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FAUNAS AND CORRELATION OF THE LATE PALEOZOIC ROCKS OF NORTHEAST GREENLAND

Part IV
BRYOZOA

BY

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WITH 7 FIGURES IN THE TEXT
AND 18 PLATES

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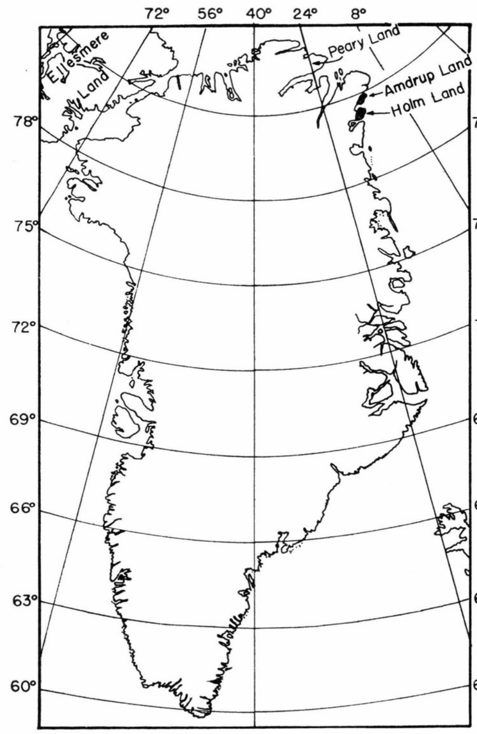

Fig. 1. Map of Greenland showing location of Holm and Amdrup Land, northeast Greenland.

Fig. 2. Geological sketch map of late Paleozoic strata and position of stratigraphic sections on Holm and Amdrup Land measured by NIELSEN, after NIELSEN (1941).

INTRODUCTION

Although in a very remote and isolated part of the world a number of courageous scientific expeditions have explored the icy expanses of northeast Greenland.

On the Denmark Expedition of 1906—1908, Captain I. P. KOCH and Dr. ALFRED WEGENER made numerous collections of fossiliferous rocks exposed along the coast of Holm and Amdrup Land between 80 and 81 degrees North latitude. These promontories, separated by Ingolf Fjord, form part of the eastern coast of northeast Greenland (text-figs. 1, 2).

On the Denmark Expedition to northeast Greenland under the leadership of Ambassador EBBE MUNCK and Count EIGIL KNUTH during 1938—1939, Dr. EIGIL NIELSEN made extensive fossil collections from thirteen measured stratigraphic sections in the late Paleozoic rocks of Holm and Amdrup Land. NIELSEN (1941) reported on the geologic observations of the expedition and FREBOLD (1950) described the brachiopod assemblages that had been collected.

The Bryozoa used in this study come from the collections of both the Denmark Expeditions of 1906—1908 and 1938—1939. This material is housed in the Mineralogical Museum, The University of Copenhagen, Copenhagen, Denmark, and the MMUH numbers (ref. the text & the plates) refer to the catalogue of figured specimens in this museum (abbreviated MMUH). The study was undertaken at Peabody Museum, Yale University, in 1960.

The authors are indebted to Professor CARL O. DUNBAR, Yale University, for permitting us to see the fusulinids collected from the late Paleozoic sequence of northeast Greenland and extend our sincere thanks to him for his help and advice. We are also grateful to Miss HELEN DUNCAN, U.S. Geological Survey, for helpful discussions and Mrs. LOUISE HOLTZINGER for her care in typing the manuscript.

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STRATIGRAPHIC SUCCESSION AND FOSSILS

Late Paleozoic strata are exposed along the eastern coast of Holm and Amdrup Land and form a plateau 100 to 500 metres high and about 30 kilometres wide. Gneisses crop out at various low promontories along the coast and, to the west, metamorphic rocks rise to about 1000 metres (text-figure 2).

The base of the Late Paleozoic strata is apparently poorly exposed and its relation to the gneisses and metamorphic rocks is not thoroughly understood. The Paleozoic strata are gently warped and the folds plunge at low angles to the northeast so that successively younger beds appear northward along the coast of Holm Land (Nathorst, 1911, p. 339—341). In Amdrup Land a similar stratigraphic succession plunging gently to the northeast is essentially a repetition of the Holm Land stratigraphic section.

The stratigraphy and collecting localities from the Denmark Expedition of 1906—1908 are discussed in detail by Grönwall (1917, p. 518—529). On Holm Land, Koch and Wegener measured and collected fossils from two profiles near Depot 80°09′, "Koch's Section" and, to the east, "Conglomerate Section". Material from these two profiles was not available for examination. The only collections available in which Bryozoa were present are float blocks collected by Dr. Alfred Wegener at Mallemukfjeld and Eskimonæs, Holm Land (text-figure 2). These loose blocks collected by Dr. Wegener were apparently derived from strata higher than the rocks exposed in either of the two measured profiles. In the two float blocks from Mallemukfjeld, the bryozoan species present include: Sample No. 153, *Tabulipora* sp. A, and *Polypora* sp. cf. *P. timorensis* Bassler; Sample No. 154, *Rhombotrypella* sp. cf. *R. composita* Nikiforova and *Tabulipora* sp. B.

In the float blocks from Eskimonæs, the bryozoan assemblages include:

Sample No. 204, *Rhombotrypella* sp. cf. *R. gigantea* sp. nov., *Stenopora*? sp., and *Ramipora*? sp.

Sample No. 210, *Rhombotrypella* sp. B, *Polypora* sp. cf. *P. russiensis* Shulga-Nesterenko.

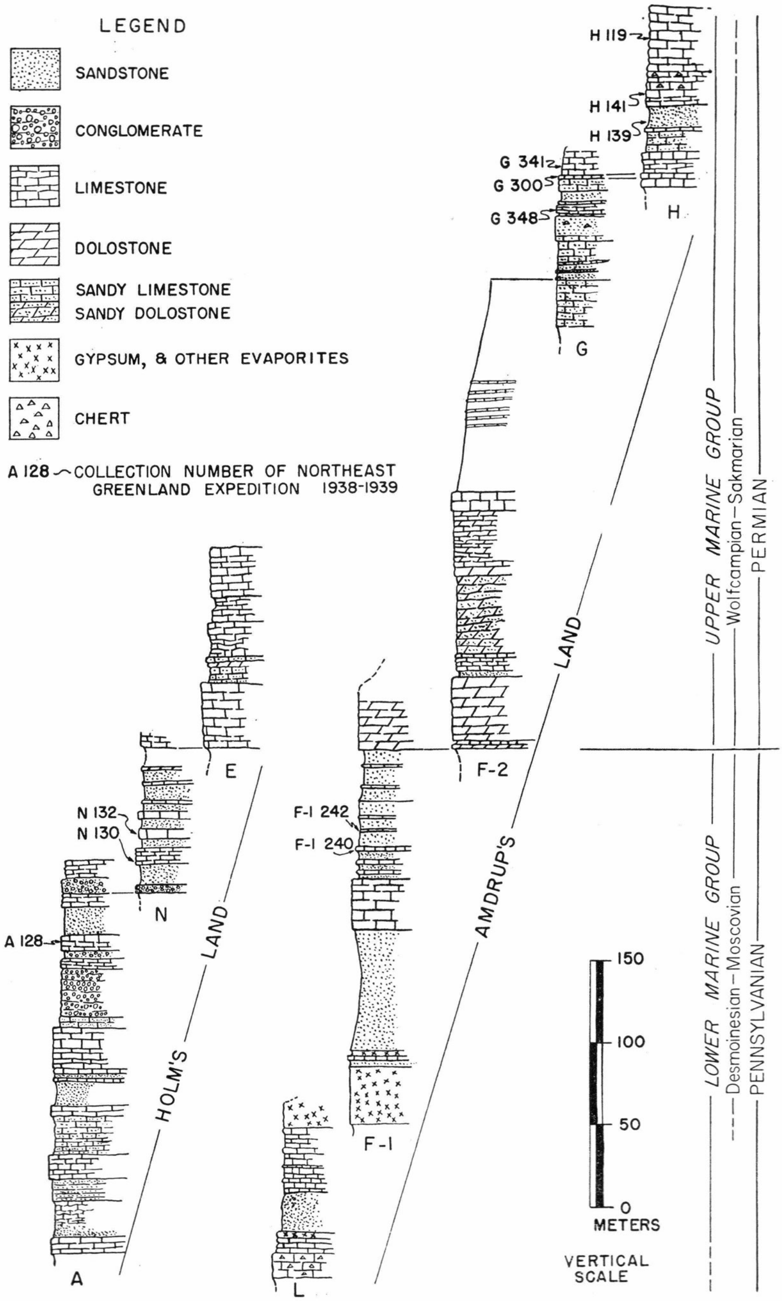

Fig. 3. Stratigraphic sections of the Pennsylvanian and Permian beds on Holm and Amdrup Land.

Sample No. 212, *Timanodictya* sp. cf. *T. dichotoma* (STUCKENBERG).
Sample No. 213, *Tabulipora* sp. C.

The two composite stratigraphic sections shown in text-figure 7 are compiled from a number of sections measured by EIGIL NIELSEN in 1938—1939 as published by FREBOLD (1950, p. 13—33). The stratigraphic position of the small samples containing Bryozoa collected by the expedition are shown beside the graphical sections.

Bryozoan material from Sections A and N on Holm Land (text-fig. 3) was collected from the upper part of the sections in calcarenite interbedded between conglomerate and sandstone. Sample A 128, 323—333 metres from the base of Section A measured at Depotfjeld, south coast of Holm Land, is a conglomeratic calcarenite weathering red and grey and having numerous brachiopods and large zoarial fragments of *Rhombotrypella holmensis* sp. nov. Sample No. 130, 58—68 metres above the base of Section N measured at Mallemukfjeld, east of Depotfjeld, is a reddish weathering calcarenite having brachiopods, smaller Foraminifera, algae, crinoid columnals, and thick cylindrical colonies of *Rhombotrypella mallemukensis* sp. nov., *Fenestella* sp., *Pennitepora* sp., and fine fragments of a fistuliporid and rhomboporid. Sample No. 132, 73—77 metres above the base of Section N is also a calcarenite weathering red and gray and having brachiopods, crinoid stems, tabulate corals, and *Rhombotrypella* sp.

To the north on Amdrup Land, the Denmark Expedition of 1938—1939 collected fossiliferous rocks from thin calcarenite units interbedded between sandstone in sections in the vicinity of Kap Jungersen (text-figs. 2, 3). In Section F 1, Sample F 1 240, 243—244 metres above the base of the section measured just west of Kap Jungersen, is a conglomeratic calcarenite, weathering orange-brown and having brachiopods, clay pellets, chert pebbles, and fragments of a delicate fenestellid *Polypora* sp. cf. *P. martis* FISCHER. In the succeeding beds measured between 244—272 metres above the base of Section F 1, Sample F 1 242 is a calcareous siltstone having brachiopods, algae, thick cylindrical branches of *Rhombotrypella amdrupensis* sp. nov., and small unidentifiable stenoporids.

Northeast of Kap Jungersen in beds considerably higher in the sequence than those near Kap Jungersen, bryozoan material is present in limestone and sandstone units in Sections G and H. In Sample G 348, 175.7—177.2 metres above the base of the section, a recrystallised calcilutite has a delicate *Polypora* sp. cf. *P. ovaticella* SHULGA-NESTERENKO, *Rhombotrypella* sp., and *Stenopora* sp. Sample G 300, 193—194.5 metres above the base of the section is a reddish weathering ferruginous quartzose calcarenite having brachiopods, algae, large solitary corals, smaller Foraminifera, extraordinarily thick branches of *Rhombotrypella gigantea* sp. nov., thick multilaminate colonies of *Tabulipora greenlandensis* sp. nov., and a delicate fenestellid *Polypora* sp. cf. *P. subovaticellata* SHULGA-NESTERENKO. In the overlying calcareous siltstone, 194.5 metres above the base of the section, Sample G 341 has brachiopods, solitary corals, a coarse fenestellid *Polypora amdrupensis* sp. nov., and a delicate species of *Fenestella*.

Three kilometres north of Section G and stratigraphically higher in the sequence, Bryozoa are found in Samples H 139, H 141, and H 119 in Section H. Sample H 139, 228—240 metres above the base of the section, is a quartzose calcarenite having brachiopods, algae, sponge fragments, cylindrical branches of *Stenopora thula* sp. nov., a coarse fenestrate fragment of *Polypora*, and thick stems of *Rhombotrypella* sp. C. Sample H 141, 240—258 metres above the base of the section, is a calcarenite having brachiopods, crinoid columnals, cylindrical branches of *Stenopora jungersenensis* sp. nov., *Rhombotrypella* sp. A, *Rhabdomeson*? sp., and small unidentifiable stenoporids. Sample H 119, 258—305 metres above the base of the section is a yellow to grey calcarenite having brachiopods, crinoid columnals, and very thick cylindrical branches of *Tabulipora arcticensis* sp. nov.

AGE AND CORRELATION

Historical Review.

AMDRUP (1913) published an account of the Denmark Expedition of 1906—1908 to northeast Greenland. NATHORST (1911) described plant fossils collected by this expedition from the lower non-marine deposits and assigned a lower Carboniferous age to this part of the succession. GRÖNWALL (1917) outlined a stratigraphic sequence from the accounts and notes of the expedition and described the brachiopods in the collections from the thick fossiliferous marine shale and limestone sequence overlying the non-marine deposits. As the material collected by the expedition was mainly loose blocks, only a sketchy stratigraphic sequence could be compiled. However GRÖNWALL (1917, p. 549) divided the late Paleozoic succession of northeast Greenland into three groups. At the base a Terrestrial Group of shale and sandstone about 200 metres thick, overlain by a Lower Marine Group of bituminous limestone and shale, 100 to 200 metres thick, and at the top an Upper Marine Group of light grey limestone and chert, 500 to 1000 metres thick. He (1917, p. 611) suggested that the Lower Marine Group was of middle Late Carboniferous age and that the Upper Marine Group was of later Carboniferous age and equivalent to the *Schwagerina* horizon of Russia (subsequently placed in the Sakmarian Series of the Lower Permian). GRÖNWALL also compared the brachiopod fauna from the Upper Marine Group with the *Spirifer* Limestone (upper Carboniferous as it was then recognized) of Spitsbergen.

FREBOLD (1950, p. 13—33) in his study of the brachiopods collected by the Denmark Expedition of 1938—1939 showed that the Lower Marine Group was about 800 metres thick and the Upper Marine Group, 250—300 metres thick. He believed (1950, p. 50) that the lower part of the Lower Marine Group, that is, beds beneath the gypsum-bearing unit on Amdrup Land (text-fig. 3) was of Late Carboniferous age and equivalent to the Russian *Triticites* zone, or the Gzhel beds in the Moscow Basin. FREBOLD believed (1950, p. 90) that the gypsum-bearing unit was equivalent to the upper gypsum beds of Spitsbergen, an upper member of the *Cyathophyllum* Limestone, and that the overlying upper part of the Lower Marine Group was thus younger than Carboniferous and must be of early Permian age. He concluded, like GRÖNWALL, that the Upper

Marine Group of northeast Greenland was correlative with the Spirifier Limestone of Spitsbergen and the *Schwagerina (Pseudoschwagerina)* Limestone of the Lower Permian of Russia.

Age.

The northeast Greenland Terrestrial Group has a floral assemblage similar to that of the Bellefjord Sandstone, Lower Carboniferous, of Spitsbergen (NATHORST, 1911). The lower part of the Lower Marine Group below the gypsum-bearing beds contains *Profusulinella*, *Paraeofusulina*, and *Fusulinella* and is correlative with the Passage beds of Spitsbergen (FORBES, *et al.*, 1958, p. 470), the Bashkirian and the lower part of the Moscovian of the Middle Carboniferous of Russia, and the upper part of the Atokan and lower part of the Desmoinesian of the United States. Above the gypsum-bearing beds the upper part of the Lower Marine Group has *Rhombotrypella amdrupensis* sp. nov., *R. holmensis* sp. nov., *R. mallemukensis* sp. nov., *Polypora* sp. cf. *P. martis* FISCHER, and species of *Fusulina*, *Taitzehoella*, and *Wedekindellina* that indicate a late Moscovian and late Desmoinesian age. It is probably correlative with the Lower Wordiekammen Limestone ("Black Crag"), upper Moscovian of Spitsbergen.

Near the base of the Upper Marine Group, the calcarenite 50 metres above the massive dolostone (text-figure 3) has species of *Pseudoschwagerina*, *Schwagerina*, *Rugosofusulina*, and *Daixina* which suggest a correlation with the Mid Wordiekammen Limestone of Spitsbergen, the Asselian Stage (usage according to RUZHENCEV, 1954) of the Lower Permian of Russia, and the Wolfcampian Series af the United States.

The upper part of the Upper Marine Group, in which fusulinids are absent, contains *Polypora* sp. cf. *P. ovaticella*, *Rhombotrypella gigantea* sp. nov., *Tabulipora greenlandensis* sp. nov., *Polypora* sp. cf. *P. subovaticellata*. SHULGA-NESTERENKO, *P. amdrupensus* sp. nov., *Stenopora thula* sp. nov., *S. jungersenensis* sp. nov., *Rhombotrypella* sp. A., *Rhombotrypella* sp. C., *Tabulipora arcticensis* sp. nov. These bryozoan species show similarity to those described from the Sakmarian Stage (restricted sense of RUZHENCEV, 1954) and from the lower part of the Artinskian Stage of the Lower Permian of Russia.

Relation with other Bryozoan Faunas.

The Bryozoa from the late Paleozoic rocks of northeast Greenland are predominantly stenoporids and fenestellids and the collections examined suggest that fistuliporids are not abundant. The fauna from the upper part of the Lower Marine Group on Holm and Amdrup Land shows affinity with the middle and late Carboniferous fauna of the Moscow Basin but the two faunas are far from identical. They are similar in the strong representation of species of *Rhombotrypella. R. holmensis* sp. nov. is similar to specimens assigned to *Rhomboporella typica* BASSLER by SHULGA-NESTERENKO and found in the Kasimov horizon (C_3^{ks}, lower horizon of the Russian upper Carboniferous and the *Triticites-Protriticites* zone) of the Moscow Basin; *Rhombotrypella amdrupensis* sp. nov. resembles *R. astragaloides* NIKIFOROVA from the middle Carboniferous, C_2^4, of the Donetz Basin, and *Rhomboporella pentagonalis* SHULGA-NESTERENKO from the Gzhel stage, upper Carboniferous, Moscow Basin. *Rhombotrypella mallemukensis* sp. nov. shows resemblances to *R. astragaloides* NIKIFOROVA from the middle Carboniferous, C_2^4, of the Donetz Basin, and to *R. subcomposita* SHULGA-NESTERENKO from the Gzhel Stage, Moscow Basin. A species of *Polypora* in the northeast Greenland assemblage is similar to the cosmopolitan species *P. martis* FISCHER ranging from the middle Carboniferous (C_2^4) into the Lower Permian (P_1^a) in the Moscow Basin and the Urals and found in the middle and upper Carboniferous of the Donetz Basin. This species of *Polypora* also resembles *P. cestriensis* ULRICH var. *kassimovensis* NIKIFOROVA from the C_2^3 and C_2^5 of the Donetz Basin.

Although Bryozoa have been described from the Permian of Spitsbergen, little is known of their occurrence in the Carboniferous. LEE (1908, p. 152—155) identified a new species of *Stenopora*, *S. brucei*, Upper Carboniferous?, from scant material collected from Prince Charles Foreland but this species is not comparable to any species in the Carboniferous or Permian of northeast Greenland. LEE (1909, p. 156) noted that Bryozoa were poorly represented in a Lower Carboniferous? limestone collected from a cliff at the extremity of Cape Cherney, a promontory situated on the western coast of southern Novaja Zemlya in latitude 70°49′ and longitude 56°37′. He recorded *Stenopora* sp. and *Polypora* sp. cf. *P. papillata* McCOY.

The bryozoan assemblages from the upper part of the Lower Marine Group of Holm and Amdrup Land show no relation with other Carboniferous faunas from Europe, North America, and Australia.

The bryozoan fauna from the upper part of the Upper Marine Group is not closely related to any previously described Lower Permian faunas. It shows general similarities with the Lower Permian faunas of the Russian Urals. The Family Stenoporidae is well represented by the Russian genus *Rhombotrypella* and the genera *Tabulipora* and *Stenopora* which characterize some Lower Permian bryozoan assemblages from the Urals. Few bryozoan assemblages having good representation of these genera have been described from the lower most part of the Russian

Lower Permian (Sakmarian) so that comparison commonly had to be made with Artinskian faunas. The lower Permian species of the genera *Tabulipora* and *Stenopora* from northeast Greenland are not closely similar to any species in the Russian deposits. Comparing the fenestellids, *Polypora amdrupensis* sp. nov. is similar to *P. ornamentata* Shulga-Nesterenko and *P. supraornamentata* Shulga-Nesterenko from the Sterlitamak horizon, Sakmarian Series of the Urals. A species of *Polypora* from Sample G 348 is comparable with *P. ovaticella* Shulga-Nesterenko from the lower Artinskian, sponge-fusulinid horizon, Verkne Chusovskye Gorodki, of the Urals, and another species is comparable with. *P. subovaticellata* Shulga-Nesterenko from the lower Artinskian (Burtsevka horizon) of the eastern Urals. This northeast Greenland species is also similar to *P. longa* Shulga-Nesterenko from the bryozoan-reef horizon, lower Artinskian, Verkne Chusovskye Gorodki, of the Urals. The species of *Rhombotrypella* have little resemblance to the Russian species except

Species / Occurrence	Permian						Pennsylvanian				
	H 119	H 141	H 139	G 341	G 300	G 348	F_1 242	N 132	F_1 240	N 130	A 128
Rhombotrypella holmensis sp. nov.											×
R. mallemukensis sp. nov......										×	
Rhombotrypella sp...........								×			
R. amdrupensis sp. nov........							×				
Rhombotrypella sp...........						×					
R. gigantea sp. nov...........					×						
Rhombotrypella sp. C..........			×								
Rhombotrypella sp. A..........		×									
Stenopora thula sp. nov........			×								
Stenopora jungersenensis sp.nov.		×									
Stenopora sp................						×					
Tabulipora greenlandensis sp. nov..................					×						
T. arcticensis sp. nov..........	×										
Polypora sp. cf. *P. martis* Fischer..................									×		
Polypora sp. cf. *P. ovaticella* Shulga-Nesterenko						×					
Polypora sp. cf. *P. subovaticellata* Shulga-Nesterenko					×						
P. amdrupensis sp. nov........				×							
Fenestella sp................										×	
Fenestella sp................				×							
Penniretepora sp............										×	
Rhabdomenson? sp...........		×									

Species / Occurrence	Permian Wolfcampian?					
	Float–Eskimonæs				Float–Mallemukfjeld	
	No. 213	No. 212	No. 210	No. 204	No. 154	No. 153
Rhombotrypella sp. cf. *R. composita* NIKIFOROVA					×	
Rhombotrypella sp. cf. *R. gigantea* sp. nov.				×		
Rhombotrypella sp. B			×			
Stenopora? sp.				×		
Tabulipora sp. A						×
Tabulipora sp. B					×	
Tabulipora sp. C	×					
Polypora sp. cf. *P. timorensis* BASSLER						×
Polypora sp. cf. *P. russiensis* SHULGA-NESTERENKO			×			
Ramipora? sp.				×		
Timanodictya sp. cf. *T. dichotoma* (STUCKENBERG)		×				

for *Rhombotrypella* sp. C which has transverse sections similar to *R. composita* NIKIFOROVA from the Sakmarian Series of the Ural Mountains.

This northeast Greenland Lower Permian fauna shows no affinites with Permian bryozoan assemblages of the Salt Range of India, and Timor. From the Spitsbergen Permian sequence, *Polypora timorensis* var. *greenharbourensis* NIKIFOROVA from the Brachiopod Chert, Artinskian, western coast of Green Harbour, Central Vestspitsbergen, has similarities to *Polypora* sp. cf. *P. ovaticella* from the northeast Greenland sequence. In the Western Australian Permian sequence *Polypora fovea* Crockford from the Nooncanbah Series has a meshwork formula partly similar to *Polypora* sp. cf. *P. subovaticellata* SHULGA-NESTERENKO, northeast Greenland. From the Eastern Australian Permian sequence, *Polypora pertinax* LASERON from the *Eurydesma cordatum* horizon, Allandale, New South Wales, also has similarities in its meshwork to *Polypora subovaticellata* SHULGA-NESTERENKO, northeast Greenland.

SYSTEMATIC PALAEONTOLOGY

Order **Trepostomata.**

Family **Stenoporidae** WAAGEN and WENTZEL 1886.

Rhombotrypella NIKIFOROVA 1933.

Rhombotrypella NIKIFOROVA, 1933, U.S.S.R. United Geological and Prospecting Service Trans., Fasc. 237, p. 9, 35:
— NIKIFOROVA, 1938b, U.S.S.R. Acad. Sci., Paleont. Inst., v. 4, pt. 5, Fasc. 1, p. 57, 223.

Type species: *Rhombotrypella astragaloides* NIKIFOROVA, 1933, U.S.S.R. United Geological and Prospecting Service Trans., Fasc. 237, p. 9, 10, 36, pl. 4, figs. 1—4, text-fig. 8. C_2^4 (middle Carboniferous), Donetz Basin.

Generic Diagnosis: "Zoarium ramose, continuous. External surface bearing both acanthopores and mesopores. Zooecia in transverse sections of axial region quadrate in outline. Zooecial walls in peripheral part thickened, beaded; perforated diaphragms present" (NIKIFOROVA, 1938b, p. 223).

Remarks: NIKIFOROVA (1933) erected the genus *Rhombotrypella* for Carboniferous species occurring in the Donetz Basin and placed the genus in the Order Trepostomata. This distinctive genus is found by the Russians to range from the middle Carboniferous (C2) to the lower Permian (Artinskian) in the U.S.S.R. Subsequently species of *Rhombotrypella* have been described from the middle and upper Carboniferous (C2 and C3) of the Donetz and Moscow Basins, Pennsylvanian of Utah, and the Permian of the Urals and Timan. The present study extends the distribution of the genus to the Pennsylvanian and Permian of Greenland.

BASSLER (1936) briefly described a new cryptostome genus *Rhomboporella* from material found in the "Carboniferous of Chulpapampa, Bolivia." Very little data is available on the taxonomic characters and the stratigraphic position of this genus and Russian palaeontologists who have worked extensively with species of *Rhombotrypella* have generally regarded *Rhomboporella* as a synonym of *Rhombotrypella*. Re-examination of the holotype of *Rhomboporella typica* is needed to give a

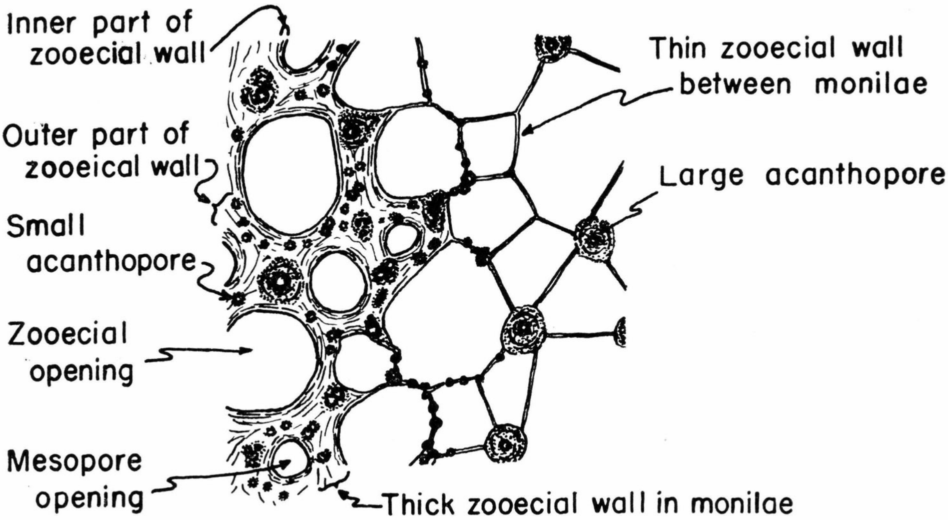

Fig. 4. Tangential section of *Tabulipora greenlandensis* sp. nov. showing moniliform walls separating zooecial tubes and mesopores, large acanthopores having concentrically laminate walls and clear calcite axes, and small granular acanthopores. × 50.

complete analysis and to determine the taxonomic position of *Rhomboporella.* If the transverse structures at the base of the peripheral regions prove to be perforate diaphragms and not superior hemisepta as described by BASSLER (1936), the species *R. typica* may belong to *Rhombotrypella.*

SHULGA-NESTERENKO (1955) has recently assigned species to *Rhomboporella* that have irregular polygonal zooecia in the inner part of the axial region and regular quadrate zooecia in the outer part of the axial region, and she has retained the genus *Rhombotrypella* for species having regular networks of quadrate zooecia in the axial regions. BASSLER's illustrations (1936, fig. 12) suggest the species *Rhomboporella typica* BASSLER has polygonal zooecia in its axial region but this feature does not seem to have taxonomic generic significance. In certain species from northeast Greenland, transverse sections across a branch at different levels show varying features in the axial region. Some transverse sections have regular networks of quadrate zooecia and others show polygonal zooecia in the inner part of the axial region and quadrate zooecia in the outer part of the axial region. These irregular zones of polygonal zooecia may be associated with budding or branching of a colony.

