233. Bird Fiord Formation, approximately 374 m above base, and 82 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality. Same section and collection data as UA locality PCC 92229. *Cladopora* sp., *Alveolites* sp., *Oculipora*? sp., *Syringopora* sp., *Lekanophyllum foliatum* Pedder and Goodbody, *L. retiforme* Pedder, *L. rugulosum* Pedder, *Taimyrophyllum* sp., *Atrypa* sp. B of Jones (1982), *Spinatrypa borealis* (Warren), "Elythina" sverdrupi Brice, biaxial crinoid ossicles.

UA locality PCC 92240. Bird Fiord Formation, spot sample from approximately 375 m above base, and 90 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality. Eastern side of main valley, 10 km north of the head of Muskox Fiord; 76°42'33"N latitude, 87°42'15"W longitude. Collected by Q.H. Goodbody, 1982. Caunopore consortium, *Oculipora*? sp., *Aulopora* sp., *Lekanophyllum foliatum* Pedder and Goodbody, *L. retiforme* Pedder, *Taimyrophyllum* sp., *Mansuyphyllum versicularium* Pedder and Goodbody, *Schizophoria sulcata* Johnson and Perry, indeterminate strophomenid brachiopod, *Trigonirhynchia*? sp., *Atrypa* sp. B of Jones (1982), *Spinatrypa borealis* (Warren), *Emanuella* sp., "Elythina" sverdrupi Brice.

UA locality PCC 92244. Bird Fiord Formation, spot sample from approximately 400 m above base, and 115 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality (UA locality PCC 92244 is 25 m stratigraphically above UA locality PCC 92240). Eastern side of main valley, 10 km north of the head of Muskox Fiord; 76°42'45"N latitude, 87°42'W longitude. Collected by

Q.H. Goodbody, 1982. Caunopore consortium, *Favosites* sp., *Cladopora* sp., *Alveolites* sp., *Oculipora* ? sp., *Syringopora* sp., *Lekanophyllum foliatum* Pedder and Goodbody, *L. retiforme* Pedder, *L. rugulosum* Pedder, *Taimyrophyllum* sp., *Atrypa* sp. B of Jones (1982), *Spinatrypa borealis* (Warren), *Howellella* ? sp. *Perryspirifer scheii* (Meyer).

UA locality PCC 92246. Bird Fiord Formation, spot sample from approximately 420 m above base, and 135 m above the top of the gypsiferous dolostone unit in the lower part of the formation at this locality (UA locality PCC 92246 is 20 m stratigraphically above UA locality PCC 92244, and 45 m stratigraphically above UA locality PCC 92240). Eastern side of main valley, 10 km north of the head of Muskox Fiord; 76°42'45"N latitude, 87°42'W longitude. Collected by Q.H. Goodbody, 1982. *Cladopora* sp., *Alveolites* sp., *Oculipora* ? sp., *Syringopora* spp. (2), *Lekanophyllum foliatum* Pedder and Goodbody, *L. retiforme* Pedder, *L. rugulosum* Pedder, *Ellesmerelasma pumile* Pedder and Goodbody, *Taimyrophyllum* sp., *Mansuyphyllum consolum* Pedder and Goodbody, *M. versicularium* Pedder and Goodbody, *Schizophoria sulcata* Perry and Johnson, indeterminate strophomenid brachiopod, *Trigonirhynchia* ? sp., *Atrypa* sp. B of Jones (1982), *Spinatrypa borealis* (Warren), *Emanuella* sp., *Perryspirifer scheii* (Meyer), *Costacranaena marlenae* Johnson and Perry.

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