Interpretation of the Skeletal Microstructures based on species from northeast Greenland:

In longitudinal thin sections, the zooecial walls are longitudinally laminate in the axial regions except where arcuate rows of monilae extend across the zoarial branches (text-fig. 5). The zooecial walls

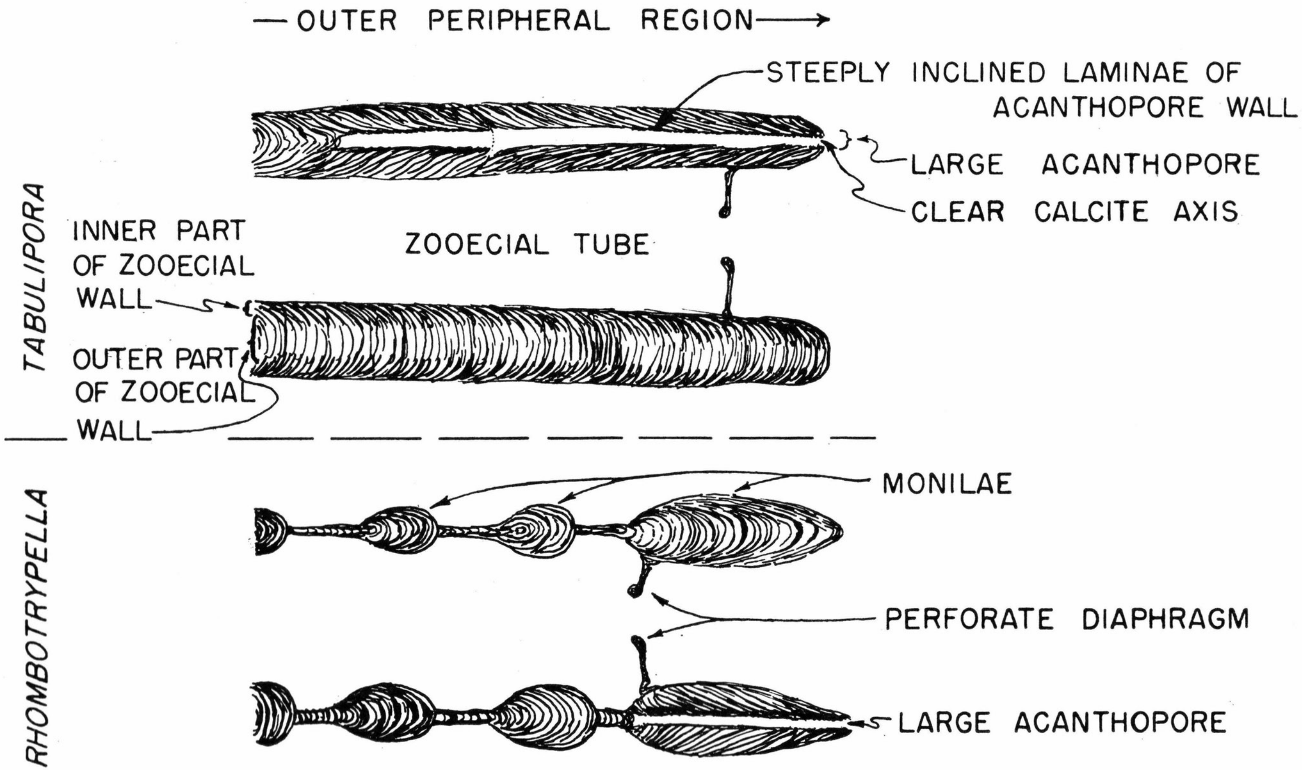

Fig. 5. Portion of longitudinal sections through the peripheral part of colonies of *Rhombotrypella* and *Tabulipora* showing the distally convex laminate zooecial walls, moniliform walls, perforate diaphragms, and large acanthopores having steeply inclined laminate walls. $\times$ 50.

commonly bifurcate above these arcuate rows of monilae. The zooecial walls generally thicken greatly in the peripheral region and may or may not be strongly moniliform. These walls (text-fig. 5, pl. 2, fig. 1, pl. 3, fig. 1; pl. 7, figs. 1, 3) consist of steeply inclined laminae lining the zooecial tubes and they become broadly convex distally in the outer part where laminae of adjacent zooecial walls intertongue and are amalgamate. Large acanthopores having clear calcite axes cut through the zooecial walls and the steeply inclined laminae of these large acanthopores wedge into the laminae of the zooecial walls. Small acanthopores which commonly are not discernible in longitudinal sections appear as dark irregular rods having dark granular axes and lines by slightly curved laminate zooecial walls. Both the large and small acanthopores may extend the complete depth of the peripheral region and in many instances they may project above the surfaces of the colonies. Large acanthopores may also penetrate monilae in the axial regions. The zooecial and mesopore openings are commonly closed by flat terminal diaphragms which curve laterally into the zooecial tubes and line the inner part of the zooecial walls. Perforate diaphragms present in different parts of the peripheral regions may have large perforations, generally centrally located, so that the diaphragms are narrow platforms that appear like short superior and inferior hemisepta that curve back at their perforated edge toward the axial region (text-fig. 5, pl. 7, fig. 1). These diaphragms connect with the inner part of the zooecial walls by turning sharply down toward the axial region and then hooking back into the steeply inclined laminae of the inner part of the zooecial walls.

In tangential sections, the oval or round zooecial openings are separated by amalgamate zooecial walls pierced by mesopores and small and large acanthopores. The zooecial wall consists of an inner part of concentric laminae lining the zooecial tube and an outer laminate part which is amalgamate with the outer part of adjacent zooecial walls. Mesopores likewise are contained in a similar wall structure. The distinctive large acanthopores occur at the junctions of the outer part of the zooecial walls and may, in some instances, indent the inner part of the zooecial walls. The large acanthopores have concentrically laminate walls and clear calcite axes. The small acanthopores which are also located in the outer part of the zooecial walls form one or more series of dark granular spots that may merge together.

In specimens of a species, the radius of the axial region is generally uniform along a branch. The radius of the peripheral region which in most species is small shows some variations of the order of .2—.3 mm. Thus the ratio of the radius of the zooecium/radius of the peripheral region varies correspondingly as the peripheral region varies. Most of the ratios determined on species of *Rhombotrypella* from northeast Green-

Species	Diameter Branch mm	Radius mm		No. of zooecia pr. 2 mm longitudinally	Diameter of Zooecial Opening mm	
		Zooecium	Peripheral Region		Intramonticule	Monticule
Rhombotrypella amdrupensis sp. nov.	4.7–5.7	2.9	.29?	4.5–5 Av. 5	Min. (.20×.16) Max. (.30×.20) Av. (.23×.16)	(.18×.13) (.26×.26) (.21×.20)
	5.2	2.6	1.0	4.5–6 Av. 5	Min. (.23×.16) Max. (.33×.26) Av. (.26×.20)	
Rhombotrypella holmensis sp. nov.	4.3–4.9	2.4	.8	5	Min. (.18×.10) Max. (.23×.13) Av. (.20×.12)	
Rhombotrypella mallemukensis sp. nov.	5.5–7.0	2.86	.64	4 –5.5 Av. 5	Min. (.20×.11) Max. (.23×.15) Av. (.21×.13)	(.30×.18) (.50×.46) (.36×.23)
	4.7	2.35 2.35	.57 .71	3 –5 Av. 4.5	Min. (.16×.13) Max. (.20×.16) Av. (.20×.12)	(.23×.13) (.26×.12)
Rhombotrypella sp. cf. *R. composita* NIKIFOROVA	5.8	2.9	.71	4 –6 Av. 5	Min. (.23×.26) Max. (.46×.46) Av. (.31×.30)	
				5 –6.5 Av. 5.5	Min. (.16×.13) Max. (.23×.20) Av. (.20×.14)	
Rhombotrypella sp. B.	4.5–6.5	2.9	.43?		Min. (.23×.10) Max. (.26×.16) Av. (.23×.12)	
Rhombotrypella sp. cf. *R. gigantea*	11.4	5.7 5.7	.14 .18	5 –6 Av. 5	Min. (.16×.13) Max. (.26×.21) Av. (.23×.17)	
Rhombotrypella sp. C.	7.4	3.7	1.14		Min. .16 Max. .30 Av. .23	
Rhombotrypella sp. A.	6–7	2.5	1.0	6	Min. (.16×.07) Max. (.33×.16) Av. (.21×.11)	
Rhombotrypella gigantea sp. nov.	25–28	13	4.3	6 –7 Av. 6.5	Min. (.16×.12) Max. (.30×.30) Av. (.23×.21)	

* Dimensions in monticule. Ratio* – Radius of the peripheral region/radius of the zooecium

Dimensions of Zooecial Wall mm		Diameter Acanthopore mm		Diameter Mesopore mm	Ratio*	Age
Longitud.	Laterally	Large	Small			
.01–.33 Av. .13 *.16–.23 *Av. .20	.01–.49 Av. .14 *.03–.23 *Av. .18	.07–.13	.01	Min. (.03×.03) Max. (.10×.08) Av. (.07×.06)	.10?	Desmoinesian
.01–.31 Av. .12	.01–.36 Av. .12	.07–.13	.01	Min. (.03×.03) Max. (.10×.12) Av. (.08×.07)	.38	Desmoinesian
.07–.39 Av. .23	.07–.20 Av. .14	.07		.03–.07	.23–.33	Desmoinesian
.13–.39 Av. .23 *.03–.23	.12–.30 Av. .20 *.03–.16	.07	.01–.02	Min. (.03×.03) Max. (.10×.09) Av. (.07×.06)	.22–.25	Desmoinesian
.10–.39 Av. .24	.10–.26 Av. .18	.07–.10	.01–.02	Min. (.03×.03) Max. (.07×.07)	.24–.27 .31	Desmoinesian
.02–.16 Av. .08	.07–.23 Av. .13	.07–.10	.01–.02	Min. (.10×.10) Max. (.20×.10) Av. (.13×.10)	.24	Wolfcampian?
.07–.39 Av. .18	.07–.26 Av. .16	.07	.01–.02	Min. (.07×.07) Max. (.10×.10) Av. (.08×.08)	Not det.	Wolfcampian?
.16–.20	.16–.23	.07	.01–.02	Min. (.07×.10) Max. (.13×.10)	.15?	Wolfcampian?
.07–.46 Av. .18	.01–.39 Av. .18	.07–.10	.01–.02	Min. (.07×.05) Max. (.10×.07)	.24 .31	Wolfcampian?
.07–.16					.3	Wolfcampian?
.07–.36 Av. .24	.13–.33 Av. .20	.10–.13	.02–.03	(.07×.07)	.4	Wolfcampian?
.01–.13 Av. .07	.01–.20 Av. .09	.07–.14 Av. .09	.01–.04	Min. (.07×.05) Max. (.13×.10)	.33–.38	Wolfcampian?

land range from .2 to .4 suggesting that the specimens are representative of the mature parts of colonies.

The degree of development of moniliform walls in mature specimens of a species appears constant in species in which strongly beaded structures are present (text-fig. 5; pl. 5, fig. 1; pl. 6, figs. 1, 3). However mature specimens of some species having poorly developed monilae may in parts of a colony lack monilae.

Rhombotrypella amdrupensis sp. nov.

Plate 1, figures 1—7.

Material: Specimens from Sample F 1 242, located in Profil F 1 (Frebold, 1950, p. 27), 244—272 metres above the base of the section measured north of Kap Jungersen. Pennsylvanian; Desmoinesian. The sample is a calcareous siltstone having brachiopods, algae, and bryozoans.

Holotype .... MMUH no. 9113
Syntype A .... MMUH no. 9114

Description: Colonies are thick, solid, cylindrical ramose stems having tuberculate monticules as high as 1 mm (pl. 1, fig. 4). Smooth intramonticular areas have regularly arranged zooecia. The characteristics of branching in colonies were not determined from the numerous fragments which were generally 7—8 cm in length.

Transverse sections across the stems of colonies display the distinctive thin walled quadrate zooecia in the axial regions (pl. 1, fig. 5). The axial region is divisible into a number of zones according to the shape and arrangement of the zooecia. Its central part has quadrate and polygonal zooecia irregularly arranged and this is succeeded by a hexagonal zone of quadrate zooecia. In the peripheral region the well developed moniliform walls emphasize the hexagonal groupings of the zooecia. Acanthopores at the junctions of the zooecial walls are visible in both the axial and peripheral regions (pl. 1, fig. 5).

In longitudinal sections the zooecial walls are thin and slightly crenulate in the axial region (pl. 1, fig. 3). In the outer part of the axial region the walls become slightly moniliform and develop greater curvature. The narrow peripheral region has distinctly thickened moniliform walls. Centrally perforate diaphragms, sparsely developed, appear in the outer part of the axial region and in the early part of the peripheral region (pl. 1, fig. 7). As the perforations are large the perforate diaphragm located at the base of the thickened peripheral region generally appears like a short superior hemiseptum and a short inferior hemiseptum. In the outer part of the axial region the zooecial walls develop slight monilae and as this growth feature occurs at the same level in all zooecia across the stem, it forms a curved band. Commonly above these growth bands the zooecial walls bifurcate. In the inner part of the axial region the zooecial walls are longitudinally laminate. In the outer part of the axial region as the walls become moniliform they display a distally convex laminate microstructure. The laminae along the inner part of the zooecial tubes are steeply inclined and in the outer part the laminae of adjacent zooecia intertongue in a broad convex curve commonly forming an irregular dark zig zag band. This microstructure of the zooecial walls is commonly obscured by the steeply inclined laminae of the acanthopores which have a clear calcite axial region. The usually flat diaphragms are thin and composed of laminae which extend into the laminae of the inner zooecial walls in the thickened part of the monilae. The zooecial tubes in both the axial and peripheral regions contain silt size grains of quartz.

In tangential sections the zooecial tubes are irregularly oval or subround and are separated by zooecial walls carrying mesopores and acanthopores (pl. 1, fig. 2). The mesopores, round to oval openings, are variable in size and number per zooecia, and extend only a short distance below the surfaces of the colonies. The acanthopores, large and distinctive, occur at the junctions of the outer part of the zooecial walls and rarely indent the inner zooecial wall of the zooecial tube. Steeply laminate walls of the acanthopores, as seen in longitudinal section, appear as broad bands of concentric laminae pierced by an axis of clear calcite. The tangential sections show the abrupt changes in zooecial walls thickness as the different levels of the moniliform walls are cut. In the monticules the zooecial walls may almost double their thickness, the zooecial openings are proportionately smaller, large acanthopores are distinctive and numerous and small acanthopores fill the outer part of the zooecial walls. These small acanthopores may be also present as a single series in the outer part of zooecial walls in the intramonticular areas (pl. 1, fig. 6).

Remarks: The new species *Rhombotrypella amdrupensis* is characterized by a wide axial region having quadrate and polygonal zooecia irregularly arranged in its central part and regularly arranged quadrate zooecia forming a hexagonal band in its outer part, and strongly moniliform walls in the narrow peripheral region. The species differs from *Rhomboporella pentagonalis* SHULGA-NESTERENKO (1955, p. 92, p. 98, 99, pl. 14, figs. 1—4, text-figs. 8, 11) from the Gzhel stage (C_3^{gj}, upper Carboniferous) Gzhel Station, Moscow Basin, in having a smaller zoarial diameter and also a smaller radius of the peripheral region, larger zooecial openings, narrower longitudinal zooecial walls, wider lateral zooecial walls, smaller diameter of the large acanthopores, and larger mesopores. The two species are similar in the number of zooecia per 2 mm longitudinally, the diameter of the small acanthopores, the width of the peripheral regions, and the arrangement of the thin walled zooecia in the axial region of transverse sections.

R. amdrupensis differs from the Russian species *R. astragaloides* NIKIFOROVA (1933, p. 36, pl. 4, figs. 2, 3, text-fig. 8) from the middle Carboniferous, C_2^4, of the Donetz Basin, in the arrangement of the zooecia in the axial region, in its narrower peripheral region, and fewer diaphragms in the zooecial tubes. In the general development of the zooecial structures the species are closely similar.

The species takes its name from Amdrup Land.

Rhombotrypella holmensis sp. nov.

Plate 2, figures 1—4.

Material: Specimens in Sample A 128, located in Profil A (FREBOLD, 1950, p. 19) about 323 metres from the base of a section measured at Depotfjeld, south coast of Holm Land. Pennsylvanian; Desmoinesian. The sample is a conglomeratic calcarenite, weathering red and gray and having numerous brachiopods and large fragments of bryozoan colonies.

Holotype .... MMUH no. 9115

Description: Colonies are thick, cylindrical, ramose stems.

Transverse sections show thin walled quadrate zooecia in part of their axial regions (pl. 2, fig. 2). The central part of the axial region is a large rosette of polygonal zooecia and this is surrounded by a wide band of regularly arranged quadrate zooecia. The very narrow peripheral region having thickened zooecial walls lacks monilae. Acanthopores at the junctions of zooecial walls appear as dark dots in both the axial and peripheral regions (pl. 2, fig. 2).

In longitudinal sections the wide axial region and the very narrow peripheral region are distinctive (pl. 2, fig. 4). The zooecial walls are thin and slightly crenulate in the axial region and show progressive bifurcations as they curve out to the peripheral region. Centrally perforate diaphragms are generally present at the base of the peripheral region. As the perforations are exceedingly wide and the diaphragm width proportionately narrow, these perforate diaphragms are suggestive of short superior and inferior hemisepta that curve back toward the axial region. The zooecial and mesopore openings along the sectioned colony are closed by flat diaphragms which curve into the zooecial tubes so as to line the inner zooecial walls (pl. 2, figs. 1, 2, 4). The microstructure of the zooecial walls consists of laminae which are steeply inclined along the inner part of the zooecial tubes and which curve as a broad arch in the outer part of the zooecial walls (pl. 2, fig. 1). In this outer part of the zooecial walls the laminae of adjacent zooecial walls are amalgamate and intertongue. The steeply inclined laminae of the large acanthopores ripple the microstructure of the zooecial walls. The laminae of these acanthopores also intertongue with the zooecial walls and a characteristic wedge-shaped pattern commonly results. The axial region of the large acanthopores is clear calcite with black inclusions.

In tangential sections the oval zooecial tubes are separated by wide zooecial walls. These walls are penetrated by large acanthopores at their junctions, and a single series of small acanthopores of variable diameter and some mesopores lie in the amalgamate outer part of zooecial walls (pl. 2, fig. 3).

Remarks: This new species *Rhombotrypella holmensis* is characterised by a very wide axial region separable into a central part having polygonal zooecia and an outer part having regularly arranged quadrate zooecia; a very narrow peripheral region; centrally perforate diaphragms at the base of the peripheral region; and terminal diaphragms at the zooecial openings. The species is similar to specimens assigned to *Rhomboporella typica* BASSLER by SHULGA-NESTERENKO (1955, p. 92, 93, 98) and found in the Kasimov horizon (C_3^{ks}, lower horizon of the Russian upper Carboniferous) along the North Dvina River, Moscow Basin. The specimens described by SHULGA-NESTERENKO are similar to *Rhombotrypella holmensis* in their branch diameter, number of polygonal zooecia in the central region, and the diameter of the zooecial openings. *R. holmensis* differs from the Russian specimens in having a narrower peripheral region, more numerous zooecia per 2 mm longitudinally, narrower zooecial walls longitudinally, and very much narrower zooecial walls laterally, smaller diameter of its large acanthopores, and greater diameter of its mesopores. *R. holmensis* has a general resemblance to *Rhomboporella typica* BASSLER briefly described from the "Carboniferous of Chulpapampa, Bolivia" (BASSLER, 1936, p. 160). The two species are similar in their wide axial regions and narrow peripheral regions, and perforate diaphragms at the base of the peripheral region. Insufficient data about *Rhomboporella typica* does not permit more detailed comparison of structures in the two species. *Rhombotrypella holmensis* has wider zoarial branches than *Rhomboporella typica.*

The species takes its name from Holm Land.

Rhombotrypella mallemukensis sp. nov.

Plate 3, figures 1, 2, 4—6; plate 4, figures 1—3.

Material: Specimens from Sample N 130, located in Profil N (FREBOLD, 1950, p. 21), 58—68 metres above the base of a section measured at Mallemukfjeld, south coast of Holm Land, Pennsylvanian; Desmoinesian. The sample is a reddish weathering calcarenite having brachiopods, other bryozoans, smaller Foraminifera, algae, and crinoid columnals.

Holotype........ MMUH no. 9116; syntype A...... MMUH no. 9117
syntype B .... MMUH no. 9145; syntype C...... MMUH no. 9146

Description: Colonies are thick cylindrical stems having slightly elevated monticules.

Transverse sections across the stems of colonies show the characteristic thin walled quadrate zooecia in the axial region but the arrangement of the zooecia is variable. In one transverse section the quadrate zooecia are regularly arranged in a rhombic pattern of intersecting rows across the axial region. In another transverse section the quadrate zooecia in the inner part of the axial region form a rhombic pattern that is encompassed by quadrate zooecia of the outer part of the axial region forming a hexagonal pattern (pl. 3, fig. 2). In yet another section the central part of the axial region is a rosette having a central polygonal zooecium surrounded by nine polygonal and triangular zooecia, and these are enclosed by a number of rows of quadrate zooecia. These in turn are surrounded by the outer part of the axial region which has quadrate and polygonal zooecia in an irregular pattern (pl. 3, fig. 4). The narrow peripheral region of thickened zooecial walls lacks monilae (pl. 3, figs. 2, 4).

In longitudinal sections the zooecial walls are thin and longitudinally laminate in the axial region and show progressive bifurcations which occur at definite, curved levels across the colonies. The zooecial walls are greatly thickened in the peripheral region where they lie at right angles to the axis of growth of the colony. Centrally perforate diaphragms lie at the base of the peripheral region. As the perforations have a large diameter, .1 mm, the diaphragms are proportionately short projections in thin section, and they are suggestive of short superior and inferior hemisepta that curve back toward the axial region. The zooecial and mesopore openings along the sectioned colonies are closed by flat diaphragms which curve into the zooecial tubes so as to line the inner zooecial walls (pl. 3, fig. 1). The microstructure of the zooecial walls shows steeply inclined laminae along the inner part of the zooecial walls (and lining the zooecial tube) that curve as broad arches in the outer part of the zooecial walls where laminae of adjacent zooecial walls intertongue and are amalgamate. The large acanthopores having clear calcite axes cut across the microstructure of the zooecial walls and the steeply inclined laminae lining the large acanthopores wedge into the laminae of the zooecial walls (pl. 3, fig. 1). The small acanthopores have dark granular calcite axes and slightly curved laminae of the zooecial walls line this microstructure (pl. 3, fig. 1). Both the large and small acanthopores extend the complete depth of the peripheral region and may extend above the surface of the colonies.

In shallow tangential sections the colonies show a regular distribution of oval zooecia, oval mesopores, and acanthopores (pl. 4, fig. 1). Large zooecia are concentrated in the monticules which may be crowded laterally by abundant mesopores (pl. 4, fig. 1), and large and small acanthopores. In the intramonticular areas of the colonies large acanthopores occur at the junctions of the zooecial walls, a single series of small acanthopores pierce the outer part of the zooecial walls, and the mesopores are sparsely distributed, about one mesopore per 2 zooecia. Intramonticular areas up to 0.5 sq. mm may lack mesopores. Centrally perforate diaphragms form inner circles or crescents in the zooecial tubes when viewed in cross section (pl. 4, fig. 2). Large acanthopores appear as dark concentrically laminated spots (pl. 4, fig. 3). The microstructure of the small acanthopores is not discernible (pl. 4, fig. 3).

Remarks: The new species *Rhombotrypella mallemukensis* is characterised by a wide axial region, narrow peripheral region, very sparse development of centrally perforate diaphragms and an axial region having regularly arranged networks of quadrate zooecia. This species differs from *R. subcomposita* Shulga-Nesterenko (1955, p. 92—94, pl. 12, figs. 5—7, text-figs. 8, 9) from the Gzhel Stage (C_3^{gj}, upper Carboniferous), Gzhel Station, Moscow Basin, in having zooecial openings of greater diameter, both large and small acanthopores of lesser diameter and fewer series of small acanthopores in the outer part of the zooecial walls. The two species are similar in the dimensions of zooecial walls (both longitudinally and latera.ly), diameter of their mesopores, diameter of their thick colonies which have wide axial regions and narrow peripheral regions, sparse development of diaphragms and arrangement of their zooecia in their axial regions (compare p. 12, fig. 6, Shulga-Nesterenko, 1955, with pl. 3, fig. 2 of text). *R. mallemukensis* shows general similarities in the development of thick walls in the peripheral region, arrangement of the rhomboid network in the axial region, and abundance of acanthopores to *R. astragaloides* Nikiforova (1933, p. 36, pl. 4, figs. 2, 3, text-fig. 8) from the middle Carboniferous, C_2^4, of the Donetz Basin. It differs from the Russian species in the sparse development of diaphragms.

The species takes its name from Mallemukfjeld, Holm Land.

Rhombotrypella gigantea sp. nov.

Plate 6, figures 2, 3; plate 7, figures 1, 3, 4; plate 17, figures 4, 5.

Material: Specimens from Sample G 300, located in Profil G (Frebold, 1950, p. 29) 193—194.5 metres above the base of a section measured north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian. The sample is a reddish weathering ferruginous quartzose calcarenite having brachiopods, other bryozoans, algae, large solitary corals, and smaller Foraminifera. Holotype .... MMUH no. 9124

Description: Colonies are very thick cylindrical stems having low monticules and may develop overgrowths.

The large transverse sections show axial regions having irregularly arranged polygonal and quadrate zooecia (pl. 6, fig. 2). The wide peripheral region has strongly moniliform zooecial walls and numerous perforate diaphragms (pl. 6, fig. 2), as many as 8 per zooecial tube.

In longitudinal sections the wide peripheral regions clearly display the moniliform walls (pl. 6, fig. 3, pl. 7, figs. 1, 3). The microstructure of the laminate walls is similar to that described in *Rhombotrypella mallemukensis* sp. nov. and *Rhombotrypella* sp. cf. *R. composita* Nikiforova. Large acanthopores having clear calcite axes pierce the laminae of the zooecial walls and have the typical steeply inclined laminate walls. These acanthopores project like spines above the surfaces of the colonies. The diaphragms have large perforations, .1 mm diameter, so that they appear in many longitudinal sections like short spines projecting from the inner part of the zooecial walls into the zooecial tubes. The diaphragms connect with the inner part of the zooecial walls by turning sharply toward the axial region and then hooking back into the steeply inclined laminae of the inner part of the zooecial walls (pl. 7, fig. 1). In the peripheral regions the zooecial walls may bifurcate above thick beads in the zooecial walls and then extend for a short distance as slender zooecial walls before coalescing in two monilae above which a single zooecial wall develops.

In tangential sections the zooecia are variable in shape and size and this is partly the result of the moniliform structure of the zooecial walls. The large acanthopores are located at the junctions of zooecial walls and a single series of small acanthopores lie in the outer part of the zooecial walls. Oval mesopore openings are not numerous.

Remarks: This new species *Rhombotrypella gigantea* is not closely comparable with any previously described species. It is characterised by its enormously thick stems, wide peripheral regions having well developed moniliform walls and numerous perforate diaphragms, 6—7 zooecia per 2 mm, narrow zooecial walls, and considerably large acanthopores. The axial sections of transverse sections of *R. gigantea* have a general resemblance to *R. astragaloides* Nikiforova (1933, p. 36, pl. 4, figs. 2, 3, text-fig. 8), the type species of *Rhombotrypella*, which occurs in the middle Carboniferous, C_2^4, of the Donetz Basin. *R. astragaloides* has a more regular arrangement of quadrate zooecia in its axial region than *R. gigantea.* The peripheral regions of the two species are similar with respect to their strongly moniliform walls and numerous perforate diaphragms but they are otherwise dissimilar.

Although having considerably thicker stems than other species of *Rhombotrypella* from northeast Greenland, *R. gigantea* does not show gigantism of zooecial structures. The axial and peripheral regions have proportionately greater radii, zooecia are more numerous per 2 mm but not anomously so. Likewise the diameter of the zooecial openings do not show extraordinary dimensions.

The species takes its name from the Latin, *gigantea*, meaning very large and refers to the large dimensions of the stems of the colonies.

Rhombotrypella sp. cf. *R. gigantea* sp. nov.

Plate 5, figures 1, 3—5.

Material: Specimens from GRÖNVALL's Collection No. 204; float from Eskimonæs, Holm Land. Permian; Wolfcampian? The specimens are in light grey calcarenite having brachiopods.

Description: Colonies are very thick cylindrical stems in which the characteristics of branching were not determinable.

The large transverse sections have a wide axial region of irregularly arranged quadrate and polygonal zooecia (pl. 5, fig. 3). The narrow peripheral region has thickened moniliform walls and perforate diaphragms (pl. 5, fig. 1).

The longitudinal sections show, in the axial regions, thin longitudinally laminate zooecial walls which bifurcate at definite levels across the stems of the colonies. Monilae appear as widely spaced low thickenings in the outer part of the axial regions and are pierced by large acanthopores (pl. 5, fig. 5). The moniliform zooecial walls of the peripheral regions show the laminate microstructure as displayed in *Rhombotrypella gigantea* sp. nov. Large acanthopores with clear calcite axes pierce the zooecial walls. Their typical steeply inclined laminate walls are readily discernible (pl. 5, fig. 5). Two to three centrally perforate diaphragms are present in the peripheral region of each zooecial tube. The small acanthopores appear as dark irregular granular lines cutting across the laminate zooecial walls.

In tangential sections the zooecial walls are variable in width according to the development of the monilae. In the wider parts of the moniliform walls the large acanthopores are numerous, four to five per zooecium. The small acanthopores lie in a short single series between the distinctive large acanthopores (pl. 5, fig. 4). Mesopores are variable in number but may be as numerous as the large acanthopores between which they are commonly confined (pl. 5, fig. 4).

Remarks: The specimens from GRÖNVALL's Collection, Sample No. 210, Eskimonæs, are characterised by zoarial stems of great thickness and an abundance of large acanthopores of considerable diameter in the well developed moniliform walls. These specimens have certain resemblances to *Rhombotrypella gigantea* sp. nov. The two species are similar in their thick zoarial stems, irregular arrangement of quadrate and polygonal zooecia in their axial region, distinct moniliform walls and centrally perforate diaphragms in their peripheral regions, similar ratio: width of peripheral region of zooecium/width of zooecium, zooecial diameter, and diameter of the large acanthopores and mesopores. The specimens in Sample No. 210 have considerably smaller zoarial stems, narrower peripheral region, fewer zooecia per 2 mm, wider zooecial walls, and more abundant large acanthopores than *R. gigantea.* No previously described species is closely comparable to these specimens.

Rhombotrypella sp. cf. *Rhombotrypella composita* NIKIFOROVA

Plate 3, figure 3; plate 4, figure 4; plate 5, figure 2.

Rhombotrypella composita NIKIFOROVA, 1939, S.S.S.R. Geol. Oil Inst. Trans., Ser. A, Fasc. 115, p. 80, 81; pl. 2, figs. 10, 11; pl. 3, figs. 1—6.

Material: Specimens in GRÖNVALL's Collection, Sample No. 154; float from the Mallemukfjeld, Holm Land. Permian, Wolfcampian? This sample is a white weathering calcarenite having brachiopods and bryozoans.

Description: Colonies are cylindrical ramose stems.

Transverse sections across the stems of colonies show the characteristic thin walled quadrate zooecia in axial sections (pl. 3, fig. 3). In a transverse section, 4 mm diameter, the quadrate zooecia form a regular intersecting rhombic pattern but in transverse sections of greater diameter polygonal zooecia are scattered among the quadrate zooecia in an irregular pattern (pl. 3, fig. 3). The narrow peripheral region has thickened strongly moniliform walls and generally two to three centrally perforate diaphragms (pl. 3, fig. 3).

In longitudinal sections the zooecial walls are thin, slightly crenulate, and longitudinally laminate. The thickened moniliform zooecial walls of the peripheral region show the typical laminate microstructure as in *Rhombotrypella mallemukensis* sp. nov. The distally convex laminate microstructure of the walls is present at all levels in the peripheral region but is more readily discernible in the thickened beaded parts. At such levels the beads have developed from the accumulation of successive laminae originating at the same point on the inner zooecial wall. The large acanthopores having clear calcite axes penetrate the amalgamate zooecial walls but are only visible in the thickened beads. The slender walls connecting monilae show distally convex laminae that intertongue in the outer part of the zooecial walls in a dark irregular band. The flat diaphragms having large perforations connect with the inner part of the zooecial walls by turning sharply downwards toward the axial region and then hooking back into the steeply inclined laminae of the inner part of the zooecial walls (pl. 3, fig. 3).

In tangential sections the oval and round zooecial cross sections lie in a regular pattern and the zooecial walls vary in thickness according to the level cut in the moniliform walls (compare pl. 4, fig. 4, and pl. 5, fig. 2). Mesopores are oval in the thickened parts of the zooecial walls and quadrate or polygonal in the slender parts of the zooecial walls and may be numerous. Large acanthopores lie at the junctions of the zooecial walls and a single series of small acanthopores lie in the outer part of the zooecial walls (pl. 4, fig. 4).

Remarks: The specimens in Sample No. 154 may be compared with *Rhombotrypella composita* NIKIFOROVA from the Fenestellid Series (Zone of *Schwagerina anderssoni* and *Pseudofusulina concavutas*; lower part of the Artinskian), Shak-Tau and Mt. Lipovaia, South Ural Mountains. The specimens are similar to the Russian species in the number of zooecia per 2 mm, diameter of their large and small acanthopores, pattern of the axial regions of their transverse sections, and their narrow peripheral regions. The specimens from northeast Greenland have longer and narrower zooecial openings, wider zooecial walls, and mesopores of smaller diameter than the Russian species.

The specimens also have general resemblances in the axial region and tangential sections to *Rhombotrypella arbuscula* EICHWALD (NIKIFOROVA, 1938b, pl. 8, figs. 2, 3, pl. 9, figs. 3—5) from the lower Permian (Irgina and Sarga beds) in the environs of Saraninski Works (Urals). The northeast Greenland material differs from *R. arbuscula* in its larger zoarial branches, more numerous mesopores and zooecia per 2 mm longitudinally, larger zooecial and mesopore openings, and considerably wider peripheral region.

Rhombotrypella sp. A.

Plate 4, figure 5.

Material: Specimens from Sample H 141, Profil H (FREBOLD, 1950, p. 32), 240—258 metres above the base of a section measured 3 kilometres north of Profil G and north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian? The sample is a calcarenite having other bryozoans, brachiopods, and algae, partly replaced by silica.

Description: Colonies are cylindrical stems in which the characteristics of branching were not determinable.

In transverse sections the inner part of the axial regions are infilled with sediments and zooecial walls are not visible but the outer part of the axial regions has regularly arranged quadrate zooecia. The narrow peripheral regions have thickened moniliform walls and one to two perforate diaphragms.

Features of the longitudinal sections were not observed.

In tangential section, the oval or round zooecial openings are separated by wide zooecial walls (pl. 4, fig. 5). Large acanthopores lie at the junctions of the zooecial walls. A single series of small acanthopores of variable diameter and an occasional mesopore lie in the outer part of the zooecial walls.

Remarks: There is insufficient material for specific identification of this species and for comparison with previously described species.

Rhombotrypella sp. B.

Plate 6, figure 5; plate 7, figure 2.

Material: Specimens from GRÖNWALL's Collection No. 210; float from Eskimonæs, Holm Land. Permian; Wolfcampian? The specimens are in a light gray silicified calcarenite having other bryozoans, algal plates, ostracods, and crinoid columnals.

Description: Colonies are cylindrical stems in which the characteristics of branching were not determinable.

In transverse sections the wide axial region has quadrate zooecia. The extraordinarily narrow peripheral region has moniliform walls and perforate diaphragms.

In longitudinal sections the thin, longitudinally laminate zooecial walls of the axial region develop widely spaced monilae in the subperipheral region. The very short peripheral region has greater development of monilae in the thickened zooecial walls. Centrally perforate diaphragms in the subperipheral and peripheral regions number three to four per zooecium and commonly there is a terminal diaphragm.

Features of the tangential sections were only observed in an oblique tangential section. The zooecial openings are oval and large acanthopores are present at the junctions of the zooecial walls. Two series of small acanthopores lie in the outer part of the zooecial walls as does an occasional mesopore.

Remarks: There is insufficient material for specific identification of this species which was collected in float at Eskimonæs. The extraordinarily narrow peripheral region having moniliform walls and the centrally perforate diaphragms are distinctive.

If more material had been available, this species may have been found to lie within the variation of *Rhombotrypella* sp. cf. *R. composita* NIKIFOROVA.

Rhombotrypella sp. C.

Plate 6, figures 1, 4.

Material: Specimens from Sample H 139, located in Profil H (FREBOLD, 1950, p. 32) 228—240 metres above the base of a section measured 3 kilometres north of Profil G and north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian? The sample is a calcareous sandstone with some replacement by silica.

Description: Colonies are large cylindrical stems in which the characteristics of branching were not determinable.

In transverse sections the axial regions have an inner rhombic pattern of quadrate zooecia encompassed by an outer network of quadrate zooecia (pl. 6, fig. 1). The peripheral regions of moderate width have thickened moniliform zooecial walls and perforate diaphragms (pl. 6, fig. 1).

In longitudinal sections the moderately wide axial regions have thin zooecial walls. Recrystallization has almost completely destroyed the laminate microstructure of the beaded zooecial walls in the peripheral regions.

Features of the tangential sections were not observed.

Remarks: There is insufficient material for specific identification of this species. The transverse sections of the colonies have a general resemblance to *Rhombotrypella composita* NIKIFOROVA (1939, p. 95, pl. 3, figs. 5, 6), from the Permian (Fenestellid Series; zone of *Schwagerina anderssoni* and *Pseudofusulina concavutas*) of Shak-Tau and Mt. Lipovaia, South Ural Mountains.

Tabulipora YOUNG 1883.

Tabulipora YOUNG, 1883, Ann. Mag. Nat. Hist., ser. 5, v. 12, p. 154;
— LEE, 1912, p. 149, 150.

Type species: *Tabulipora scotica* LEE 1912, Geol. Survey Great Britain Mem. Palaeontology, v. 1, pt. 3, p. 162, pl. 14, figs. 4a—4d, pl. 15, figs. 12, 13, 17, 18. Lower Carboniferous, Central Scotland.

Generic Diagnosis: "Zoaria generally forming solid or hollow branches, or parasitic, sometimes laminar. Surface even or with maculae. Zooecial walls periodically thickened in certain species, uniform in others. Acanthopores present. No mesopores but a small cell is sometimes present

Species	Diameter	Radius		No. of zooecia per 2 mm longi-tudinally	Diameter Zooecial Opening	
	Branch mm	Branch	Peripheral Region		Intramonticule	Monticul
Tabulipora sp. A.	4.2–7.0	2.98 2.1 2.1	.71 .35 .57	5.5–6	Min. (.18 × .13) Max. (.26 × .13) Av. (.21 × .14)	Not det.
Tabulipora sp. B.	6.5	3.2	1.2	4.5–5 Av. 5 *2–2.5	Min. (.14 × .10) Max. (.23 × .20) Av. (.20 × .16)	(.1 × .1) (.20 × .16 (.14 × ·13
Tabulipora sp. C.........	6–9	3.3	1.06	4–5.5	Min. (.27 × .16) Max. (.33 × .26) Av. (.28 × .20)	
Tabulipora arcticensis sp. nov...............	12.5–14	5.99 5.99	.43 .71	3.5–5 Av. 4.5	Min. (.20 × .13) Max. (.30 × .23) Av. (.24 × .18)	
Tabulipora greenlandensis sp. nov...............				4–5 Av. 4.5	Min. (.23 × .16) Max. (.33 × .22) Av. (.26 × .20)	

* Dimensions in monticule.

between adjacent zooecia. Tabulae present in all the typical species, always perforated" (Lee, 1912, p. 149, 150).

Remarks: In 1912 Lee defined the genus *Tabulipora* which Young (1883) had erected in a species description of *T. urei* without giving a diagnosis of the genus. Young had assumed his material was conspecific with *Cellepora urei* Fleming (1808). As Fleming's material is lost and Young's material of *T. urei* included several species of which none were figured but which according to Lee (1912, p. 150) were congeneric, Lee established a new species *T. scotica* as the type species of *Tabulipora*. In Lee's description of the type material of *T. scotica* he included a thin section from Young's Collection, Kelvingrove Museum, Glasgow, labelled *Tabulipora urei* (Fleming), Hillhead Quarry, Beith. Crockford (1957, p. 44) has noted that recognition of *Tabulipora* as a valid genus and acceptance of *T. scotica* Lee as the type species is doubtful without application to the I.C.Z.N. for suspension of the relevant rules of Zoological Nomenclature.

Lee (1912) in his diagnosis of *Tabulipora* states "no mesopores but a small cell is sometimes present between adjacent zooecia." However, Lee's illustrations of *T. scotica* (1912, pl. 14, figs. 17, 18) suggest these small cells are mesopores and may be numerous.

Dimensions of Zooecial Wall		Diameter Acanthopore		Diameter Mesopore	Ratio	Age
Longitud.	Laterally	Large	Small			
.03–.16 Av. .09	.07–.23 Av. .14	.03–.07	.02	Min. (.03 × .03) Max. (.16 × .10) Av. (.09 × .07)	.17–.21, .27	Wolfcampian?
.10–.33 Av. .20 *.16–1.0 *Av. .32	.13–.39 Av. .22	. 1–.13 *.07–.16	.02–.03	Min. (.07 × .07) Max. (.16 × .13) Av. (.13 × .10)	.4	Wolfcampian?
.03–.15 Av. .09	.04–.16 Av. .09	.08–.14	–	Min. (.03 × .03) Max. (.16 × .14) Av. (.11 × .10)	.3	Wolfcampian?
.10–.39 Av. .28	.12–.33 Av. .20	.07–.1	.01–.02	Min. (.07 × .07) Max. (.13 × .08) Av. (.08 × .09)	.07–.12	Wolfcampian?
*.10–.46 Av. .20	.01–.56 Av. .18	.07–.13	.01–.02	Min. (.07 × .07) Max. (.13 × .13) Av. (.10 × .08)	Not det.	Wolfcampian?

The genus *Amphiporella* GIRTY (1911) is closely similar to *Tabulipora* and the frondose growth and presence of mesopores are doubtful taxonomic features upon which to base separation of *Amphiporella* from *Tabulipora*.

Many species previously assigned to the genus *Stenopora* have the taxonomic characters of *Tabulipora* and ELIAS (1957, p. 399) has suggested re-classification of many American species, formerly classified under *Stenopora*, that have centrally perforate diaphragms to *Tabulipora*.

The genus appears to have a broad range and the Russians report it as extending from the Upper Devonian to the Permian (NEKHOROSHEV, V. P., 1948, p. 69) of the Russian succession. Its distribution is poorly known as a result of its confused taxonomic status.

The species from northeast Greenland do not appear to be closely related to previously described species of *Tabulipora*. They are thick stemmed, large colonies having more strongly developed zoarial structures in comparison to other described species. The skeletal microstructures (text-figs. 4, 5) are closely similar to those in *Rhombotrypella*, however the species of *Tabulipora* have the characteristic perforate diaphragms that are lacking in *Rhombotrypella*.

Tabulipora greenlandensis sp. nov.

Plate 10, figure 5; plate 11, figures 1—5.

Material: Specimen from Sample G 300, Profil G (FREBOLD, 1950, p. 29) 193—194.5 metres above the base of a section measured north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian? The sample is a ferruginous quartzose calcarenite having brachiopods, other bryozoans, algae, smaller Foraminifera, and large solitary corals.

Holotype.. MMUH no. 9130

Description: Colonies are thick and multilaminate and have low monticules.

In longitudinal sections the zooecial walls are thin and longitudinally laminate in the basal and proximal regions. As the walls extend distally, short monilae and perforate diaphragms develop in arcuate rows across the colony (pl. 10, fig. 5). In the narrow peripheral region the thickened walls are continuous series of short swollen monilae (pl. 10, fig. 5; pl. 11, fig. 3). The typical distally convex laminate microstructure of the zooecial walls is pierced by the steeply inclined laminae of the large acanthopores that have clear calcite axes and lie in the monilae in both the proximal and distal regions (pl. 11, figs. 1, 3). The centrally perforate diaphragms are numerous, at least 8 diaphragms per zooecial tube, and lie in both the proximal and distal regions of the colony. The swollen axial extremities of the perforate diapragms commonly turn downwards toward the proximal region (pl. 11, fig. 1). Diaphragms located near the periphery may be continuous from one zooecium to the next and in the zooecial walls have a laminate microstructure similar to that of the zooecial walls (pl. 11, fig. 3).

In tangential sections the large zooecial openings have an irregular distribution of size and shape (pl. 11, figs. 2, 4, 5). The large acanthopores which have clear calcite axes and concentrically laminate walls are clearly perceptible at the junctions of the zooecial walls (pl. 11, figs. 2, 4, 5). Small dark granular acanthopores in one or two series are very numerous but in some instances they may be completely lacking (pl. 11, figs. 2, 5). Small mesopores of variable diameter are very abundant but they do not extend any great depth below the surface of the colony (pl. 11, fig. 4).

Remarks: *Tabulipora greenlandensis* is characterised by moniliform walls and numerous perforate diaphragms extending from the proximal to the peripheral regions, very numerous mesopores, and perforate diaphragms having thickened axial extremities. The species is not closely similar to any previously described species. *T. greenlandensis* has certain similarities to *T. arcticensis* as noted under that species.

The species takes its name from Greenland.

Tabulipora arcticensis sp. nov.

Plate 9, figure 5; plate 10, figures 3, 4; plate 17, figures 6.

Material: Specimens from Sample H 119, Profil H (Frebold, 1959, p. 32) 258—305 metres above the base of a section measured 3 kilometres north of Profil G and north of Kap Jungersen, Amdrup Land. Permian; Wolfcampian. The sample is a yellow to grey calcarenite having brachiopods and crinoid columnals. Holotype......... MMUH no. 9129

Description: Colonies are very thick, cylindrical ramose branches.

In longitudinal sections in the axial regions the zooecial walls are thin and crenulate, and arcuate rows of monilae extend across the zoarial branches (pl. 10, fig. 3). In the very narrow peripheral regions, the thickened zooecial walls are moniliform (pl. 10, fig. 3). Centrally perforate diaphragms, about 4 diaphragms per zooecial tube, have thickened axial extremities which commonly are bent toward the axial regions. The diaphragms are located in both the axial and peripheral regions and in the axial regions they lie (pl. 10, figs. 3, 4) in arcuate rows associated with the monilae. Large acanthopores penetrate the monilae in the zooecial walls in both the axial and peripheral regions.

The moniliform zooecial walls in the peripheral region display the typical distally convex laminate microstructure.

Transverse sections show thin walled polygonal zooecia in the wide axial regions and thickened moniliform zooecial walls and perforate diaphragms in the peripheral regions.

In tangential sections the zooecial and mesopore openings are circular to subcircular and the mesopores number about one to two per zooecium (pl. 9, fig. 5). Large acanthopores lie at the junctions of the zooecial walls but are not present at all junctions (pl. 9, fig. 5). Numerous small acanthopores in one or two series lie in the outer part of the zooecial walls and number 14 or more per zooecium. Very slender parts of the moniliform zooecial walls appear as narrow laminate bands in the inner parts of the zooecial walls that amalgamate in the outer part of the zooecial walls in very narrow dark laminate bands.

Remarks: *Tabulipora arcticensis* is characterised by wide axial regions, very narrow peripheral regions, arcuate rows of monilae which extend across the zooecial branches in both the axial and peripheral regions, and scattered perforate diaphragms having thickened axial extremities. It is not similar to any previously described species. *T. arcticensis* has certain resemblances to *Tabulipora* sp. C in the development of arcuate rows of monilae in its wide axial regions but differs from *Tabulipora* sp. C in having considerably narrower peripheral region, wider zooecial walls, smaller diameter of the large acanthopores and mesopores, and greater development of perforate diaphragms. *T. arcticensis* is not similar to *T. greenlandensis* sp. nov. which has a laminate growth form, wider zooecial walls, smaller diameter of its large acanthopores and more numerous mesopores. *T. arcticensis* differs from *Tabulipora* sp. B. in having smaller diameter of the large acanthopores, larger diameter of the zooecial openings, and narrower zooecial walls.

The species takes its name from the Arctic region within which its locality lies.

Tabulipora sp. A.

Plate 8, figures 2—5.

Material: Specimens in GRÖNVALL's Collection, Sample No. 153; float from the Mallemukfjeld, Holm Land. Permian. Wolfcampian? The sample is a calcarenite having other bryozoans and smaller Foraminifera.

Description: Colonies are thick cylindrical ramose branches having low monticules with small zooecial openings and numerous mesopores. The colony examined extends through a cube, 12 cm in length.

In longitudinal sections the zooecial walls in the axial regions are thin and slightly crenulate (pl. 8, fig. 2). In the narrow peripheral regions of the colony the zooecial walls thicken considerably and curve in a broad arc. Moniliform walls, perforate diaphragms, and large acanthopores projecting above the surface of the colony characterise this narrow peripheral region. The centrally perforate diaphragms and occasional eccentrically perforate diaphragm are commonly located in the early part of the peripheral region but in the older parts of the colony the diaphragms extend to the periphery of the zooecial tubes. Diaphragms commonly 4—5 per zooecial tube are thin laminate structures intertonguing laterally with the laminae of the inner part of the zooecial walls. The laminae of the zooecial walls have the typically distally convex curvature, the steeply inclined lateral laminae of the inner part of the zooecial walls intertonging with the broad amalgamate laminae of the outer part of the zooecial walls. These microstructures in the walls are commonly obscured by the steep laminae of the large acanthopore walls which extend from the axial region to the periphery and in many instances stand as strong spikes above the surface of the colony (pl. 8, fig. 2). The large acanthopores have distinctly clear calcite axes.

Transverse sections across the branches of the colony show polygonal thin walled zooecia and acanthopores at the junctions of the zooecial walls in the axial regions (pl. 8, fig. 3). The moniliform walls identify the peripheral region.

Tangential sections show the subcircular zooecial openings and zooecial walls of variable thickness due to their moniliform structure.

Large clearly perceptible acanthopores lie at the junctions of the zooecial walls (pl. 8, fig. 4) while small dark granular acanthopores encircling the zooecial tubes lie in the outer part of the zooecial walls (pl. 8, fig. 4). Numerous small mesopores likewise encircle the zooecial tubes (pl. 8, fig. 4).

Remarks: *Tabulipora* sp. A. is characterised by very narrow peripheral regions, development of diaphragms, centrally and eccentrically perforate, large zooecial openings, and numerous small mesopores. *Tabulipora* sp. A has certain similarities to *Tabulipora* sp. C as noted under that species.

Tabulipora sp. B.

Plate 8, figure 1; plate 9, figures 2, 4.

Material: Specimens in GRÖNVALL's Collection, Sample No. 154; float from the Mallemukfjeld, Holm Land. Permian. Wolfcampian? The sample is a white weathering calcarenite having brachiopods and bryozoans.

Descriptions: Colonies are thick cylindrical ramose branches having low monticules and maculae.

In longitudinal sections the wide axial regions have thin slightly crenulate zooecial walls and numerous arcuate rows of monilae which extend across the branches (pl. 8, fig. 1). The narrow peripheral region has moniliform zooecial walls which have small short beads in the early part and long swollen monilae extending to the periphery in the outer part. Centrally perforate diaphragms, 2—3 diaphragms per zooecial tube, commonly lie in the early part of the peripheral region but may also occur near the periphery (pl. 8, fig. 1). The laminate zooecial walls of the peripheral region have typically distally convex microstructure. The small granular acanthopores cut across the laminae of the zooecial walls like slender sticks.

Transverse sections across the zoarial branches have polygonal thin walled zooecia and acanthopores at the junctions of the zooecial walls in the axial regions and thickened zooecial walls in the narrow peripheral regions.

Tangential sections display greatly thickened zooecial walls and zooecial openings of irregular shape (pl. 9, fig. 4). Mesopores are irregularly distributed; they may be lacking for an area of .5 sq. mm and adjacent areas may have either four mesopores encircling a zooecial tube or one mesopore shared between two zooecia (pl. 9, fig. 4). Three to four large distinctive acanthopores having concentrically laminate walls encircle a zooecial tube and are located at the junctions of zooecial walls. One or two series of small acanthopores lie in the outer part of the zooecial walls and may number from 8—16 (pl. 9, fig. 4).

Remarks: *Tabulipora* sp. B is characterised by wide zooecial walls in the peripheral regions penetrated by well developed large acanthopores, and variable abundance of large mesopores. This species is similar to *Tabulipora* sp. C in the dimensions of its narrow peripheral region, number of zooecia per 2 mm longitudinally, diameter of the large acanthopores, and arcuate rows of monilae across the zooecial branches. It differs from *Tabulipora* sp. C in its smaller zooecial openings, wider zooecial walls, and larger mesopores.

Tabulipora sp. C.

Plate 9, figures 1, 3; plate 10, figures 1, 2, 6, 7; plate 17, figure 8.

Material: Specimens from GRÖNWALL's Collection, Sample No. 213; float from the Eskimonæs, Holm Land. Permian. Wolfcampian? The sample is a white weathering calcarenite having brachiopods.

Description: Colonies are thick cylindrical ramose branches having numerous overgrowths (pl. 17, fig. 8) which extend in many instances as broad laminate growths along the zoarial branches.

In longitudinal sections the wide axial regions have thin slightly crenulate zooecial walls and widely spaced arcuate rows of short monilae which extend across the branches (pl. 10, fig. 1). The zooecial walls commonly bifurcate above the short monilae in the axial regions. In the peripheral region the zooecial walls are distinctly moniliform and the swollen monilae are of variable length (pl. 10, fig. 1). Large acanthopores having clear calcite axes penetrate the monilae in both the axial and peripheral regions (pl. 9, fig. 1). The steeply inclined laminae of the large acanthopores penetrate the distally convex laminate microstructure of the monilae of the zooecial walls (pl. 9, fig. 1). Small dark granular acanthopores are not perceptible in these longitudinal sections.

The distally convex laminate microstructure of the slender walls connecting monilae in the peripheral regions show the distally convex laminate microstructure and the laminae of adjacent walls intertongue in irregular dark lines. In longitudinal sections of the overgrowths the zooecial walls are thin, longitudinally laminate, and slightly crenulate in the basal region (pl. 10, fig. 2). The microstructures of the wide proximal and narrow peripheral regions are similar to those found in the zoarial branches (pl. 9, fig. 3).

In tangential sections the large circular or oval zooecial openings are separated by narrow zooecial walls. Large acanthopores lie at the junctions of the zooecial walls and slightly indent the zooecial openings. Circular mesopore openings also lie near the junctions of the zooecial walls, and may number one to four per zooecium. Small dark granular acanthopores were not observed.

Remarks: *Tabulipora* sp. C is closely similar to *Tabulipora* sp. A from which it differs in having larger zooecial openings, greater diameter of the large acanthopores, wider peripheral regions, arcuate rows of monilae in the axial regions, fewer perforate diaphragms, and less numerous mesopores. *Tabulipora* sp. C differs from *T. scissa* CROCKFORD (1957, p. 44, 45, pl. 12, fig. 7, text-fig. 6) from the Nooncanbah Formation, Permian, Western Australia, which has narrower peripheral regions and more abundant perforate diaphragms. The two species are similar in the diameter of the zooecial openings, sparse development of mesopores, and the development of arcuate rows of monilae in the axial regions. The northeast Greenland species is not closely comparable to *T. sustutensis* FRITZ from the Permian ?, British Columbia, which is a species of *Rhombotrypella* as "cross cuts of the branches show that the zooecia in the central region are uniformly rhomboidal in outline" (FRITZ, 1946, p. 86).

Stenopora LONSDALE 1844.

Stenopora LONSDALE 1844, p. 178, Description of Six Species of Corals from the Paleozoic Formation of Van Diemen's Land. *In* DARWIN, Charles, Observations on Volcanic Islands, Appendix.
— 1845a, p. 262, Polyparia. *In* STRZELECKI, Physical Description of New South Wales and Van Diemen's Land, Chapter 6, Zoology, Paleozoic Faunas.
— CROCKFORD, 1943, Royal Soc. N.S.W. Proc., v. 76, p. 261.
Ulrichotrypa BASSLER, 1929, Palaeontologie von Timor, v. 16, pt. 28, p. 55.
Tubuliclidia MURCHISON and VERNEUIL 1844, [*nomen nudem*], Geol. Soc. France Bull., v. 1, ser. 2, p. 497—498.
— MURCHISON, VERNEUIL, and KEYSERLING, 1845b, p. 221, The Geology of Russia in Europe and the Ural Mountains.
— DUNCAN, 1949, Jour. Wash. Acad. Sci., v. 39, p. 131.

Type species: *Stenopora tasmaniensis* LONSDALE 1844, Description of Six Species of Corals from the Palaeozoic Formation of Van Diemen's Land. *In* DARWIN, Geological Observations on Volcanic Islands, Appendix, p. 161. Permian, Tasmania, Australia.

Diagnosis: Zoarium massive, ramose, incrusting, laminar, or frondescent; zooecia tubular, thin-walled in the axial region, but irregularly thickened (moniliform) in the peripheral region. Diaphragms absent or extremely rare. Acanthopores well developed, generally large and very numerous, and commonly occurring in two series. Mesopores non tabulated, generally fewer in number than the zooecia. Monticules or less commonly maculae characteristically developed, except in some fine ramose species. (After CROCKFORD, 1943).

Remarks: LONSDALE (1844, p. 161) described a species of *Stenopora*, *S. tasmaniensis* from the Permian of Tasmania, Australia, from

Species	Diameter Branch mm	Radius Branch	Radius Peripheral Region	No. of zooecia per 2 mm longitudinally	Diameter Zooecial Opening
Stenopora thula sp. nov......	4.2–5.4	2.1	.86	4–7 Av. 6.	Min. (.16×.16) Max. (.26×.20) Av. (.21×.16)
Stenopora jugersenensis sp. nov..................	4–5.8	1.47	1.0	$5^1/_2$–7 Av. 6	Min. (.23×.16) Max. (.28×.26) Av. (.25×.21)
Stenopora sp............... (G 348)	2.5–3.0	Not det.	Not det.	5–6 Av. 6.	Min. (.03×.03) Max. (.23×.16) Av. (.18×.11)

collections made by DARWIN. In the succeeding year after a study of STRZELECKI's collections of fossils from Tasmania (Van Diemen's Land), LONSDALE (1845a, p. 262, 263, pl. 8, figs. 2—2e) gave a generic diagnosis of *Stenopora* and figured specimens of *S. tasmaniensis*. Later in the same year in an appendix to MURCHISON, VERNEUIL, and KEYSERLING's "The Geology of Russia in Europe and the Ural Mountains", LONSDALE (1845b, p. 631) described and figured two species of *Stenopora*, *S. crassa* and *S. spinifera*, from the Permian of Russia and referred to his earlier publication (1845a) of the generic characters of *Stenopora* based on the Australian material. In a footnote in the Appendix to "The Geology of Russia in Europe and the Ural Mountains", LONSDALE noted that he was not using the generic name *Tubuliclidia* which had been listed in a faunal chart by MURCHISON and VERNEUIL (1844, p. 497, 498). MURCHISON, VERNEUIL, and KEYSERLING (1845b, p. 221) in the text of "The Geology of Russia in Europe and the Ural Mountains" preceding LONSDALE's Appendix, also listed the names *Tubuliclidia crassa* and *T. spinifera* in a faunal chart. However no description of a species of *Tubuliclidia* or a generic diagnosis of the genus was ever published and this name is a *nomen nudem*.

The widely distributed genus *Stenopora*, ranging from the lower Carboniferous to the Upper Permian is well represented in the Permian of the Urals, Salt Range of India, Timor, and Eastern and Western Australia and so far has only been found in the Lower Permian part of the northeast Greenland sequence. In the species of *Stenopora* from northeast Greenland, the skeletal microstructures are similar to those of *Rhombotrypella*. However, species of *Stenopora* lack the distinctive quadrate zooecial sections and perforate diaphragms that characterise *Rhombotrypella*.

Dimensions of zooecial Wall		Diameter Acanthopore		Diameter Mesopore	Ratio	Age
ngitudin.	Laterally	Large	Small			
		.04	–	Min. (.06×.06)	.41	Wolfcampian?
.02–.07	.03–.09			Max. (.10×.13)		
Av. .04	Av. .06			Av. (.09×.08)		
		.07–.1	–	Min. (.03×.03)		
.03–.13	.03–.15			Max. (.13×.10)	.69	Wolfcampian?
Av. .06	Av. .07			Av. (.10×.07)	.62	
.10–.3	.13–.26	.10–.16	.02	Min. (.01×.01)		
				Max. (.10×.07)	Not det.	Wolfcampian?
Av. .20	Av. .18	Av. .13		Av. (.06×.04)		

Stenopora thula sp. nov.

Plate 13, figures 1, 3, 4; plate 17, Figure 12.

Material: Specimens in Sample H 139, located in Profil H (Frebold, 1950, p. 32), 228—240 metres above the base of a section measured three kilometres northeast of Profil G and north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian? The sample is a quartzose calcarenite having other bryozoans, brachiopods, algae, and sponge fragments.

Holotype .... MMUH no. 9133

Description: Colonies are cylindrical branching stems of moderate diameter.

In longitudinal sections the zooecial walls are longitudinally laminate and finely crenulate in the axial regions. The walls curve gradually into the peripheral region where they thicken slightly. In the narrow peripheral region the slender crenulate zooecial walls display a very irregular laminate microstructure due to numerous crenulations. Steeply inclined laminae line the inner parts of the zooecial walls and pass into the outer part of the zooecial walls as broad distally convex laminae. Laminae of adjacent walls intertongue in an irregular band. Walls lining the mesopores have the same microstructure as the zooecial walls. Small closely spaced monilae in the crenulate walls lie in a very irregular zig zag pattern. No transverse structures cross the zooecial tubes. An occasional large acanthopore having steeply inclined laminate zooecial walls pierces the zooecial walls.

In transverse sections the axial region has numerous thin walled polygonal zooecia of varying size. Near the early part of the peripheral region, acanthopores are visible at the junctions of the zooecial walls.

The slightly thickened crenulate zooecial walls in the peripheral region display the same curved laminate microstructure as observed in longitudinal sections.

In tangential sections, the polygonal zooecial openings are irregularly indented by the crenulate walls. Deeper tangential sections display subpolygonal zooecial tubes and mesopores having smooth inner zooecial walls. The narrow inner part of the adjacent zooecial walls are separated by a dark irregular outer part so that the zooecial walls *in toto* appear integrate. Large acanthopores having concentric laminate walls and clear calcite axes are located at the junction of the zooecial walls. Mesopores are numerous and may form clusters in which a few small zooecial tubes are also present. The mesopores are lined by the same wall structure as in the zooecial walls.

Remarks: This new species is characterised by slender crenulate moniliform walls in its narrow peripheral regions, sparse development of large acanthopores, and numerous mesopores. It is not closely comparable with any previously described species including the two species of *Stenopora*, *S. brucei* (upper Carboniferous?) and *S. cidariformis* (Permian?) described by Lee (1908, p. 152, 155, 159—161) from Prince Charles Foreland, and species described from Russia, Salt Range of India, Timor, Australia, and the United States.

Stenopora thula differs greatly from *S. jungersenensis*. The two species have very few features that are similar beyond the cylindrical branching growth form of the colonies and the crenulate zooecial walls in the axial regions. The wall structure in the peripheral regions of the two species and the nature and abundance of acanthopores and mesopores are vastly different.

The species takes its name from the Latin, *Thule*, meaning farthest north, and refers to the most northerly occurrence of a species of *Stenopora* thus far reported.

Stenopora jungersenensis sp. nov.

Plate 12, figures 1, 2, 4; plate 13, figure 2; plate 17, Figure 7.

Material: Specimens from Sample H 141, Profil H (Frebold, 1950, p. 32), 240—258 metres above the base of a section measured three kilometres northeast of Profil G and north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian? The sample is a calcarenite having other bryozoan, brachiopod, and crinoid columnal fragments.

Holotype.. MMUH no. 9131

Description: Colonies are cylindrical branching stems.

In longitudinal sections the wide axial regions have thin longitudinally laminate zooecial walls except where they are crossed by arcuate rows of laminate monilae. The walls commonly bifurcate above these arcuate rows of monilae. The monilae are penetrated by irregular large acanthopores having clear calcite axes. The zooecial walls and tubes curve gradually outward to the periphery and in the peripheral region the walls thicken and are moniliform. The individual monilae are commonly short and closely strung together. Mesopores likewise are lined by moniliform walls and lie in the outer part of the peripheral region. The zooecial walls in the peripheral region show the typical laminate microstructure of steeply inclined laminae in the inner part and broad, distally convex laminae in the outer part of the walls. Large acanthopores have crenulate clear calcite axes and their steeply inclined laminate walls pierce the zooecial walls. Transverse structures across the zooecial tubes are lacking.

In transverse sections, thin walled, polygonal zooecia fill the axial regions. Transverse sections across monilae in the axial region display acanthopores having clear calcite axes at the junctions of the zooecial walls. Thickened moniliform walls pierced by large acanthopores form the peripheral region.

In tangential sections large polygonal zooecial tubes and polygonal or triangular mesopores are separated by narrow laminate walls. Large acanthopores located at the junctions of the zooecial walls dominate the tangential sections. The wide acanthopore walls of concentric laminae encircle clear calcite axes. Where the zooecial walls thin between successive monilae the acanthopore walls are greatly reduced in width but their clear calcite axes are still very distinct. The inner part of adjacent laminate zooecial walls are separated by a distinctive amalgamate laminate outer part which is less densely packed with laminae than the inner part of the zooecial walls. The large acanthopores lie in the outer part of the zooecial walls but they may impinge on the inner part of the zooecial walls and cause slight indentations along the zooecial tubes and mesopores. Mesopores are variable in number and as many as three mesopores per zooecium may be present, but in other areas they may be lacking.

Remarks: *Stenopora jungersenensis* is characterised by narrow peripheral regions having slender moniliform walls pierced by large acanthopores. The species is not closely similar to any previously described species and has few features that are similar to *S. thula*, as noted under Remarks of that species.

Stenopora pustulosa Crockford (1945, p. 16, 17, pl. 2, figs. 2, 3, text-figs. 22, 23) from the Permian, Hobart, Tasmania, has certain general resemblances to *S. jungersenensis* but they differ greatly in the dimensions of the many zoarial structures. The two species have numerous closely-spaced monilae in the peripheral region, arcuate rows of monilae crossing the axial region of the zoarial branches, and large acanthopores at the junctions of the zooecial walls. *S. pustulosa* has considerably smaller zoarial branches, larger zooecial tubes, thicker zooecial walls, and more numerous large acanthopores.

The species takes its name from Kap Jungersen, three kilometres southwest of the collection locality of *Stenopora jungersenensis*.

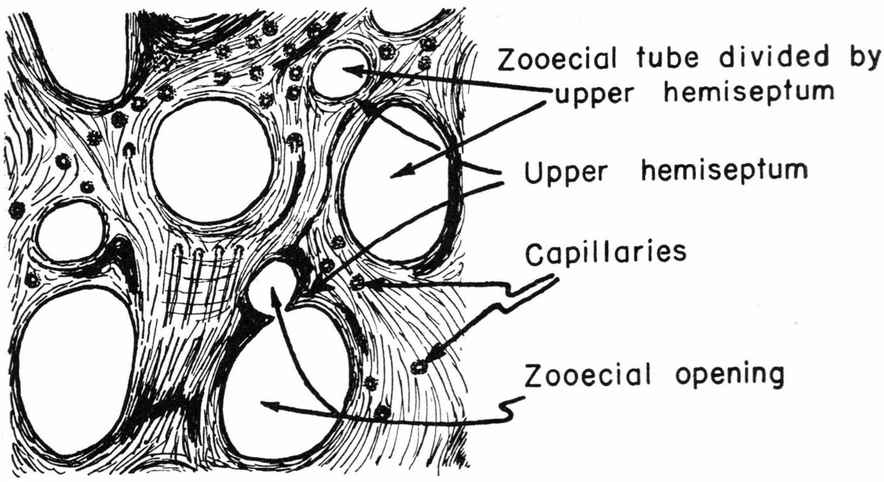

Fig. 6. Tangential section of portion of a zoarial branch of *Polypora* sp. cf. *P. ovaticella* showing the laminate zooecial walls pierced by rod- or tube-like structures called capillaries and zooecial openings divided or indented by upper hemisepta. × 50.

Order **Cryptostomata.**

Family **Fenestellidae** KING 1850.

Polypora McCOY 1844.

Polypora McCOY 1844, p. 206, Synopsis of the Characters of the Carboniferous Limestone Fossils of Ireland. Dublin.

Type species: *Polypora dendroides* McCOY 1844, p. 206, pl. 29, fig. 9.

Generic diagnosis: Infundibuliform or flabellate Fenestellidae having zooecia arranged in three or more rows on the branches, except just after bifurcation where only two rows may be present.

Remarks: In tangential sections of species of *Polypora* from northeast Greenland, the microstructure of the zooecial walls in the zoarial branches appears as amalgamate laminae which are generally pierced by small circular rods or tubes which SHULGA-NESTERENKO (1949, p. 36)

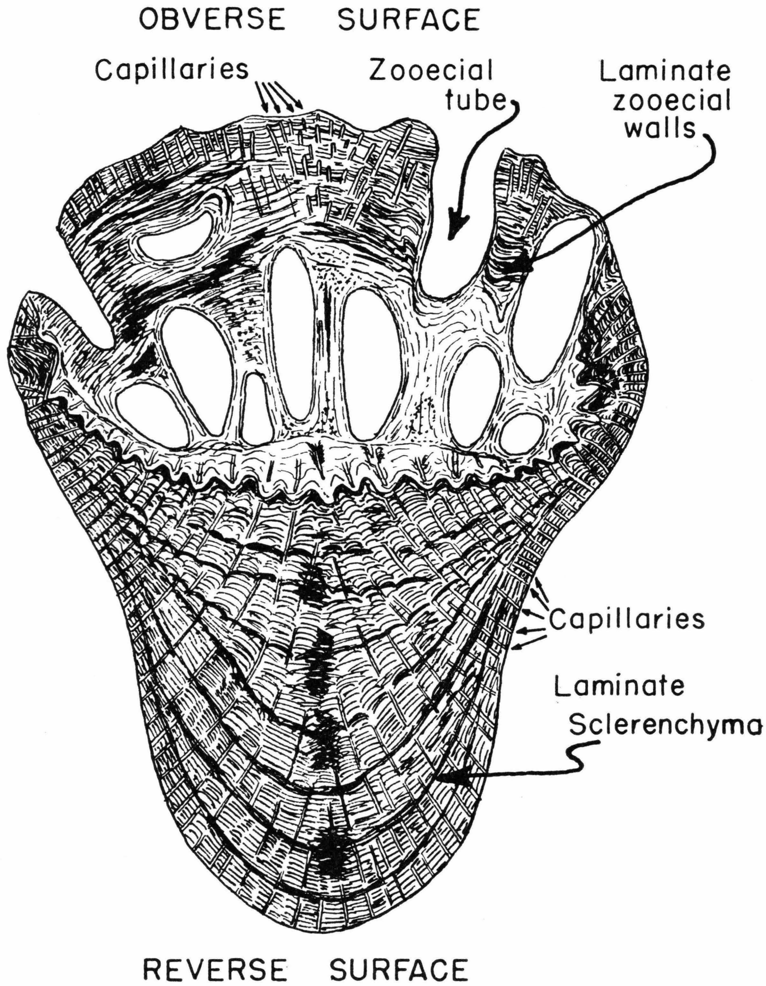

Fig. 7. Transverse section of a zoarial branch of *Polypora amdrupensis* sp. nov. showing the laminate sclerenchyma pierced by numerous capillaries and the laminate zooecial walls also pierced by capillaries. × 50.

has referred to as capillaries (text-fig. 6, pl. 14, figs. 1, 3; pl. 15, fig. 2; pl. 16, figs. 3, 5). This term is used in the text to describe the fine structures ranging in diameter from .01 to .02 mm but no functional interpretation is associated with its usage. In shallow tangential sections, the circular zooecial tubes may be lined by concentric laminae pierced or serrated by capillaries. The dissepiments which may be partly encroached by zooecia and the margins of the fenestrules also show the fine laminate microstructure pierced by numerous capillaries. Deep tangential sections may reveal upper hemisepta which commonly divide the zooecial tubes into two unequal circular or crescentic openings. Very deep tangential

Species	No. per 10 mm		No. of zooecia	
	Branches	Fenestrules	Per 5 mm	Per fenestr
Polypora sp. cf. *P. martis* Fischer........	8	6–7.5 (Av. 7)	17–18	3–4
Polypora sp. cf. *P. timorensis* Bassler	6	5.5	13.5 (Av. 13.5)	4
Polypora sp. cf. *P. russiensis* Shulga-Nesterenko.................	5.5	4	12–15 (Av. 12.5)	4–5 (Av. 4.5)
Polypora sp. cf. *P. ovaticella* Shulga-Nesterenko.................	9	6.5	14	4
Polypora amdrupensis sp. nov............	3–4 (Av. 3.5)	2.2	13–15	6–9
Polypora sp. cf. *P. subovaticellata* Shulga-Nesterenko.................	8–12 (Av. 10)	7–8.5 (Av. 8)	13–13.5 (Av. 13)	3–5 (Av. 3)

sections near the basal part of the zooecia generally show hexagonal, pentagonal, or rhomboidal basal zooecial sections separated by narrow laminate zooecial walls. Tangential sections cutting the reverse surface reveal laminate calcitic sclerenchyma pierced by numerous capillaries.

In transverse sections (text-fig. 7), the laminae of adjacent zooecial walls intertongue and the laminae are convex distally. The basal part of the zooecial walls is separated from the laminate sclerenchyma by a narrow region of clear calcite and capillaries. A serrated boundary lies between the sclerenchyma and this narrow basal region. Shulga-Nesterenko (1949, p. 49) and Elias and Condra (1957, p. 27) have described similar structures in the genus *Fenestella*.

In longitudinal sections, the zooecial tubes are uniform in diameter except for their asymmetric bulb shape in their basal proximal region. Beneath the basal zooecial walls, thick convex bars forming the sclerenchyma have a microstructure of intertonguing laminae pierced by numerous small capillaries.

The genus *Polypora* ranges from the Ordovician to the Permian and an immense amount of literature contains descriptions of species, some of which are widely distributed.

Width of		Fenestrule		Zooecial opening	Capillaries	No. of rows	Age
branch mm	dissepiment mm	length mm	width mm	diameter mm	diameter mm	of zooecia	
.59–1.26 (Av. .9)	.59–1.1 (Av. .9)	.40–.73 (Av. .67)	.36–.67 (Av. .46)	Min. (.15 × .13) Max. (.16 × .16)	.02	4–6	Desmoinesian
.87–.97 (Av. .93)	.36–.67 (Av. .46)	1.3–1.53 (Av. 1.5)	.87–1.13 (Av. 1.04)	Min. (.13 × .13) Max. (.16 × .13) Av. (.14 × .13)	.01	4	Wolfcampian?
.8–1.2 (Av. 1.0)	.46–.59 (Av. .53)	1.9–2.3 Av. 2.0)	1.0–1.5 (Av. 1.2)	Min. (.13 × .13) Max. (.16 × .16) Av. (.14 × .13)	.01	5	Wolfcampian?
.56–.90 (Av. .67)	.36–.59 (Av. .47)	1.1–1.16 (Av. 1.13)	.56–.67 (Av. .67)	Min. (.16 × .13) Max. (.18 × .15) Av. (.16 × .15)	.01	4	Wolfcampian?
1.4–1.75 (Av. 1.6)	1.0–1.75 (Av. 1.27)	2.1–3.0 (Av. 2.8)	.7–2.0 (Av. 1.5)	Min. (.13 × .12) Max. (.16 × .16) Av. (.15 × .14)	.01–.02	7	Wolfcampian or post-Wolfcampian
.24–.50 (Av. .31)	.21–.35 (Av. .26)	.7–1.0 (Av. .8)	.49–.66 (Av. .56)	Min. (.16 × .16) Max. (.26 × .20) Av. (.23 × .18)	.01–.02	4.5	Wolfcampian or post-Wolfcampian

The meshwork formula used refers to the number of branches per 10 mm / number of fenestrules per 10 mm / / number of zooecia per 5 mm / number of zooecia bordering a fenestrule.

Polypora amdrupensis sp. nov.

Plate 15, figure 4; plate 16, figures 1—5.

Material: Specimens from Sample G 341, located at the top of Profil G (Frebold, 1950, p. 29), 194.5 metres above the base of the section measured north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian? The sample is a calcareous siltstone having brachiopods, corals, and other bryozoans.

Holotype .... MMUH no. 9138
Syntype .... MMUH no. 9140

Description: The form of complete zoaria is not known. Large fragments 3 × 3 cm are coarse flat expanses (pl. 15, fig. 4). The branches are straight and bifurcations are not common. The colonies have extraordinary depth, 2.2 to 2.5 mm, the sclerenchyma having a depth of 1.3 to 1.6 mm (pl. 16, fig. 1). The small circular zooecial openings open on slightly convex surfaces. No distinct rims bound the zooecial openings which do not project into the fenestrules. The lateral rows of zooecia encroach onto the narrow dissepiments. The numerous small zooecial openings extend continuously along the branches where no nodes were observed (pl. 16, fig. 4). Generally seven rows of zooecia extend across a branch.

The fenestrules are oval on the obverse surface but commonly appear circular on the reverse surface. On the obverse surface the short narrow dissepiments connecting branches are depressed below the level of the branches.

In tangential sections the amalgamate laminate microstructure of the zooecial walls is rippled by numerous small circular capillaries which are also abundant in the inner zooecial walls lining the zooecial tubes. These inner zooecial walls thus have a finely ribbed outline in very shallow tangential sections (pl. 16, fig. 5). Likewise the margins of the fenestrules are slightly ribbed by capillaries. The capillaries in the zooecial walls are variable in diameter, in many instances the capillaries appear to be grouped like spreading bushes (pl. 16, fig. 5). In addition the capillaries bifurcate near the obverse surface of a colony (pl. 16, fig. 1). In shallow tangential section the circular openings are commonly divided by upper hemisepta into small oval or circular openings on one of their lateral margins and large circular openings (pl. 16, fig. 3). Deep tangential sections show generally hexagonal, occasionally irregular pentagonal, basal zooecial cross sections.

In longitudinal sections along a zoarial branch, the zooecial tubes are uniform in diameter but have an asymmetric bulb shape in their basal proximal region (pl. 16, fig. 2). The basal walls of the zooecia lie on thick convex bars having a microstructure of cross-bedded laminae pierced by small numerous capillaries (pl. 15, fig. 2). The bars have finely serrated surfaces below the smooth basal zooecial walls (pl. 16, fig. 1).

Remarks: *Polypora amdrupensis* is characterised by thick, wide zoarial branches, narrow oval fenestrules, and slender dissepiments. The small zooecial openings are separated by zooecial walls studded with numerous capillaries. This new species is similar to *P. ornamentata* Shulga-Nesterenko and *P. supraornamentata* Shulga-Nesterenko of the *P. cesteriensis-P. ornamentata* lineage. *P. ornamentata* Shulga-Nesterenko (1941, p. 162, 163, pl. 43, fig. 2, pl. 45, fig. 1) from P_1^1, Sterlitamak horizon, Urals, has a meshwork formula, 3—4 / $1^1/_2$—2 / / 11—12 / 9—10, 6—7 rows of zooecia across a branch, branch width, basal zooecial sections and abundant capillaries similar to the northeast Greenland species. The Russian species has narrower dissepiments, considerably longer fenstrules, considerably smaller zooecial openings, and less thick branches. *P. ornamentata* has star-like tubercles that are lacking in *P. amdrupensis*. SHULGA-NESTERENKO (1949, p. 43) restricts *P. ornamentata* to the Tastuba horizon and places *P. supraornamentata* SHULGA-NESTERENKO (1952, p. 76, 77, pl. 16, fig. 2, text-fig. 45) from the Sterlitamak horizon, Urals, as the end member of the lineage *P. cesteriensis*-*P. ornamentata*. *P. amdrupensis* has zoarial dimensions very similar to both *P. ornamentata* and *P. supraornamentata* which may be conspecific.

Polypora natalis CROCKFORD (1957, p. 64, 65, pl. 18, figs. 1, 2, text-fig. 12) from the Nooncanbah Formation, Permian, Western Australia has a meshwork formula, 3—4 / $1^1/_2$—2 / / 12 / 9—12, very similar to *P. amdrupensis*. The Western Australian species has more closely spaced zooecia, wider branches, longer and wider fenestrules, and smaller zooecial openings than the northeast Greenland species. The two species have similar dissepiment widths, and number of rows of zooecia across a branch.

The species takes its name from Amdrup Land.

Polypora sp. cf. *P. martis* FISCHER DE WALDHEIM

Plate 14, figures 1, 5.

Polypora martis FISCHER DE WALDHEIM, 1837, Oryctographie du Gouvernement de Moscou. Moscou;
— NIKIFOROVA, A. I., 1938, U.S.S.R. Acad. Sci., Paleont. Institut, Paleontology of U.S.S.R., v. 4, pt. 5, fasc. 1, p. 24, 122—124, pl. 25, figs. 1—9, pl. 26, figs. 1—7.
— SHULGA-NESTERENKO, M. I., 1951, U.S.S.R. Acad. Sci., Paleont. Institut. Trans., v. 32, p. 134—136, pl. 1, fig. 8, pl. 30, figs. 3, 4, text-fig. 53;
— MOROZOVA, I. P., 1955, Ibid., v. 53, p. 32, 33.

Material: Specimens from Sample F 1 240, located in Profil F 1 (FREBOLD, 1950, p. 23), 243—244 metres above the base of the section measured near Kap Jungersen, Amdrup Land. Pennsylvanian; Desmoinesian. The sample is a conglomeratic calcarenite, weathering orange-brown and having brachiopods, clay pellets, and chert pebbles.

Description: The form of complete zoaria is not known. The specimen examined is a fine meshwork, 4 cm × 4 cm, which is convexly curved, having the zooecial openings on the concave surface. The lateral sections of the colony are laterally divergent from the median section. Bifurcations are common in the lateral sections whereas they are not in the median section.

Generally there are four to six rows of zooecia across a branch, 0.9 to 1.0 mm wide, but there may be as many as 8 zooecia before and as few as 2 or 3 after bifurcation (pl. 14, fig. 5). The branches likewise increase in width to 1.26 mm before, and decrease to .59 to .70 mm after, bifurcation. No distinct rims bound the zooecial openings which are arranged continuously along the straight branches and which do not project into the fenestrules. The lateral rows of zooecia commonly encroach onto the narrow dissepiments (pl. 14, fig. 5).

The fenestrules are circular and oval on the obverse surface and generally oval on the reverse surface.

In tangential section the amalgamate laminate microstructure of the zooecial walls is studded with numerous capillaries, abundant large tubercles, and small circular openings. A shallow tangential section displays microstructures very similar to those in *Polypora martis* Fischer as illustrated by Shulga-Nesterenko (1951, text-fig. 53, p. 135). In such sections (pl. 14, fig. 1) the zooecial openings are subdivided laterally and distally by crescentic structures (upper hemisepta) into large circular openings and smaller circular openings that lie on the lateral margins. Capillaries are abundant across the dissepiments as well as in the zooecial walls and they line the margins of the fenestrules. In many instances these capillaries project beyond the margins of the fenestrules which are serrated. The fenestrules may be completely filled on their reverse surface by the extension of the capillaries. Deep tangential sections show hexagonal, pentagonal, or almost rhomboidal, basal zooecial sections.

In longitudinal section along a zoarial branch, the zooecial tubes have a uniform diameter and an asymmetric bulb shape in their basal proximal region. The thick convex bars forming the reverse section of the branches have a microstructure of laminae crossed by numerous capillaries.

Remarks: The specimens in Sample F 1 242 may be compared with specimens assigned to *Polypora martis* Fischer by Morozova (1955, p. 33, 34, 38) from the C_2^{2k} to C_3^1 in the Donetz Basin and by Nikiforova (1938b, p. 124) from C_2^4, C_3^s, C_3^i, and P_1^a in the Moscow Basin and Urals. *P. martis* has a meshwork formula of 8—10 / 6—8 / / 15—16, 17 ? / 3—4 approximating to the meshwork formula of the northeast Greenland specimens. The specimens from Sample F 1 242 differ from *P. martis* in having considerably wider zoarial branches and dissepiments, larger diameter of the zooecial openings, and smaller diameter of the capillaries. The two species are similar in the sizes of their fenestrules, diameter of zooecial openings, and development of upper hemisepta.

Polypora cestriensis Ulrich var. *kassimovensis* Nikiforova (1933, p. 14, 21, 22, 39, pl. 4, figs. 1, 2, text-fig. 19) from C_2^3 and C_2^5 of the middle Carboniferous of the Donetz Basin has a meshwork formula of 7—8 / 4 —5 / / 15, 17 / 3—5. This species has less fenestrules per 10 mm, slightly narrower branches and dissepiments, and smaller diameter of its zooecial openings than the northeast Greenland specimens.

Polypora sp. cf. *P. russiensis* Shulga-Nesterenko 1941

Plate 15, figure 6; plate 17, figure 1.

Polypora remota Condra var. *russiensis* Shulga-Nesterenko, M. I., 1941, U.S.S.R. Acad. Sci., Paleont. Inst., v. 5, pt. 5, Fasc. 1, Paleontology of U.S.S.R., Lower Permian Bryozoa of the Urals, p. 158, 159, 239, 240, pl. 42, fig. 4, text-fig. 120.

Material: Specimens from Grönwall's Collection, Sample No. 210; float from Eskimonæs, Holm Land. Permian; Wolfcampian? The sample is a light grey silicified calcarenite having other bryozoans, algal plates, ostracods, and crinoid columnals.

Description: The form of complete zoaria is not known. The numerous specimens in Grönwall's Collection Sample No. 210 are small fragmented mats scattered through the rock. The branches of the coarse colonies are straight or slightly sinuous but the frequency of bifurcation could not be investigated. The branches vary in width from 1.28 mm directly before to 0.71 mm directly after, bifurcation. Generally there are 5 rows of zooecia across a branch but there may be as many as seven zooecia directly before and as few as four zooecia directly after, bifurcation (pl. 17, fig. 1). The circular zooecial openings are continuously disposed along the branches. Nodes were not observed on the obverse side of the branches. The lateral rows of zooecia encroach slightly onto the well developed dissepiments (pl. 17, fig. 1). The large fenestrules are oval. The depth of the colony is 1.2 mm, the sclerenchyma being of medium depth.

In shallow tangential sections the wide zooecial walls between zooecial openings have a laminate microstructure which is densely crowded with numerous small capillaries of variable diameter, .005 to .01 mm, but no other tube- or rod-like structures are present (pl. 15, fig. 6). The small capillaries similarly crowd the laminae of the dissepiments and the margins of the fenestrules. In deep tangential sections the basal zooecial sections are rhomboidal to hexagonal (pl. 15, fig. 5). Deeper tangential sections below the basal part of the zooecial tubes show the laminate microstructure of the sclerenchyma which is traversed by numerous capillaries (pl. 15, fig. 5).

Remarks: *Polypora russiensis* Shulga-Nesterenko (originally described as *P. remota* Condra var. *russiensis* Shulga-Nesterenko, 1941, p. 158, 159, pl. 42, fig. 4) from the crinoidal bryozoan limestone of Verkne Chusovskye Gorodki, Urals, P_1^1, is closely comparable with the material from Sample No. 210. The Russian species, meshwork formula 6—7 / $3^1/_2$ / / 13—$13^1/_2$ / 4—6, has narrower branches and very much narrower dissepiments and fenestrules than the northeast Greenland specimens. The two species have similar fenestrule length, diameter of zooecial openings, basal zooecial sections, number of rows of zooecia across a branch and small capillaries crowding the zooecial walls. *P. russiensis* has large pseudopores that are lacking in the northeast Greenland material. *P. remota* Condra has distinctly narrower dissepiments and the northeast Greenland species may be a more highly evolved form having more strongly developed zoarial structures.

Polypora soshkinae Shulga-Nesterenko (1952 p. 74 pl. 15 fig. 1, text-fig. 43) from the Sterlitamak, Permian, of the Urals has a meshwork formula, 5—$6^1/_2$ / $3^1/_2$ / / $11^1/_2$—12 / 4, similar to that of the northeast Greenland form but it has narrower branches, wider dissepiments, longer and narrower fenstrules, slightly larger zooecial openings, and large capillaries and pseudopores.

Polypora cyclopora Eichwald (Shulga-Nesterenko, 1939, p. 66, 73; 1941, p. 161) from the Artinskian, P_1^1, Verkne Chusovskye Gorodki, Urals, has a meshwork formula of 6—7 / 4 / / 14—15 / 4—6? and the species, although having similar branch width, has wider dissepiments, slightly shorter and narrower fenestrules, smaller zooecial openings, and different features in tangential sections in comparison to the specimens in Sample No. 210.

Polypora medvedkensis Shulga-Nesterenko (1949, p. 43) from the Kasimov horizon of the Moscow Basin and the Urals has a meshwork formula, 5—7 / 3—4 / / 13—14 / 4—6, similar to that of Sample No. 210. The Russian species has narrower branches and dissepiments, slightly longer but narrower fenestrules, and smaller zooecial openings than the northeast Greenland form.

Polypora postabundans Shulga-Nesterenko (nomen nuden 1949, p. 45; formalized 1952, p. 77, pl. 15, fig. 2) from C_3^1, Gzhel horizon, Urals has a meshwork formula, 5—6 / 3—4 / / 13—$13^1/_2$ / 4, very similar to the specimens in Sample No. 210. The Russian species has narrower branches, considerably narrower dissepiments and fenestrules, and smaller zooecial openings.

Both *Polypora medvedkensis*, in the *P. cestriensis*-*P. ornamentata* lineage, and *P. abundans*, in the *P. helenae*-*P. kolvae* lineage, occur at the same evolutionary stage although in different lineages. The comparison of the northeast Greenland species with both these species suggests that it too lies at approximately this same evolutionary stage of development.

Polypora montuosa (Laseron) (Crockford, 1941, p. 400, 409, pl. 18, fig. 4, pl. 19, fig. 2), Permian, *Fenestella* Shale, Branxton, New South Wales, Australia, having a meshwork formula, 5—7 / 4—$4^1/_2$ / / 12 / 5—6, has similar branch width, diameter of zooecial openings, and number of rows of zooecia across a branch but considerably wider dissepiments, and shorter and narrower fenestrules than the northeast Greenland species.

The species has a general resemblance to *Polypora amdrupensis* sp. nov. in the character of the round fenestrules, thick zoarial branches, and small zooecial openings but the many other taxonomic features of the two species are different.

Polypora sp. cf. *P. ovaticella* SHULGA-NESTERENKO 1941.

Plate 15, figures 1, 2.

Polypora ovaticella SHULGA-NESTERENKO 1941, p. 147, 158; pl. 42, fig. 4, text-fig. 119.

Material: Specimens from Sample G 348, located in Profil G (FREBOLD, 1950, p. 29), 177.2—175.7 metres above the base of the section measured north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian? Specimens in recrystallised calcilutite with other bryozoans.

Description: The form of complete zoaria is not known. The slightly sinuous branches vary in width from 1.0 mm directly before, to 0.56 mm directly after, bifurcation. Generally there are four rows of zooecia across a branch but there may be as many as five before and as few as two after, bifurcation (pl. 15, fig. 1). The circular zooecial openings, continuously arranged along the branches lack distinctive rims. Lateral rows of zooecial tubes encroach onto the dissepiments which separate small oval fenestrules.

In tangential sections the zooecial walls between zooecial openings have a laminate microstructure densely crowded with small capillaries and small circular openings (pl. 15, fig. 2). The capillaries similarly crowd the laminate microstructure of the dissepiments and margins of the fenestrules. Successive tangential serial sections across zooecial tubes show the development of hemisepta which divide the zooecial tubes into large circular openings on the proximal sides of the septa and small circular openings or crescents, diameter (.07 × .07) to (.07 × .09) mm, on the distal sides (pl. 15, fig. 2). In deep tangential sections the basal zooecial sections are oval in the longitudinal direction.

Remarks: This species from northeast Greenland may be compared with *Polypora ovaticella* SHULGA-NESTERENKO (1941, p. 157, 158, pl. 42, fig. 4) from the P_1^1-sponge-fusulinid orizon, Verkne Chusovskye Gorodki, Urals. The Russian species has a meshwork formulae, 8 / 7 // 12 / 3—4, slightly different to the northeast Greenland species. The specimens in Sample G 348 have slightly narrower branches, wider dissepiments, larger zooecial openings, and more rows of zooecia across their branches. Both species have similar fenestrule length and width and capillaries of variable diameter. *P. ovaticella* lacks upper hemisepta.

Polypora nadinae SHULGA-NESTERENKO (1952, p. 71, 72, pl. 13, fig. 1, text-fig. 4) from the Sterlitamak stage, Urals, has a meshwork formula, 8—9 / 6 / / 15—16 / 4, but this may vary to 7—11 / 6 / / 14 —17 / 2—6. This species has narrower zoarial branches, and slightly smaller zooecial openings than the northeast Greenland species but it has similar dissepimental width, fenestrule dimensions, capillaries, pseudopores, and basal zooecial sections.

The northeast Greenland species has certain similarities to *Polypora timorensis* var. *greenharbourensis* NIKIFOROVA (1936, p. 121, 122, 136, pl. 2, figs. 1—3) from the Brachiopod Chert, lower Permian, Central Vestspitsbergen. The two species are similar in their meshwork formula, branch and dissepiment width, fenestrule width, and numbers of rows of zooecia on a branch. The northeast Greenland species has shorter fenestrules and larger zooecial openings than *P. timorensis* var. *greenharbourensis.*

Polypora fovea CROCKFORD (1944, p. 175, 176, pl. 3, figs. 1, 3) from the Permian, Nooncanbah Series, Western Australia has a similar meshwork formula, 8—12 / 6—$6^1/_2$ / / $15^1/_2$ / 4—5, to the northeast Greenland species. The Western Australian species has a finer meshwork and subsequently the branches are more numerous and narrower, the zooecial openings are considerably smaller, the fenestrules slightly longer and wider, and the dissepiments narrower than the northeast Greenland species.

The specimens in Sample G 348 have fewer rows of zooecia across a branch although having wider zooecial branches, considerably longer fenestrules, smaller zooecial openings, and different basal zooecial section in comparison to the specimens in Sample G 300, *Polypora* sp. cf. *P. subovaticellata* SHULGA-NESTERENKO.

Polypora sp. cf. *P. subovaticellata* SHULGA-NESTERENKO 1952.

Plate 15, figures 3, 5.

Polypora subovaticellata SHULGA-NESTERENKO 1952, U.S.S.R. Acad. Sci., Paleont. Inst. Trans., v. 37, p. 67—70, pl. 14, fig. 4, text-fig. 39.

Material: Specimen from Sample G 300, located in Profil G (FREBOLD, 1950, p. 29) 193—194.5 metres from the base of a section measured north from Kap Jungersen, Amdrup Land. Permian; Wolfcampian. The sample is a quartzose calcarenite having brachiopods, other bryozoans, and large solitary corals.

Description: The form of complete zoaria is not known. The fragment of the delicate zoarial network examined is 2.5 cm × 5 cm (pl. 15, fig. 3). The branches are straight and bifurcations are common. They vary in width from .50 mm directly before, to .24 mm directly after, bifurcation. In some instances the branches terminate distally by fusion of two branches around a fenestrule to give rise to a single branch (pl. 15, fig. 3). Generally there are four to five rows of zooecial openings across a branch but there may be as many as seven before and as few as three after, bifurcation. The circular zooecial openings lie on the flat surface of the colony. No elevated rims bound the zooecial openings which do not project into the fenestrules. The lateral rows of zooecial tubes encroach onto the dissepiments and in a few instance the dissepiments are almost enveloped by the expanding rows of zooecia (pl. 15, fig. 5). These numerous zooecial openings are arranged continuously along the branches but in the region of the dissepiments they may be slightly larger in diameter. The fenestrules are oval on the obverse surface but commonly are round on the reverse surface.

In tangential section the zooecial walls between zooecial openings are very narrow. The laminate microstructure of the walls is pierced by numerous capillaries which also line the margins of the fenestrules and fill the walls of the dissepiments (pl. 15, fig. 5). Successive serial tangential sections across zooecial tubes show development of hemisepta. In shallow tangential sections across zooecial tubes hemisepta divide the tubes into small oval areas distally and large circular zooecial openings proximally. In deeper tangential sections two distal prongs on the lateral sides of the hexagonal zooecial tubes project into the tubes. Deeper tangential sections show progressive displacement of the two prongs away from the distal walls along the periphery toward the proximal wall.

Remarks: This species from northeast Greenland is characterised by a delicate meshwork having numerous zooecia arranged on narrow branches which are separated by small fenestrules.

Polypora subovaticellata SHULGA-NESTERENKO (1952, p. 67—70, pl. 14, fig. 4, text-fig. 39) from the lower Permian, Burtsevka Horizon, Ural Mountains is a closely similar species in many taxonomic features. Its meshwork formula, 8—11 / 6 / / 13—14 / 3, indicates that it has fewer fenestrules per 10 mm than the northeast Greenland species and in addition the Russian species has narrower branches with fewer rows of zooecia, wider dissepiments, slightly longer and wider fenestrules, and much smaller zooecial openings. *P. ovaticella* has nodes and a different structure in the inner part of the zooecial openings.

Polypora longa SHULGA-NESTERENKO (1941, p. 156, 157, pl. 42, fig. 2, text-fig. 118) from the bryozoan-reef horizon, Verkne Chusovskye Gorodki, P_1^1, Permian, Urals, has a meshwork formula of 11—12 / 5 —6 / / 12—13/3(4). Tangential sections of this Russian species are similar to those of specimens in Sample G 300 except that capillaries are more sparsely developed in *P. longa*. *P. longa* has wider branches, narrower dissepiments, very much longer and narrower fenestrules, and considerably smaller zooecial openings.

Polypora neerkolensis CROCKFORD (1948, p. 426, 427, text-fig. 10) from the Neerkol Series, upper Carboniferous, Mt. Barney, Queensland, has a meshwork formula, 8—10 / $5^1/_2$—7 / / 12 / 3—5, and zooecial openings with the same distinctive large diameter as in the northeast Greenland species. This eastern Australian species has wider branches, fewer rows of zooecia across a branch, slightly wider dissepiments and longer fenestrules.

Polypora pertinax LASERON (CROCKFORD, 1941, p. 412, 413, pl. 18, fig. 5) in the beds above the *Eurydesma cordatum* horizon, Allandale, New South Wales, Permian, has a very similar meshwork formula, 8—12 / 7 —9 / / $13^1/_2$ / 3, to the northeast Greenland species which however has narrower branches, larger zooecial openings, and shorter and wider fenestrules.

Polypora fovea CROCKFORD (1944, p. 175, 176, pl. 3, figs. 1, 3) from the Permian, Nooncanbah Series, Western Australia, has a partly similar meshwork formula, 8—12 / 6—$6^1/_2$ / / $15^1/_2$ / 4—5. This species has wider branches, longer fenestrules, and considerably smaller zooecial openings than the northeast Greenland species. The two species have a similar number of rows of zooecia across a branch and dimension of their dissepiments.

Polypora sp. cf. *P. timorensis* BASSLER 1929.

Plate 14, figures 2—4.

Polypora timorensis BASSLER 1929, Paläontologie von Timor, v. 16, pt. 28, p. 79, pl. 243 (19), figs. 1—4.

Material: Specimens from GRÖNWALL's Collections, Sample No. 153; float from the Mallemukfjeld, Holm Land. Permian; Wolfcampian? The sample is a calcarenite having other bryozoans and smaller Foraminifera.

Description: The form of complete zoaria is not known. The branches in the coarse zoaria are straight and generally four rows of zooecial openings lie across a branch (pl. 14, fig. 4). These circular openings do not project into the oval fenestrules on the obverse surface. The large fenestrules are irregular rectangles and polygons on the reverse surface (pl. 14, fig. 2).

In tangential section the wide zooecial walls between zooecial openings have a laminate microstructure crowded with small capillaries (pl. 14, fig. 3). The capillaries also crowd the laminate microstructure of the dissepiments and margins of the fenestrules. In shallow tangential sections the zooecial tubes are bridged by upper hemisepta. This bridge divides a zooecial tube into a large circular opening on its proximal side and a very small circular opening or crescent on its distal side. In deep tangential section the zooecial sections are rhomboidal and hemisepta project from the lateral margins.

Remarks: The specimens in Sample No. 153 are compared with *Polypora timorensis* BASSLER (1929, p. 79, pl. 243 (19), figs. 1—4) from the Permian of Timor about which only a very scant description can be found in the literature. *P. timorensis* has more closely spaced branches and fenestrules, narrower branches, longer and narrower fenestrules, and zooecial openings of smaller diameter. The material from northeast Greenland and Timor is similar in the number of zooecia per 5 mm, the number of zooecial per fenestrule, the width of dissepiments, and the number of rows of zooecia across a zoarial branch. *P. gzhelensis* SHULGA-NESTERENKO (1951, p. 114, 115, 139, 140) having a meshwork formula of 7—8 / 5 / / 15—16 / 4—6 has a general resemblance to the specimens from northeast Greenland. This Russian species from the Gzhel stage (C_3^{gj}) of the Moscow Basin has considerably narrower fenestrules (half the width of the fenestrules in the northeast Greenland zoaria) and smaller zooecial apertures. *P. gzhelensis* lies in the *P. cesteriensis*-*P. ornamentata* lineage and is the end member of the *P. cesteriensis*-*P. martis* branch. The northeast Greenland specimens are similar to *P. montuosa* (LASERON) (CROCKFORD, 1941, p. 400, 409, 410, pl. 18, fig. 4, pl. 19, fig. 2) from the *Fenestella* Shale, Branxton Stage, Permian, Branxton, New South Wales, Australia, in the diameter of the zooecial openings and character of the basal zooecial sections. *P. montuosa* has a greater number of zooecia per fenestrule, wider dissepiments and fenestrules. *P. timorensis* var. *greenharbourensis* NIKIFOROVA (1936, p. 121, 122, 136, pl. 2, figs. 1—3) from the Permian Brachiopod Cherts of Central Vestspitsbergen has a meshwork formula, 8—9 / 5—$5^1/_2$ / / 13—14 / 3—4, similar to that of the specimens in No. 153. The Vestspitsbergen species has narrower branches, dissepiments, and fenestrules, slightly longer fenestrules, and large tubercles that are not observed in the northeast Greenland specimens.

Incertae Sedis.

Genus **Timanodictya** NIKIFOROVA 1938.

Timanodictya NIKIFOROVA 1938a, Russia Gosudarstvennyi Nauchno-issledovatel'skii Neftianoi Institut, Trudy, series A, v. 101, p. 88;
— NIKIFOROVA, 1938b, Russia Akademia Nauk, Paleontologicheskii Institut, Paleontologii S.S.S.R., v. 4, pt. 5, no. 1, p. 269.

Type species: *Coscinium cyclops* KEYSERLING var. *dichotomum* STUCKENBERG (1875, p. 95, pl. 4, fig. 5), from the *Schwagerina* beds, lower Permian, Indiga River, Timan, U.S.S.R.

Generic Diagnosis: "Zoarium ramose, symmetrically bifoliate, branches lenticular in cross section, parallel-sided. Zooecial apertures disposed in longitudinal, diagonally intersecting rows. Along the borders of the branches noncelluliferous maculae are disposed at regular intervals, the maculae running transversely to the branches and being covered by numerous sometimes stellate acanthopores. Similar acanthopores are scattered without any special order between the aperture, on both sides of the zoarium." (NIKIFOROVA, 1938b).

Remarks: The very distinctive genus *Timanodictya* has only been reported in the literature from various parts of the lower Permian of Russia (Timan, Ural Mountains).

The type species, the only representative of the genus, was well described by NIKIFOROVA (1938b).

The skeletal microstructures of the genus *Timanodictya* present many puzzles in establishing taxonomic relations with other known genera. *Timanodictya* is not readily referable to the Cystodictyonidae or to the Rhinidictyidae with which NIKIFOROVA (1938b) suggested comparison. The rod- or tube-like structures extending across the laminate zooecial walls are suggestive of acanthopores but acanthopores generally lack an axial structure. In specimens of *Timanodictya* from northeast Greenland a dark axial structure is generally present in the rod- or tube-like structures. So far as is known *Timanodictya* has a mesotheca that extends only across the axial region and lacks median tubuli, such as in the genus *Escharopora*. These features do not suggest a relation of *Timanodictya* with the Rhinidictyidae. The possible development of lunarial structures around the zooecial openings and upper hemisepta also do not suggest a taxonomic relation with the Rhinidictyidae. The familial assignment of the genus must await further study of additional material as it becomes available.

Timanodictya sp. cf. *T. dichotoma* (STUCKENBERG).

Plate 18, figures 1—6.

Coscinium cyclops KEYSERLING var. *dichotomum* STUCKENBERG, A. A., 1875, Otschet geologischeskogo putetschestvija Petchorskii krai i Timanskyjo Tundry, Materialen zur Geologie Russlands, v. 6, p. 95, pl. 4, fig. 5.

Coscinium dichotomum STUCKENBERG, 1895, Korallen und Bryozoen der Steinkohlenablagerungen des Urals und des Timan: Russia, Geologicheskii Komitet, Trudy, v. 10, no. 3, p. 173, pl. 24, fig. 3.

Timanodictya dichotoma (STUCKENBERG), NIKIFOROVA, A. I., 1938b, Types of Carboniferous Bryozoa of the European part of the U.S.S.R.: Akademiia Nauk S.S.S.R., Paleontologicheskii Institut, Paleontologii S.S.S.R., v. 4, pt. 5, p. 185

—188, 269—271, pl. 48, fig. 1—4, pl. 49, figs. 1—10, pl. 50, figs. 1—4, pl. 51, figs. 1—6, pl. 52, figs. 5—7.

Material: Specimens in GRÖNWALL's Collection, Sample No. 212; float collected at Eskimonæs, Holm Land. Permian; Wolfcampian? The sample is a white weathering calcarenite.

Description: Colonies are broad, bifurcating branches having bifoliate symmetry. Branching is common and has about the same frequency as in *Timanodictya dichotoma* (STUCKENBERG) (NIKIFOROVA, 1938b, pl. 48, figs. 1—3). Zooecial tubes open on two smooth slightly convex surfaces and the zooecia have no preferred arrangement. The lateral margins of the branches lack zooecia. The general aspect of the proximal region of the zoaria is not known.

The zooecia grow from a mesotheca (pl. 18, figs. 2, 3, 5). The early region of growth of the zoarial tubes is asymmetrically bulbous and lies near the mesotheca at the base of long sloping tubes (pl. 18, fig. 2). No transverse structures constrict these zooecial tubes except for an occasional barb-like structure (upper hemiseptum?) on the proximal walls near the zooecial opening. The zooecial walls are narrow in the early region of growth of the zooecia but thicken considerably above the bulbous part of the zooecia (pl. 18, fig. 2). The microstructure of the zooecial walls is rippled by numerous slender rods of tubes of clear calcite which lie parallel to the growth direction of the zooecial tubes (pl. 18, fig. 2). The zooecial walls curve distally where the slender rods or tubes, 0.01 mm diameter, penetrate the walls. No boundaries separate adjacent zooecial walls which appear amalgamate.

The plane of bilateral symmetry lies in the mesotheca which in the colony examined is poorly preserved (pl. 18, figs. 3, 5). The mesotheca extends across the axial region of the colony but toward the periphery is lost in the dense laminae of the zooecial walls (pl. 18, fig. 5).

In shallow tangential sections, the cross sections of the zooecial tubes are circular or oval and in some instances a small opening, .015 mm diameter, separated by a narrow partition lies at the proximal end of the zooecia (pl. 18, figs. 1, 3, 6). In another instance three such small openings penetrate a crescentic band at the proximal end of the zooecial opening. These microstructures are similar to those found in lunaria and upper hemisepta. In tangential sections the microstructure of the zooecial walls appears as shredded laminae twining between and around the zooecial tubes and pierced by numerous microscopic rods or tubes (pl. 18, fig. 1). The rods or tubes are circular or oval in cross section and these clear calcitic bodies are outlined by a very narrow dark line. In many instances a dark rod-like structure lies in the axes of these rods or tubes.

Measurements:

Zoarial branch length — mm	25
Zoarial branch width — mm	4.8
Zoarial branch depth — mm	1.8—2.3 (Av. 2.0)
No. of zooecia across branch	14 incomplete
No. of zooecia per 2 mm	
Longitudinally	5—6 (Av. 5.5).
Laterally	6
Longitudinal interspace — mm	.12—.32 (Av. .23).
Lateral interspace — mm	.07—.26 (Av. .15).
Diameter of peripheral zooecial opening—mm	(.15 × .15)—(.20. × 20) Av. (.16 × .16).
Uncommonly large lateral zooecia	(.35 × .20).

$$\text{Ratio: } \frac{\text{radius of peripheral region of thickened zooecial walls}}{\text{radius of zooecium}} = .91 \text{ and } .86$$

Mesotheca thickness — mm	.03—.07
Diameter of slender rods or tubes — mm	.01

Remarks: The specimens from northeast Greenland are very similar in zoarial growth form and skeletal microstructures to *Timanodictya dichotoma* (STUCKENBERG) from the lower Permian, Indiga River, Timan (NIKIFOROVA, 1938b). These specimens have similar zoarial dimensions (branch width, branch depth, frequency of branching, and ratio: radius of peripheral region/radius of zooecium) to *T. dichotoma.* Zooecia are more numerous per 2 mm longitudinally and zooecial openings larger in diameter than those in the Russian species. NIKIFOROVA (1938b, p. 270) noted in handspecimens "within the zooecial apertures a small, clearly pronounced opening, 0.025 mm in diameter, presenting the orifice of the operculum . . ." and these structures may be compared with the small circular openings lying at the proximal ends of zooecial openings in thin sections of the northeast Greenland colony. These structures may represent lunaria or possibly part of upper hemisepta. The Russian specimens have fine stellate rods or tubes penetrating the zooecial walls whereas the specimens in Sample No. 212 have smooth non-stellate rods or tubes.

The white weathering colonies are preserved in a white weathering calcarenite and the surficial features of the colony from Sample No. 212 could not be fully observed. Thus the arrangement of maculae which characterise the type material of *Timanodictya dichotoma* were not observed. For this reason the specimens from Sample No. 212 are only compared with *T. dichotoma* although they may be conspecific with the Timan species.

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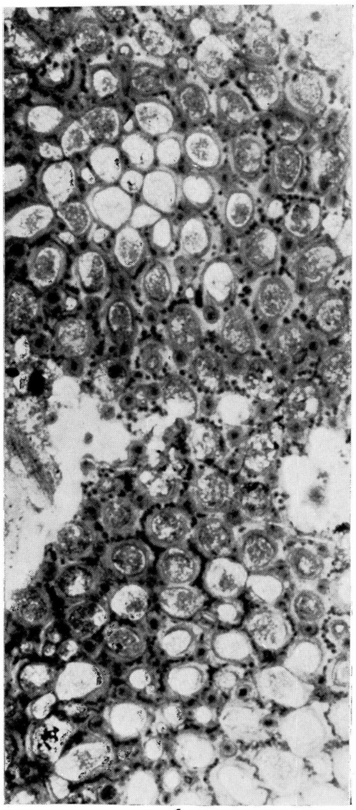
Færdig fra trykkeriet den 27. december 1962.

PLATES

Plate 1.

Figs. 1—7 *Rhombotrypella amdrupensis* sp. nov.
Desmoinesian. Profil F 1, Sample F 1 242, Amdrup Land. Holotype: MMUH no. 9113. Syntype A; MMUH no. 9114.

1. Shallow tangential section across two monticules showing varying development of acanthopores, mesopores, and thickened zooecial walls. × 20. Section cut from the holotype.
2. Shallow tangential section in the intramonticular area showing thickened and thinned moniliform walls pierced by acanthopores and mesopores. × 20. Syntype A.
3. Portion of a longitudinal section showing the narrow peripheral region of thickened zooecial walls and a monticule in the lower left hand corner. × 20. Section cut from the holotype.
4. External view of a branch of a colony having well developed monticules. × 2. Holotype.
5. Portion of a transverse section showing the angular arrangement of the quadrate zooecia; the thickened sections of the moniliform walls emphasize the zooecial arrangement. A low monticule projects above the general level of the zooecial surface in the upper left hand corner. × 20. Syntype A.
6. Shallow tangential section showing large acanthopores with laminate wall structure at the junctions of zooecial walls and mesopores and occasional small acanthopores in the outer part of the zooecial walls. × 50. Syntype A.
7. Portion of a longitudinal section showing the laminate microstructure of the thickened zooecial walls and perforate diaphragms in the narrow peripheral region. × 50. Section cut from the holotype.



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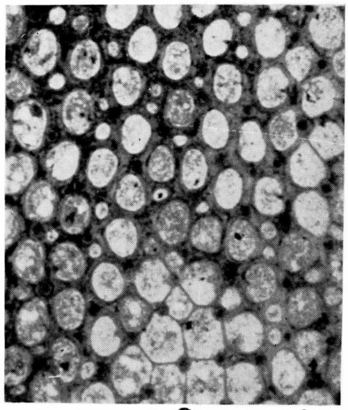

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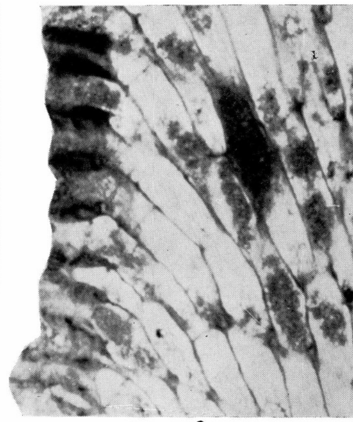

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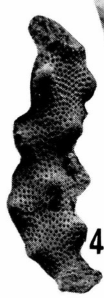

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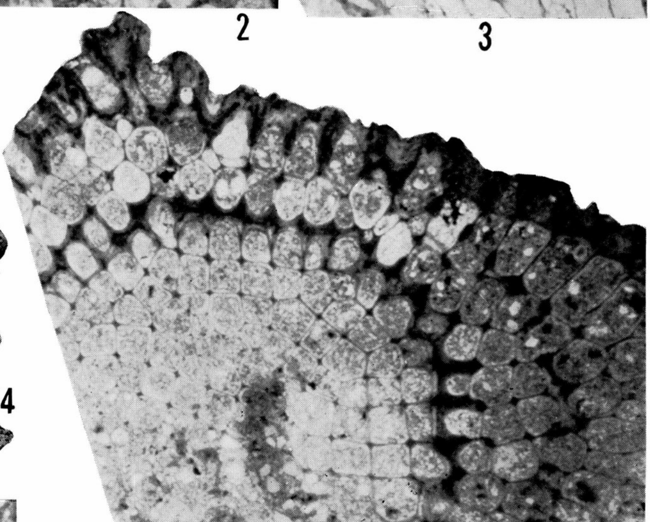

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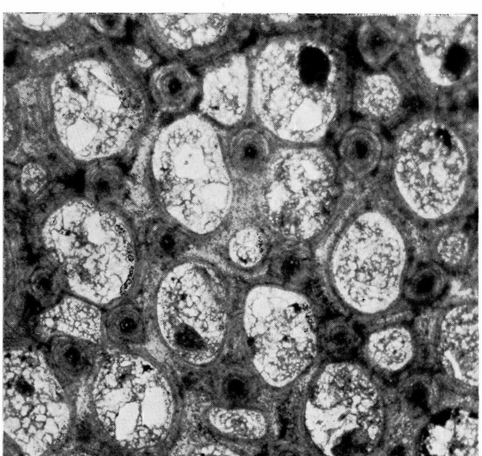

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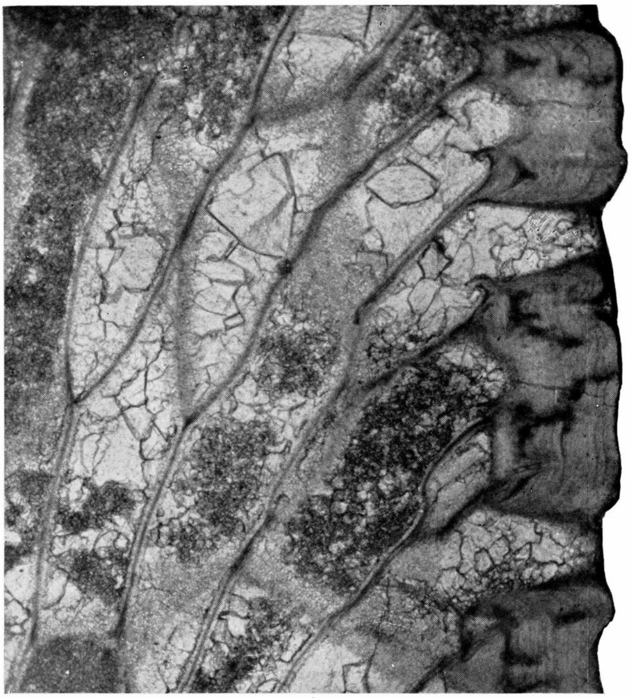
Plate 2.

Figs. 1—4. *Rhombotrypella holmensis* sp. nov.
Desmoinesian. Profil A, Sample A 128. Holm Land.
Figured thin sections cut from holotype: MMUH no. 9115.

1. Portion of a longitudinal section showing thickened zooecial walls in the narrow peripheral region and perforate diaphragms at the base of the peripheral region. $\times$ 50.
2. Portion of a transverse section showing quadrate zooecia in the axial region. $\times$ 20.
3. Oblique tangential section showing thick-walled zooecia; large acanthopores lie at the junctions of the zooecial walls, a single series of small acanthopores and a few mesopores lie in the outer part of the zooecial walls. $\times$ 50.
4. Longitudinal section showing a narrow peripheral region having thickened zooecial walls and a wide axial region of slender walls. $\times$ 20.



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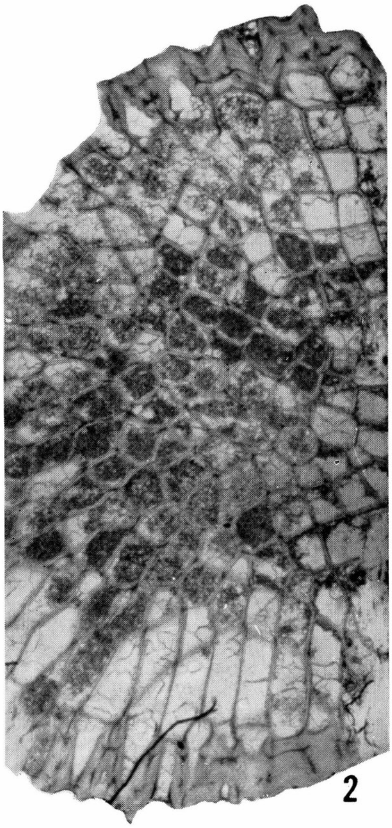

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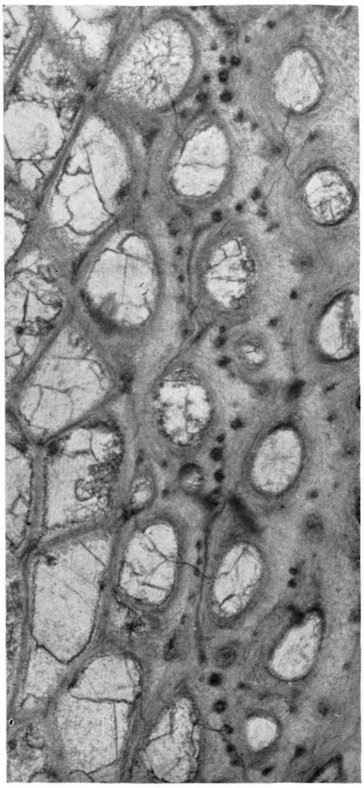

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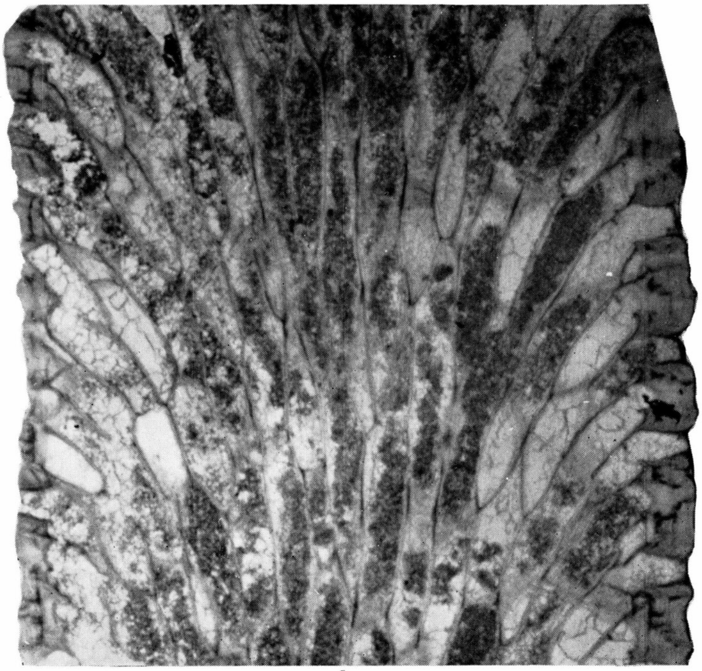

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Plate 3.

Figs. 1, 2, 4—6. *Rhombotrypella mallemukensis* sp. nov.
Desmoinesian. Profil N, Sample N 130. Holm Land.
Holotype: MMUH no. 9116. Syntype A: MMUH 9117.
Syntype B: MMUH 9145.
Syntype C: MMUH 9146.

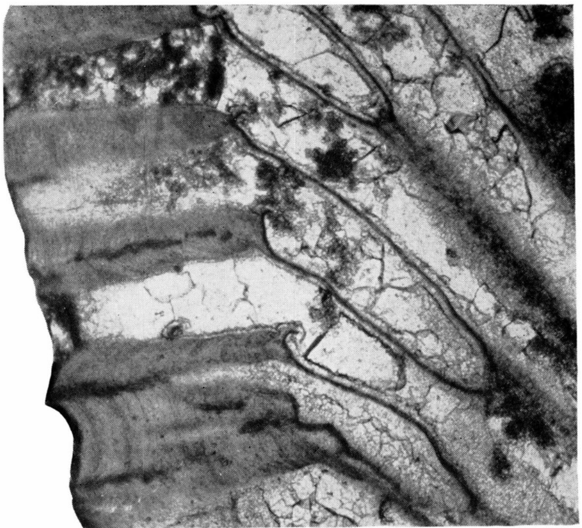
1. Portion of a longitudinal section showing a narrow peripheral region having thick walled zooecia and perforate diaphragms at its base. × 50. Section cut from holotype.

2. Portion of a transverse section showing quadrate zooecia in the wide axial region. × 20. Section cut from syntype, MMUH no. 9146.

4. Portion of a transverse section showing quadrate and polygonal zooecia sometimes in rosettes in a wide axial region. × 20. Section cut from holotype.

5, 6. External views of cylindrical branches of a colony partly embedded in matrix. × 2. Syntypes. MMUH nos. 9117 and 9145.

Fig. 3. *Rhombotrypella* sp. cf. *R. composita* NIKIFOROVA. Wolfcampian? Sample no. 154, GRÖNWALL's Collection. Holm Land. MMUH no. 9118.
Portion of a transverse section showing quadrate and polygonal zooecia in a wide axial region. × 20.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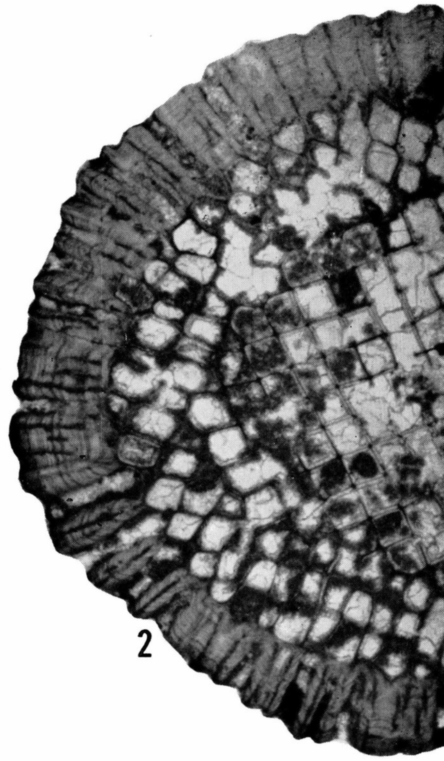
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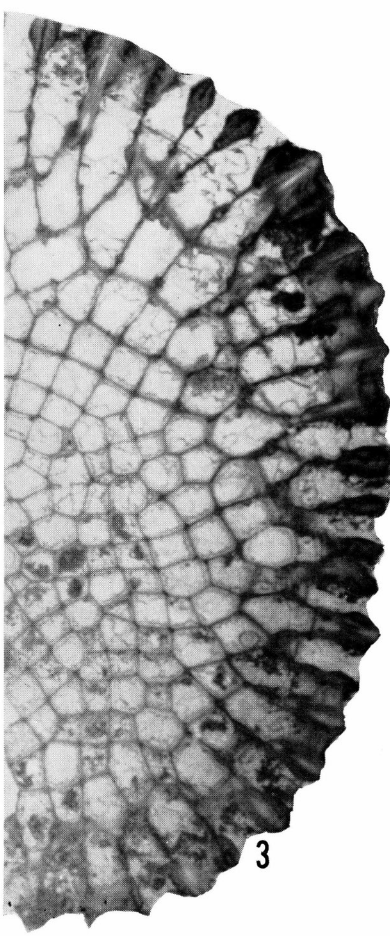
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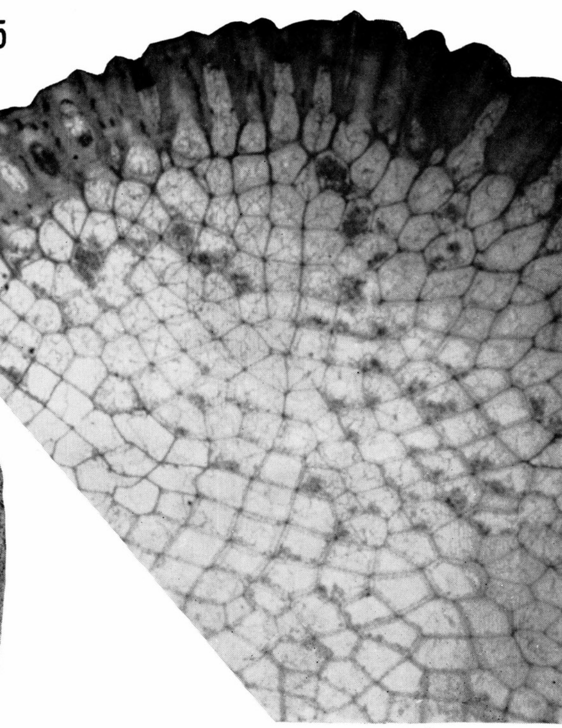
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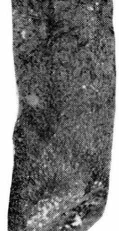
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Plate 4.

Figs. 1—3. *Rhombotrypella mallemukensis* sp. nov.
Desmoinesian. Profil N, Sample N 130. Holm Land. Holotype: MMUH no. 9116. Syntype C: MMUH no. 9146.

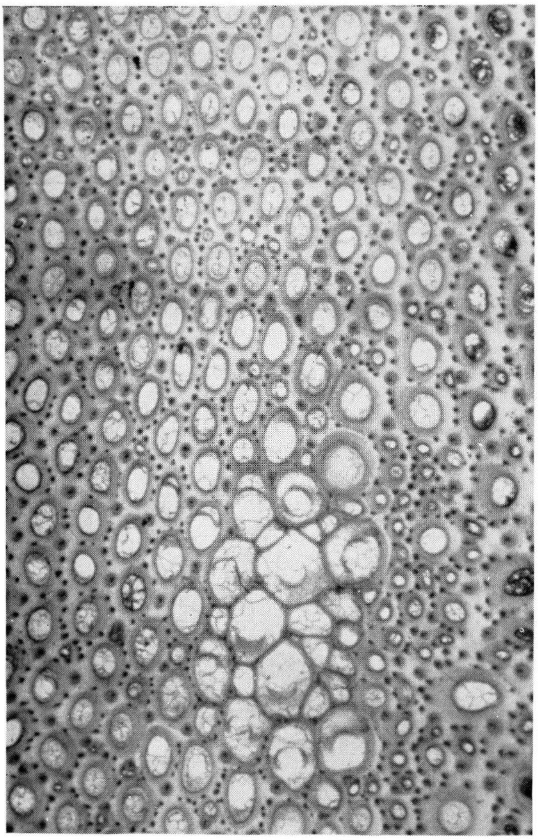
1. Shallow tangential section showing large zooecia in the monticule and mesopores clustered along one of its sides. × 20. Section cut from holotype.

2. Shallow tangential section showing zooecia in a monticule; the centrally perforate diaphragms form inner circles or crescents in the zooecial tubes. × 50. Section cut from holotype.

3. Shallow tangential section showing large acanthopores at the junction of zooecial walls; numerous small acanthopores in a single series lie in the outer part of the zooecial walls; mesopores also lie in the outer part of the zooecial walls. × 50. Section cut from syntype, MMUH no. 9146.

Fig. 4. *Rhombotrypella* sp. cf. *R. composita* Nikiforova. Wolfcampian? Sample No. 154, Grönwall's Collection. Holm Land. MMUH no. 9119.
Shallow tangential section of subquadrate zooecia and large acanthopores at the junction of zooecial walls; a single series of small acanthopores, together with some mesopores lie in the outer part of the zooecial walls. × 20.

Fig. 5. *Rhombotrypella* sp. A.
Wolfcampian? Profil H, Sample H 141. South coast of Amdrup Land. MMUH no. 9120.
Shallow tangential section showing thick zooecial walls pierced by large acanthopores, a few small acanthopores, and an occasional mesopore. × 20.



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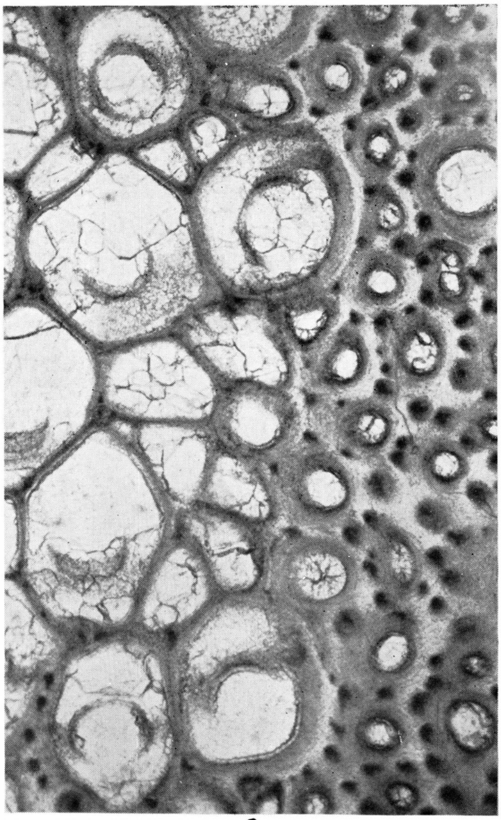

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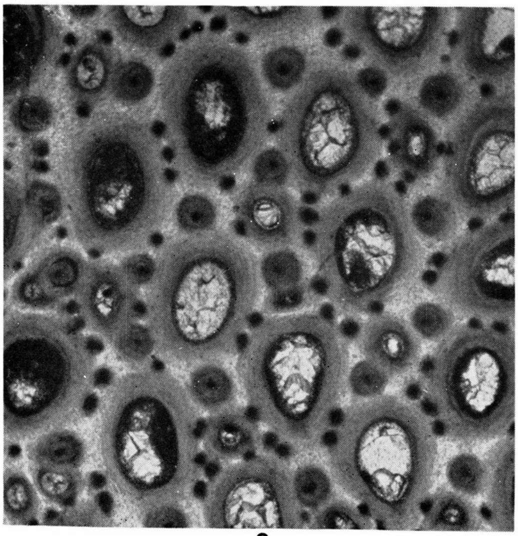

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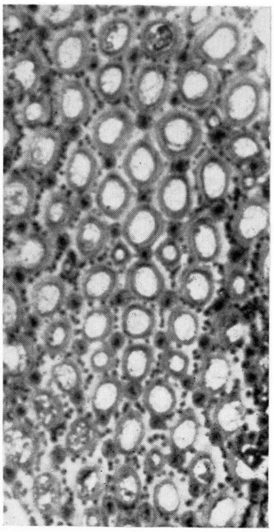

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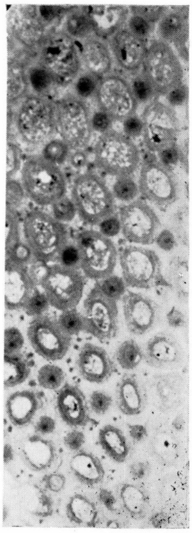

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Plate 5.

Figs. 1, 3—5. *Rhombotrypella* sp. cf. *R. gigantea.*
Wolfcampian? Sample No. 204, GRÖNWALL's Collection. Holm Land. MMUH no. 9122.

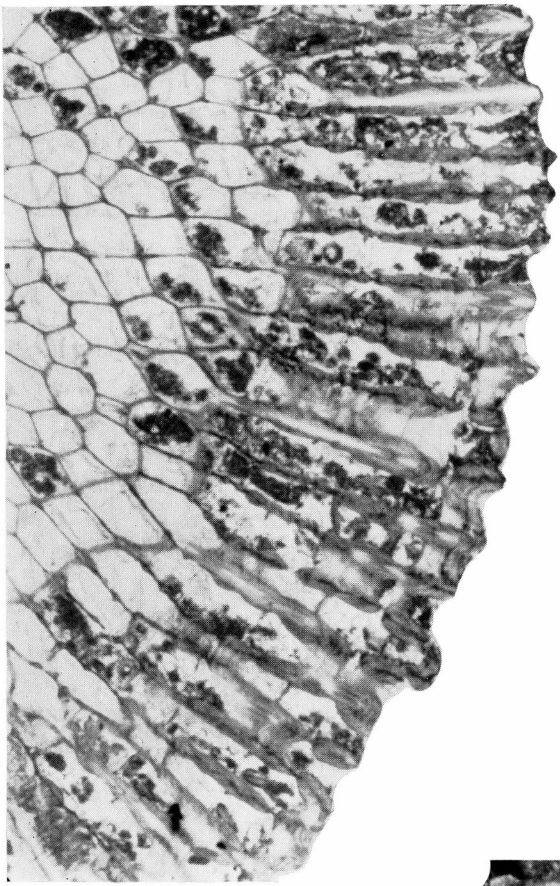
1. Portion of a transverse section showing moniliform walls and perforate diaphragms in the peripheral region. × 20.

3. Transverse section showing quadrate and polygonal zooecia in the axial region of very thick stemmed colony. × 5.

4. Shallow tangential section showing acanthopores penetrating the thickened and thinned moniliform walls and mesopores in the thickened parts of zooecial walls. × 20.

5. Portion of a longitudinal section showing the narrow peripheral region with thickened zooecial walls. × 20.

Fig. 2. *Rhombotrypella* sp. cf. *R. composita* NIKIFOROVA.
Wolfcampian? Sample No. 154, GRÖNWALL's Collection. Holm Land. MMUH no. 9118.
Deep tangential section showing large acanthopores at the junctions of the moniliform walls. × 20.



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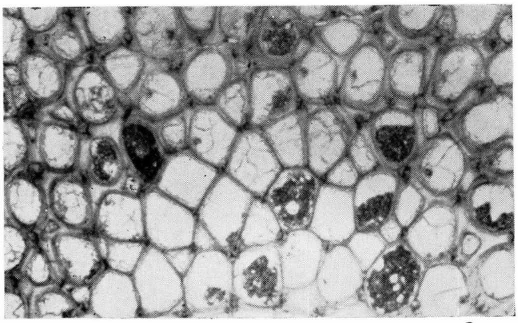

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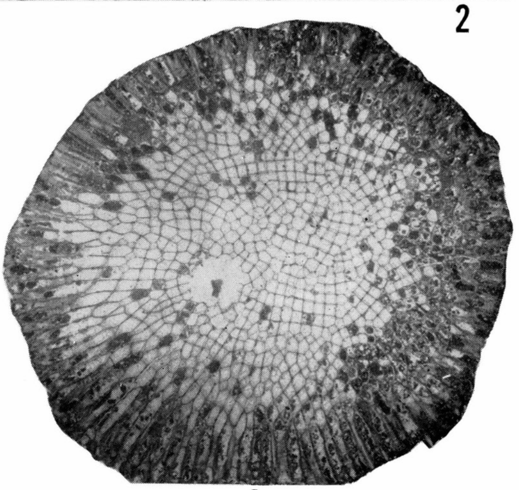

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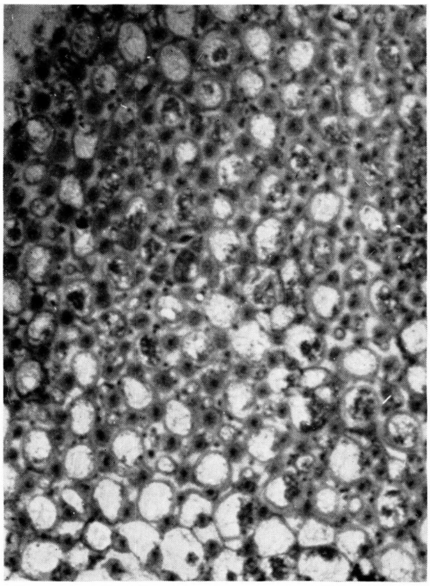

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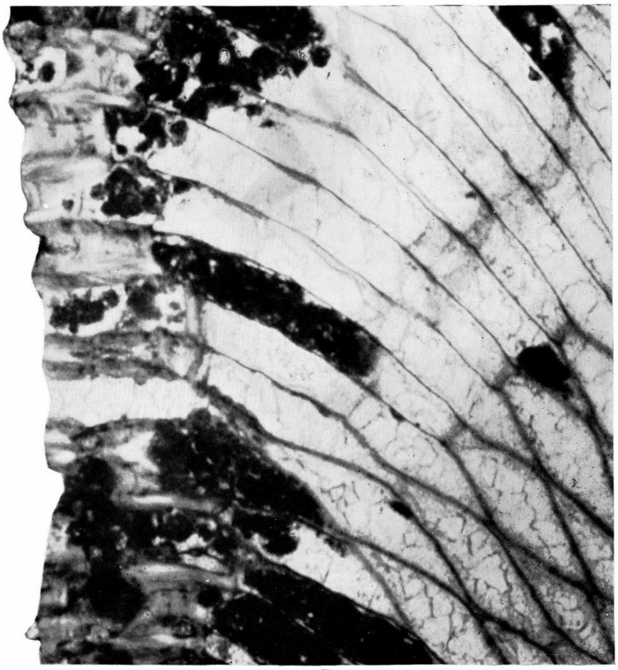

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Plate 6.

Figs. 1, 4. *Rhombotrypella* sp. C.

Wolfcampian? Profil H, Sample H 139. South coast of Amdrup Land. MMUH no. 9123.

1. Portion of a transverse section showing thin walled quadrate zooecia in the axial region and moniliform walls in the peripheral region. The zooecial walls are partly recrystallised. × 20.

4. Portion of a longitudinal section showing the wide peripheral region having moniliform walls. × 20.

Figs. 2, 3. *Rhombotrypella gigantea* sp. nov.

Wolfcampian? Profil G, Sample G 300. South coast of Amdrup Land. Thin sections cut from the holotype, MMUH no. 9124.

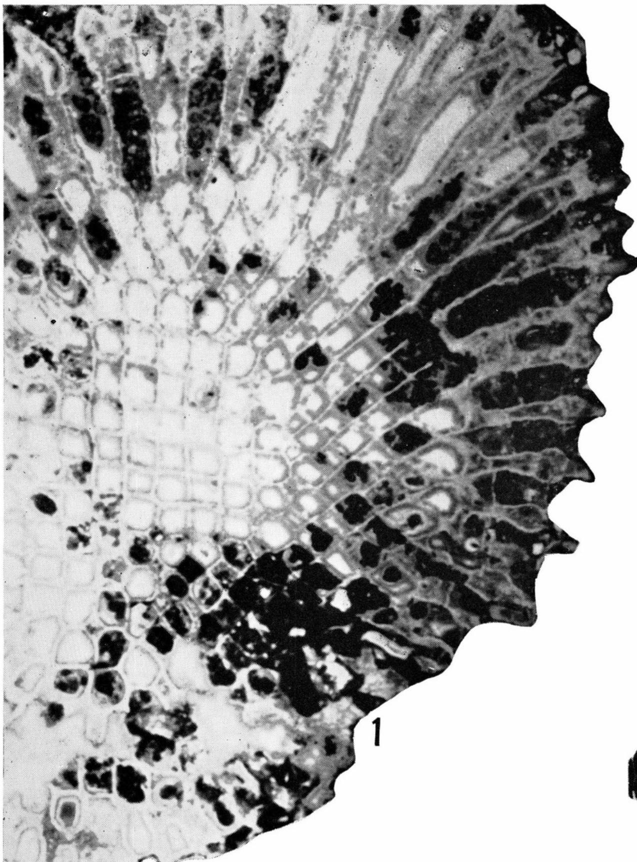
2. Portion of a transverse section of a large cylindrical stem having irregular quadrate and polygonal zooecia in the axial region. × 5.

3. Portion of a longitudinal section showing a wide peripheral region having moniliform walls and perforate diaphragms. × 5.

Fig. 5. *Rhombotrypella* sp. B. MMUH no. 9125.

Wolfcampian? GRÖNWALL's Collection, Sample No. 210. Holm Land.

Portion of a longitudinal section showing a very narrow peripheral region having moniliform walls and short monilae in the zooecial walls of the subperipheral region. × 20.



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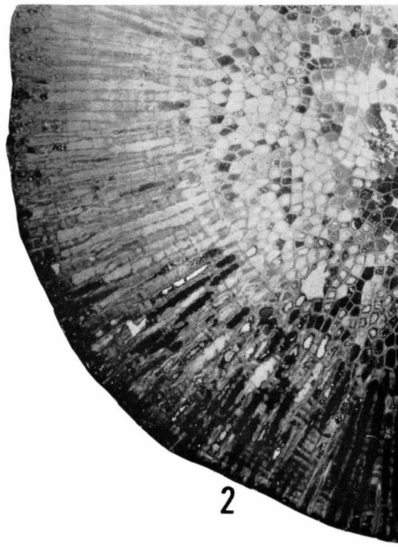

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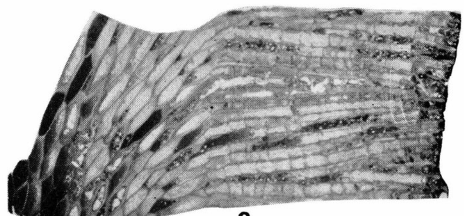

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Plate 7.

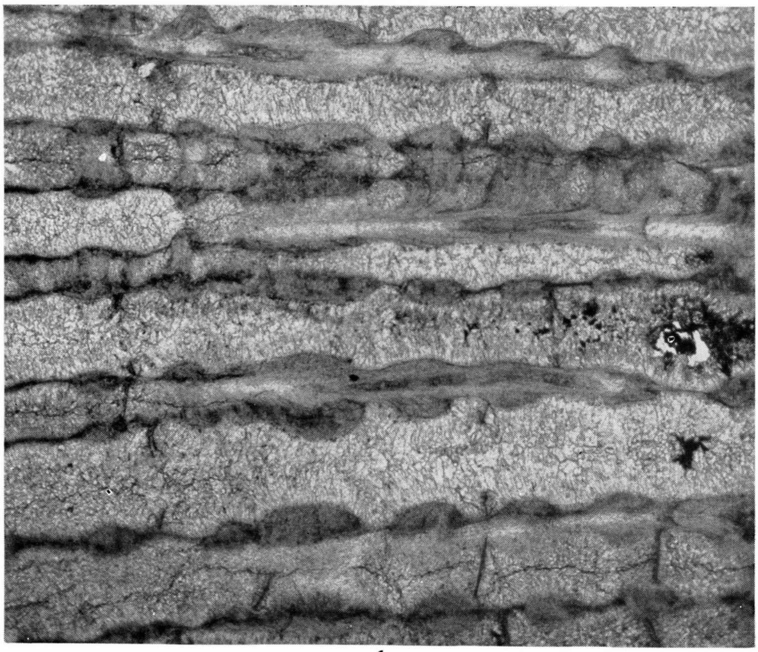
Figs. 1, 3, 4. *Rhombotrypella gigantea* sp. nov.
Wolfcampian? Profil G, Sample G 300. Amdrup Land. Holotype: MMUH no. 9124.

1. Portion of a longitudinal section in the outer peripheral region (periphery to the left) showing moniliform walls pierced by large acanthopores and perforate diaphragms. × 50.

3. Portion of a longitudinal section at the periphery of a branch showing large acanthopores and monilae projecting into the enclosing sediment. × 50.

4. Tangential section showing a monticule in the lower right, large acanthopores at the junctions of the moniliform walls, and small granular acanthopores in the zooecial walls. × 20.

Fig. 2. *Rhombotrypella* sp. B.
Wolfcampian? Grönwall's Collection, Sample No. 210. Holm Land. MMUH no. 9125.
Tangential section showing large zooecial openings separated by thick zooecial walls having an occasional mesopore, numerous small dark granular acanthopores, and large acanthopores at the junctions of the zooecial walls. × 50.



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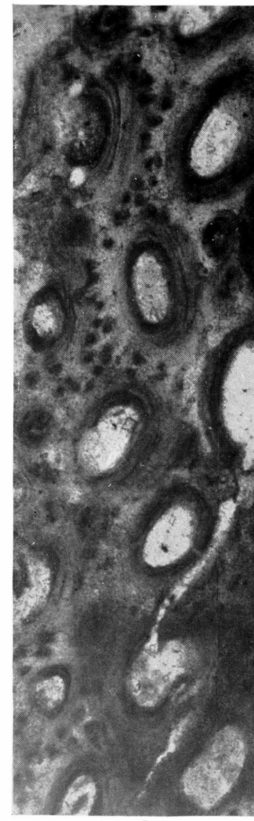

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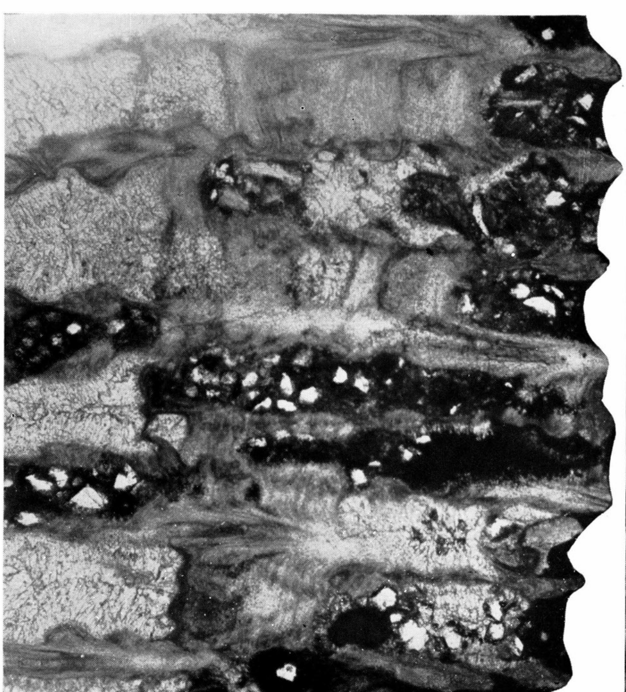

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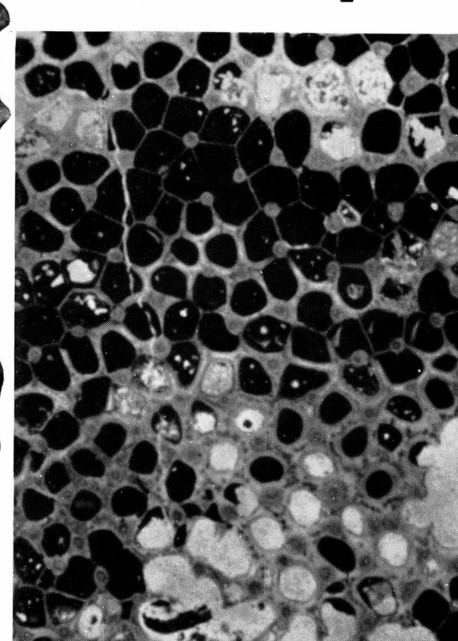

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Plate 8.

Fig. 1. *Tabulipora* sp. B.
Wolfcampian? GRÖNWALL's Collection, Sample No. 154.
Float from the Mallemukfjeld, Holm Land. MMUH no. 9126.
Portion of a longitudinal section showing moniliform zooecial walls in the wide axial and narrow peripheral regions. × 20.

Fig. 2—5. *Tabulipora* sp. A.
Wolfcampian? GRÖNWALL's Collection, Sample No. 153.
Float from the Mallemukfjeld, Holm Land. MMUH no. 9127.

2. Portion of a longitudinal section showing the narrow peripheral region having moniliform zooecial walls, perforate diaphragms, and large acanthopores projecting above the surface of the colony. × 20.
3. Transverse section showing the wide axial region having polygonal zooecia and the narrow peripheral region. × 20.
4. Tangential section showing circular zooecial openings and narrow zooecial walls penetrated by large acanthopores and numerous small mesopores. × 20.
5. External view of a branching colony having low rounded monticules of thickened zooecial walls. × 2.

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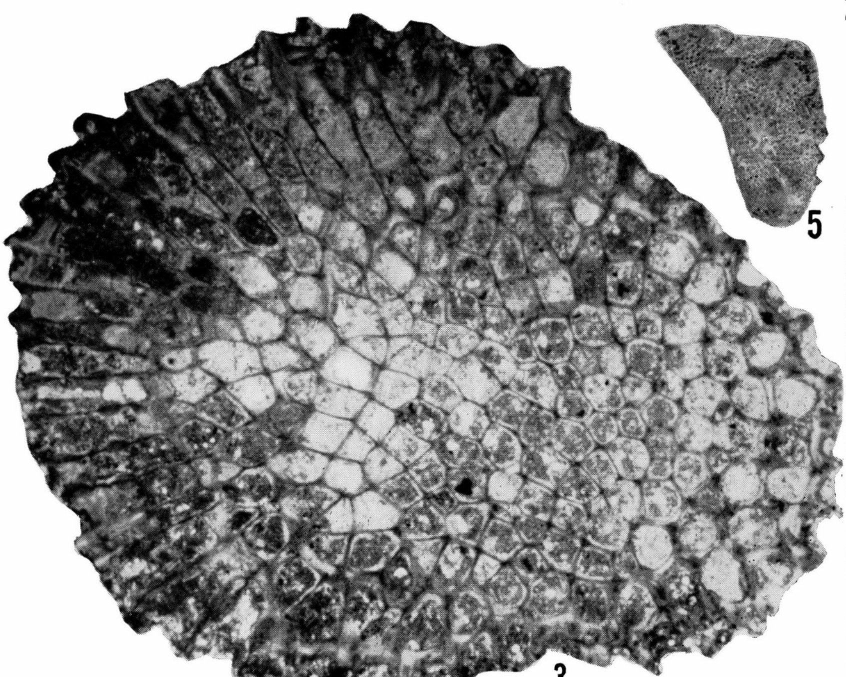

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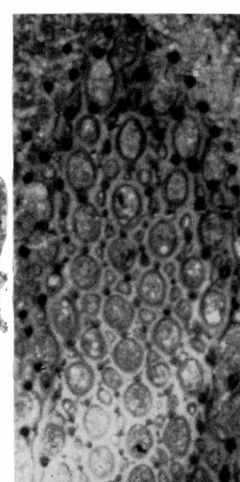

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Plate 9.

Figs. 1, 3. *Tabulipora* sp. C.
Wolfcampian? GRÖNWALL's Collection, Sample No. 213.
Float from Eskimonæs, Holm Land. MMUH no. 9128.

1. Portion of a longitudinal section showing the laminate microstructure of moniliform zooecial walls penetrated by large acanthopores. × 50.

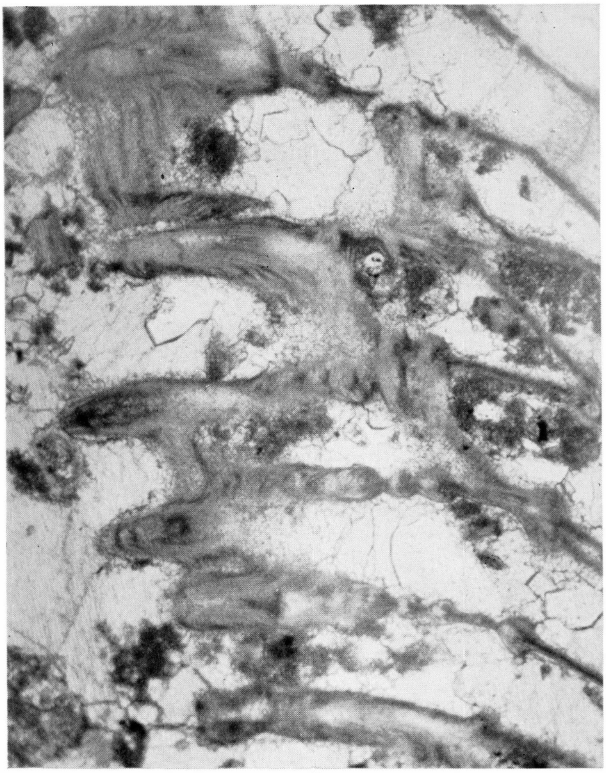
3. Portion of the peripheral region of a longitudinal section showing steeply inclined laminae of the large acanthopores with clear calcite axes penetrating distally convex laminae of the zooecial walls. × 50.

Figs. 2, 4. *Tabulipora* sp. B.
Wolfcampian? GRÖNWALL's Collection, Sample No. 154.
Float from the Mallemukfjeld, Holm Land. MMUH no. 9126.

2. Tangential section passing across the slender part of moniliform zooecial walls showing large acanthopores at the junctions of zooecial walls and numerous triangular mesopores. × 20.

4. Tangential section showing variable zooecial openings separated by wide zooecial walls penetrated by large and small acanthopores and mesopores. × 20.

Fig. 5. *Tabulipora arcticensis* sp. nov.
Wolfcampian? Profil H, Sample H 119. Amdrup Land. MMUH no. 9129.
Tangential section showing oval zooecial openings and zooecial walls penetrated by large acanthopores, a single series of small acanthopores, and circular mesopores. A thin walled section of the moniliform zooecial walls is visible in the upper right hand corner. × 20.



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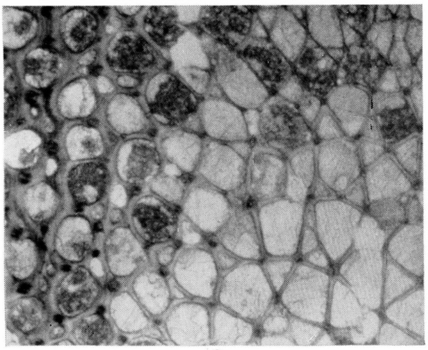

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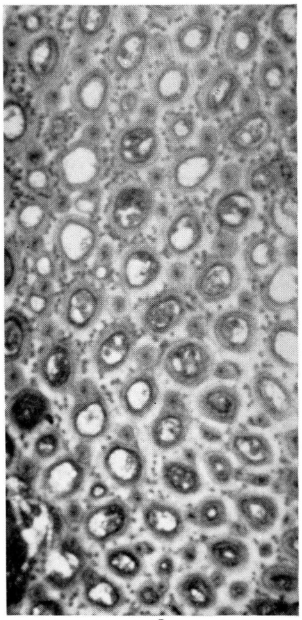

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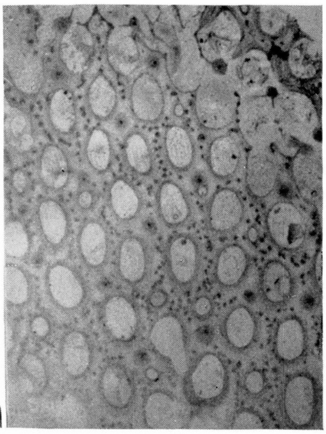

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Plate 10.

Figs. 1, 2, 6, 7. *Tabulipora* sp. C.
Wolfcampian? GRÖNWALL's Collection, Sample No. 213.
Float from the Eskimonæs, Holm Land. MMUH no. 9128.

1. Portion of a longitudinal section showing moniliform zooecial walls in the axial and peripheral regions and bifurcations of the zooecial walls above beaded sections of the walls. × 20.

2. Portion of a longitudinal section showing an overgrowth on the right. A large acanthopore projects above the surface of the colony and into the overgrowth. × 50.

6. Tangential section showing the variable size and shape of the zooecial and mesopore openings and large acanthopores at the junctions of the zooecial walls. × 20.

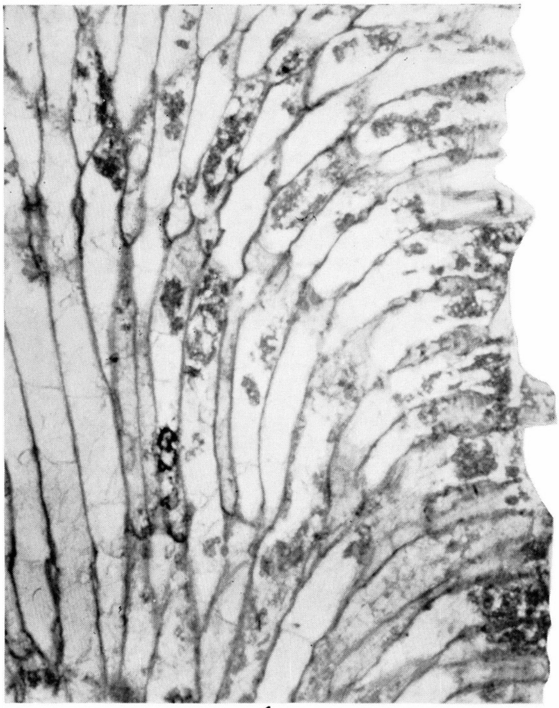
7. External view of a cylindrical branching stem on the right and an oblique section of a stem on the left. × 2.

Figs. 3, 4. *Tabulipora arcticensis* sp. nov.
Wolfcampian? Profil H, Sample H 119. Amdrup Land. MMUH no. 9129.

3. Longitudinal section of a zoarial stem showing monilae at definite levels, perforate diaphragms, and a narrow peripheral region. × 5.

4. Enlarged view of monilae in the crenulate zooecial walls and perforate diaphragms. × 20.

Fig. 5. *Tabulipora greenlandensis* sp. nov.
Wolfcampian. Profil G, Sample G 300. Amdrup Land.
Figured thin section cut from the holotype. Holotype: MMUH no. 9130.
Portion of an oblique longitudinal section showing moniliform zooecial walls in the wide axial and narrow peripheral regions and perforate diaphragms. × 5.



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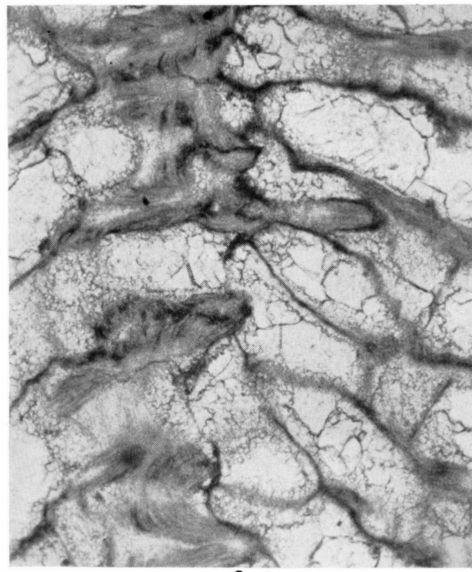

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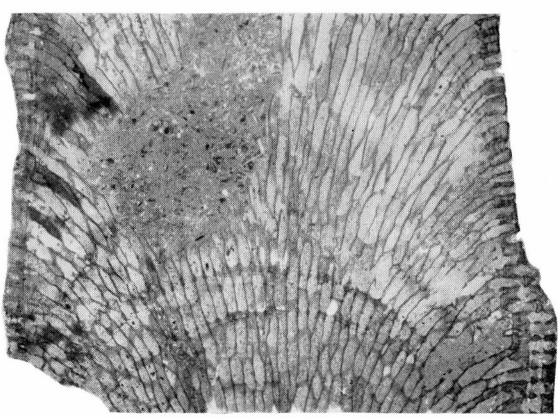

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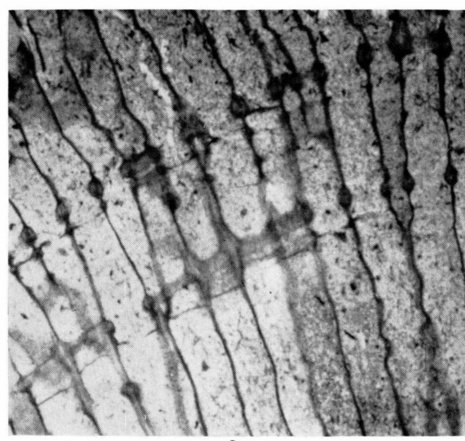

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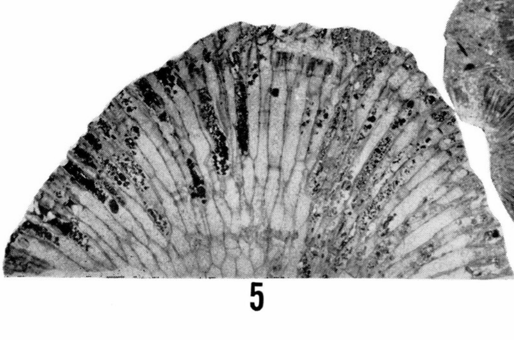

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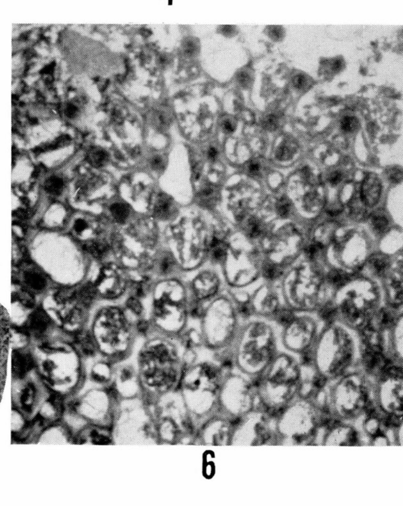

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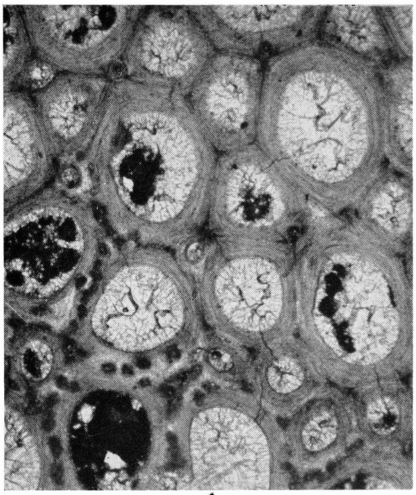
Plate 11.

Figs. 1—5. *Tabulipora greenlandensis* sp. nov. Holotype: MMUH no. 9130. Wolfcampian? Profil G, Sample G 300. Amdrup Land. Figured thin sections cut from the holotype.

1. Tangential view of the zooecial openings where the zooecial walls are strongly thickened. Small acanthopores are not present in all sections of the outer parts of zooecial walls. × 50.
2. Portion of a longitudinal section showing moniliform walls and perforate diaphragms. In the centre right a diaphragm extends across a zooecial tube into the zooecial wall laminae and continues across the adjacent zooecial tube. × 20.
3. Tangential section showing the large zooecial openings, numerous mesopores, small and large acanthopores, and moniliform walls. × 20.
4. Tangential section showing large acanthopores at the junctions of slender beaded zooecial walls. Small acanthopores and mesopores lie in the outer part of the zooecial walls. × 50.
5. Portion of a longitudinal section showing moniliform zooecial walls penetrated by large acanthopores. Note the distally convex laminate microstructure in the monilae. The perforate diaphragm in the lower right has axial extremities turned abruptly toward the axial region. × 50.



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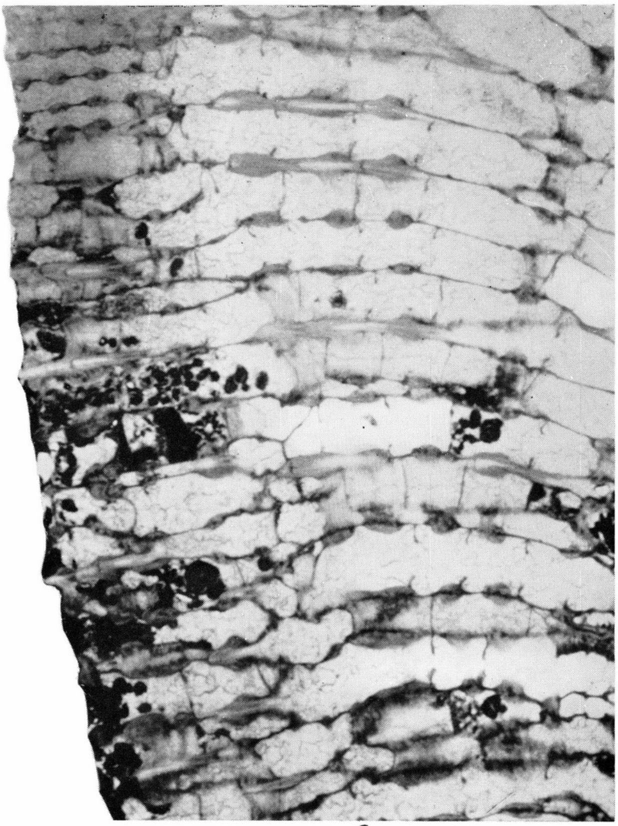

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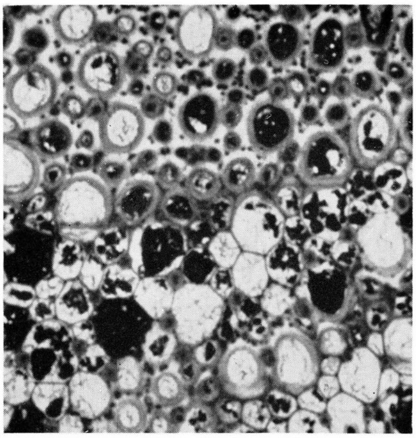

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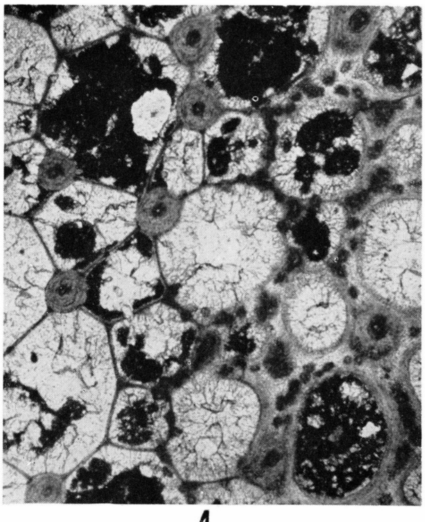

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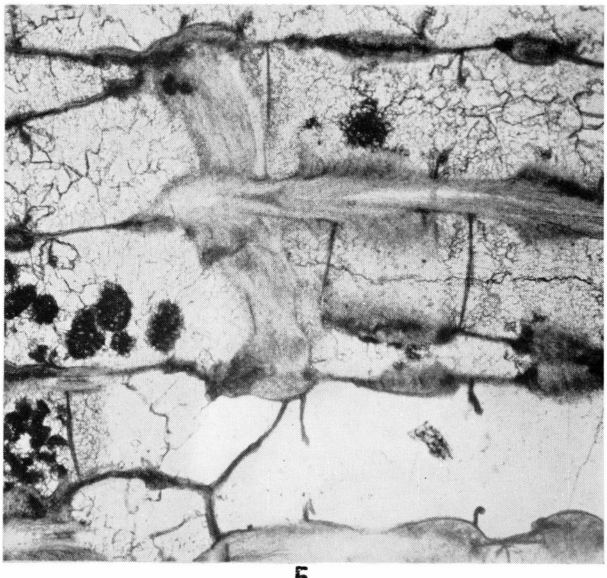

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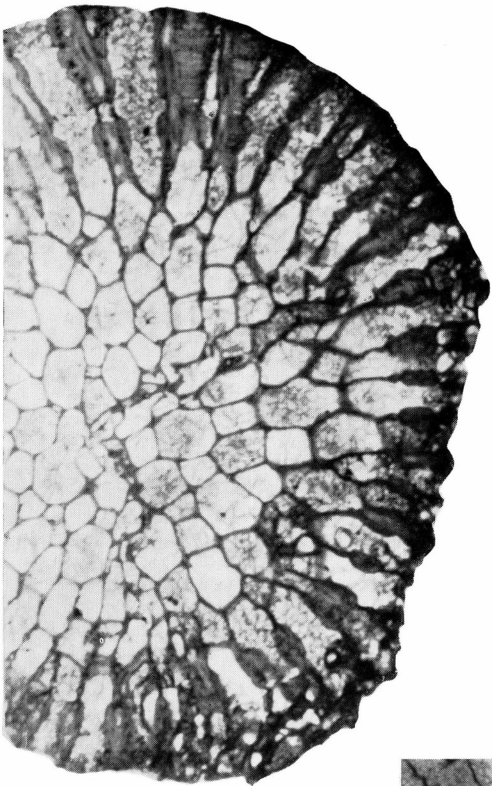
Plate 12.

Figs. 1, 2, 4. *Stenopora jungersenensis* sp. nov.
Wolfcampian? Profil H, Sample H 141. Amdrup Land. MMUH no. 9131.

1. Transverse section showing thin walled polygonal zooecia in the axial region and moniliform walls pierced by large acanthopores in the peripheral region. × 20.
2. Enlarged view of a longitudinal section showing the microstructure of the moniliform walls and large acanthopores in the peripheral region. × 50.
4. Longitudinal section showing arcuate rows of monilae crossing the zoarial branch and bifurcation of the zooecial walls in the axial region. × 20.

Fig. 3. *Stenopora* sp. MMUH no. 9132.
Wolfcampian? Profil G, Sample G 348. Amdrup Land.
Tangential section showing zooecial openings commonly infilled by thickened inner zooecial walls, very large acanthopores, and numerous very small mesopores in the zooecial walls. × 20.



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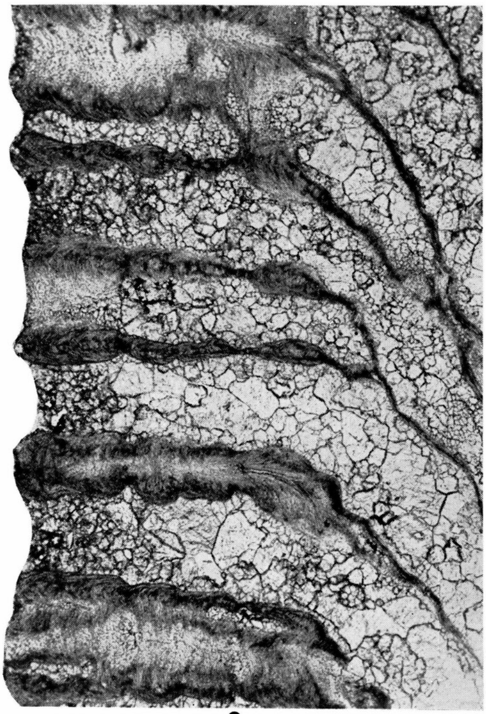

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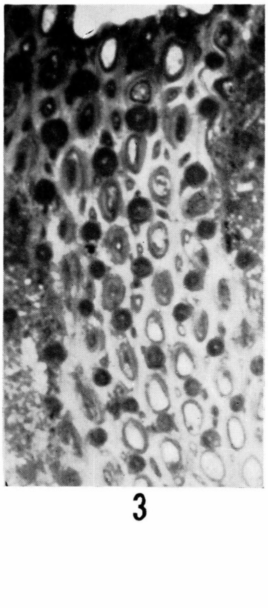

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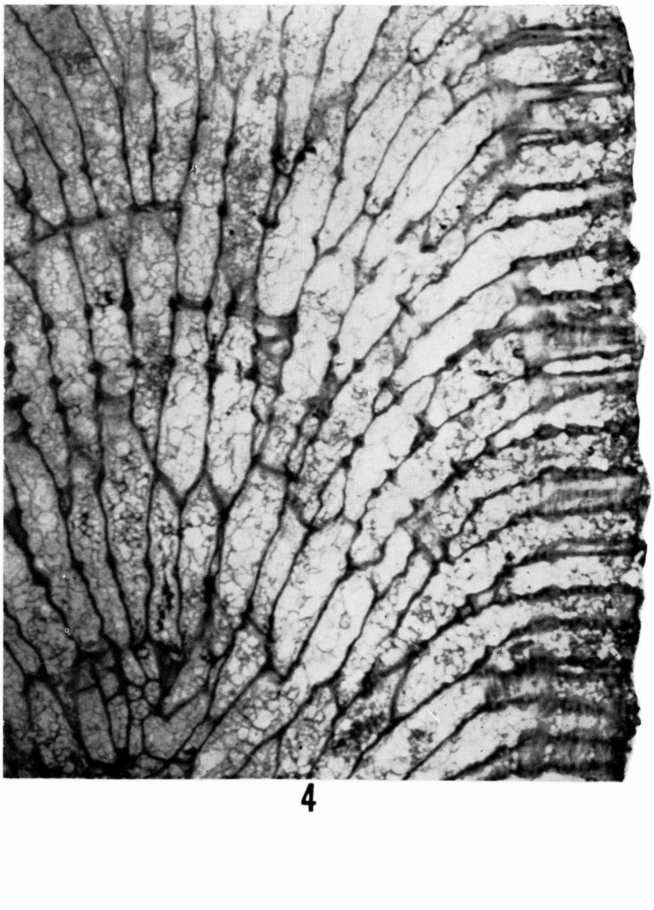

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Plate 13.

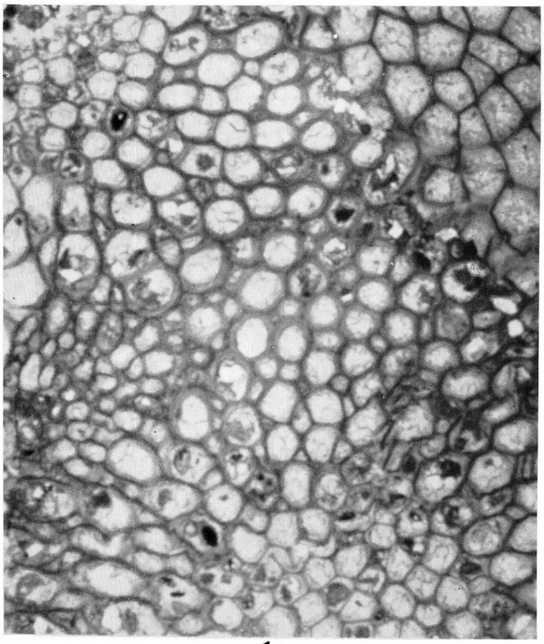
Figs. 1, 3, 4. *Stenopora thula* sp. nov.
Wolfcampian. Profil H, Sample H 139. Amdrup Land. MMUH no. 9133.

1. Tangential section showing slender integrate walls separating large zooecial tubes and numerous mesopores. × 20.

3. Portion of a longitudinal section showing crenulate zooecial walls in the axial and peripheral regions and slightly thickened moniliform walls in the peripheral region. × 20.

4. Transverse section showing thin walled zooecia in the axial region. × 20.

Fig. 2. *Stenopora jungersenensis* sp. nov. MMUH no. 9131.
Wolfcampian? Profil H, Sample H 141. Amdrup Land.
Tangential section of large zooecial tubes, small mesopores, slender zooecial walls, and large distinctive acanthopores. × 20.



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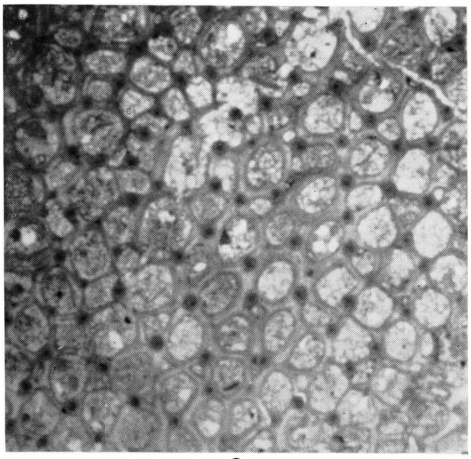

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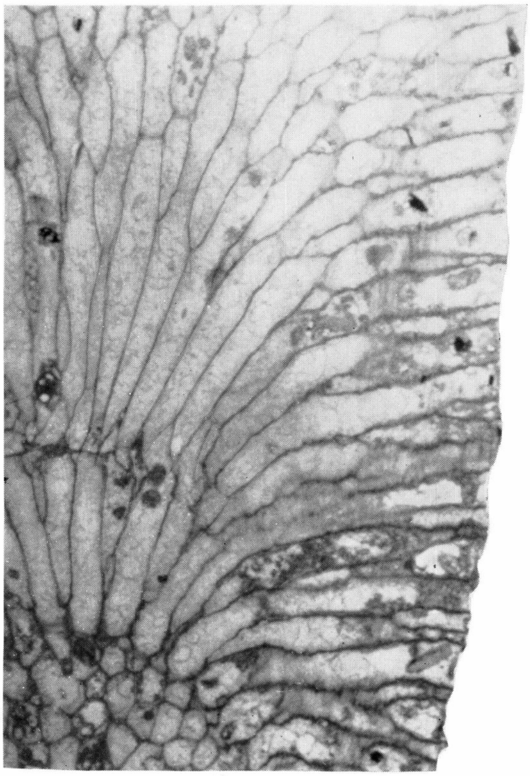

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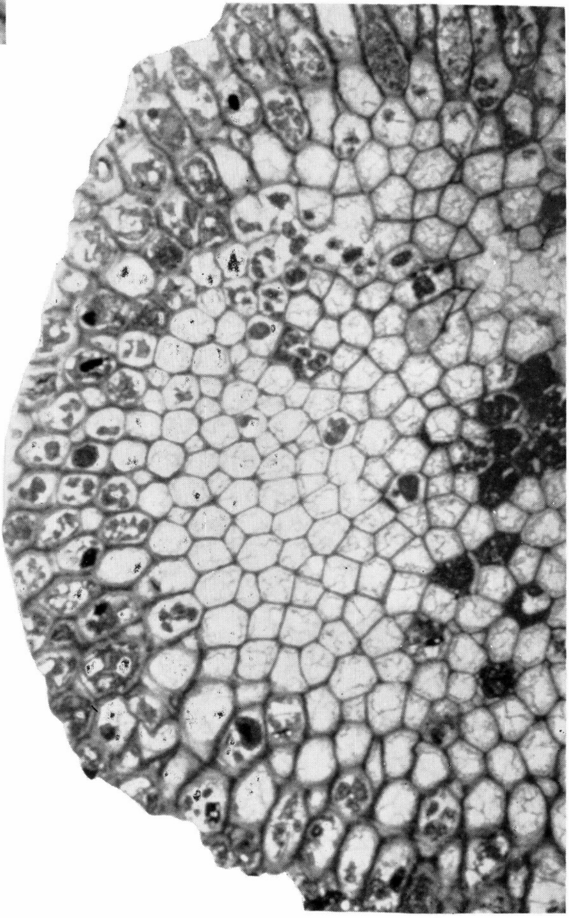

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Plate 14.

Figs. 1, 5. *Polypora* sp. cf. *P. martis* FISCHER.
Desmoinesian. Profil F 1, Sample F 1 240. Amdrup Land. MMUH no. 9134.

1. Shallow tangential section showing zooecial openings subdivided by wide upper hemisepta into small lateral distal openings and large proximal openings. Small capillaries and tubercles crowd the narrow zooecial walls. × 100.

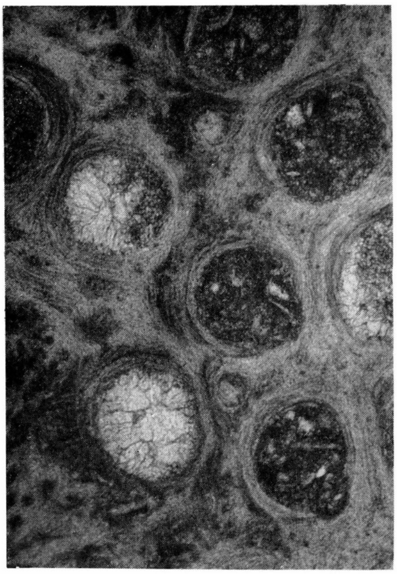
5. Deep tangential section showing the arrangement of the branches, dissepiments, fenestrules, hexagonal basal zooecial sections, and striated sclerenchyma. × 20.

Figs. 2—4. *Polypora* sp. cf. *P. timorensis* BASSLER. MMUH no. 9135.
Wolfcampian? GRÖNWALL's Collection, Sample No. 153. Holm Land.

2. Reverse surface of coarsely meshed colony. × 2.

3. Shallow tangential section showing the zooecial walls densely crowded with small capillaries. × 100.

4. Tangential section showing the meshwork of the colony and the arrangement of zooecia. × 20.



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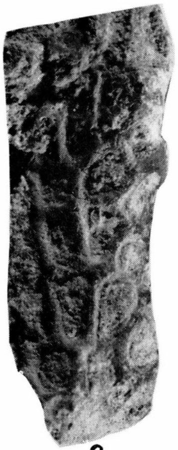

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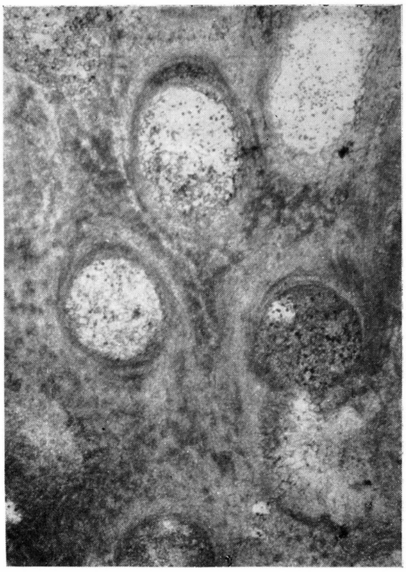

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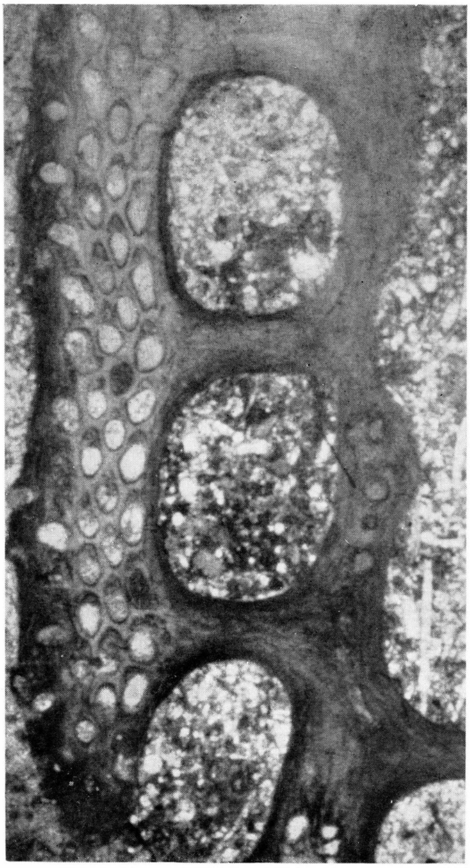

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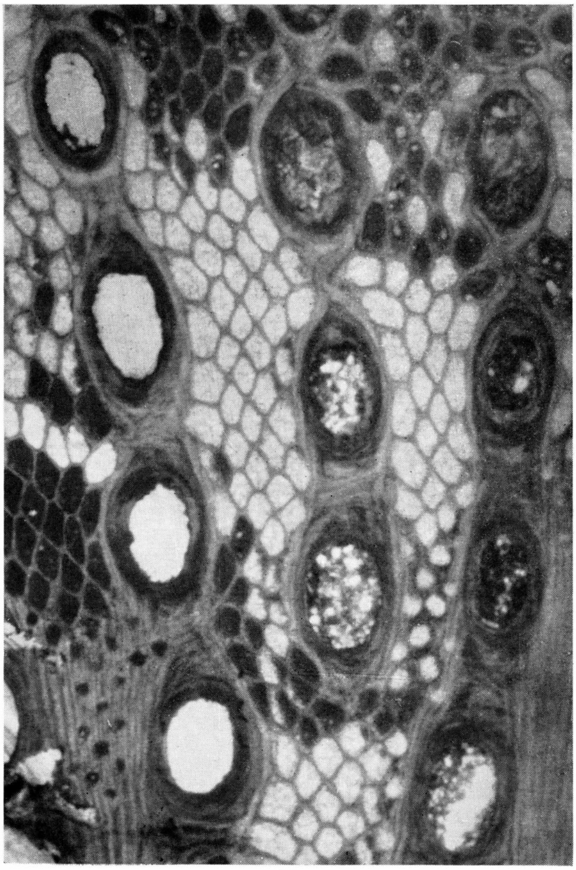

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Plate 15.

Figs. 1, 2. *Polypora* sp. cf. *P. ovaticella* SHULGA-NESTERENKO.
Wolfcampian? Profil G, Sample G 348. Amdrup Land. MMUH no. 9136.

1. Tangential section showing zooecial openings on branches of variable width. × 20.

2. Shallow tangential section showing zooecial openings divided by wide upper hemisepta and numerous capillaries in the zooecial walls and around the lower margin of a fenestrule. × 100.

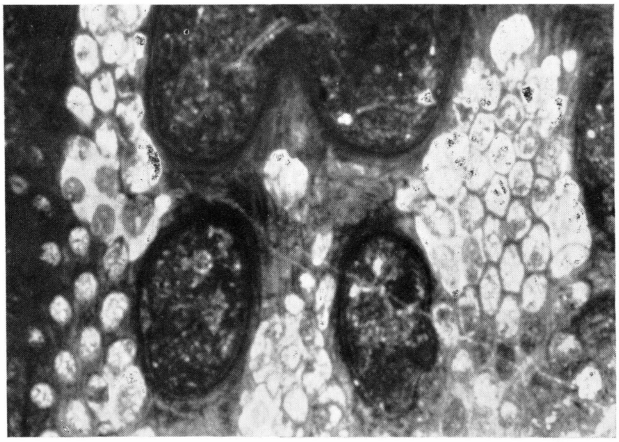
Figs. 3, 5. *Polypora* sp. cf. *P. subovaticellata* SHULGA-NESTERENKO.
Wolfcampian? Profil G, Sample G 300. Amdrup Land. MMUH no. 9137

3. External view of the delicate colony showing the reverse surface partly weathered to expose the zooecial tubes. × 2.

5. Tangential section of delicate colony showing hexagonal bazal zooecial sections. X 20.

Fig. 4. *Polypora amdrupensis* sp. nov.
Wolfcampian? Profil G, Sample G 341. Amdrup Land. Holotype: MMUH no. 9138.
External view of portion of the coarsely meshed colony having circular to oval fenestrules. × 2.

Fig. 6. *Polypora* sp. cf. *P. russiensis* SHULGA-NESTERENKO.
Wolfcampian? GRÖNWALL's Collection, Sample No. 210. Holm Land. MMUH no. 9139.
Shallow tangential section showing numerous small capillaries in the zooecial walls. × 100.



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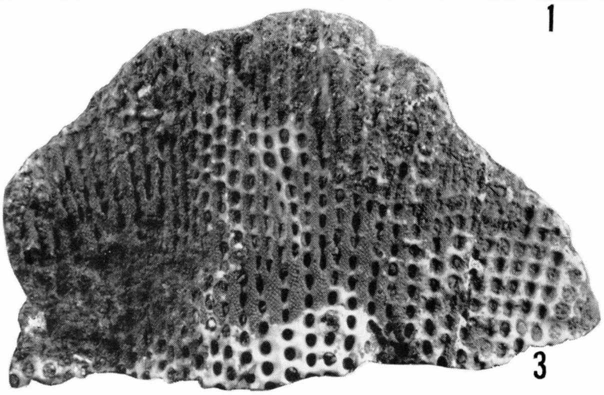

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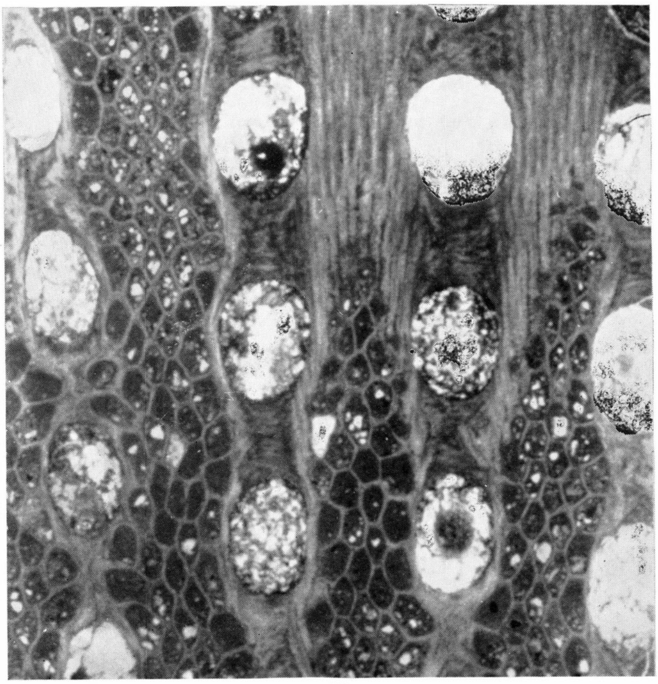

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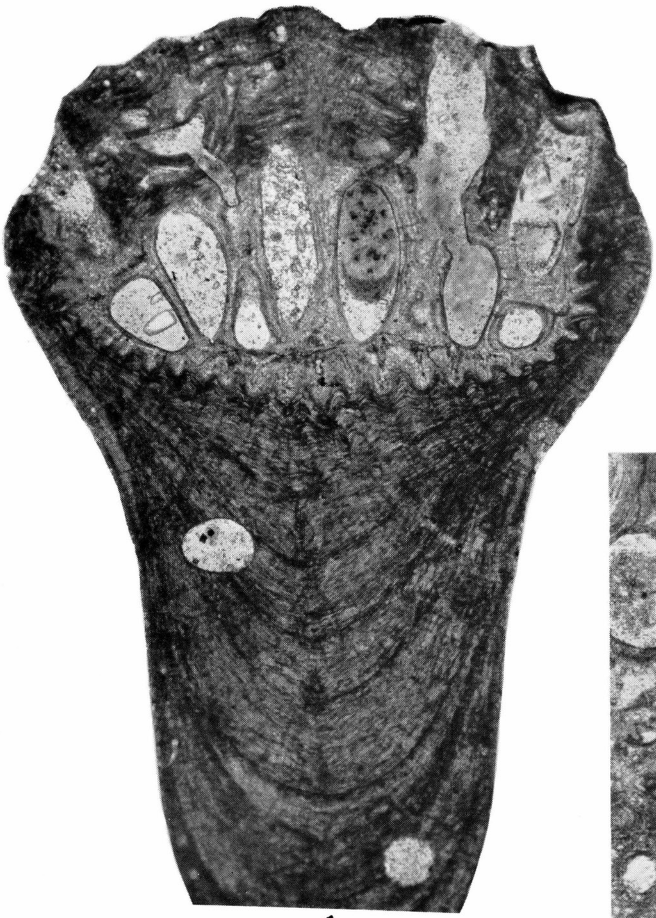
Plate 16.

Figs. 1—5. *Polypora amdrupensis* sp. nov.

Wolfcampian? Profil G, Sample G 341. Amdrup Land. Holotype MMUH no. 9138.
Syntype MMUH no. 9140.

1. Transverse section of a branch showing thick laminated sclerenchyma penetrated by capillaries and zooecial walls crowded with branching capillaries. Note the serrated boundary beneath the basal part of the zooecia. × 50. Syntype MMUH no. 9140.
2. Longitudinal section along a branch showing thick laminated sclerenchyma and zooecial tubes divided by upper hemisepta. × 20.
3. Shallow tangential section showing upper hemisepta dividing the small zooecial tubes and numerous capillaries crowded in the zooecial walls. × 100.
4. Shallow tangential section showing the meshwork of the colony and a broken narrow dissepiment. × 20.
5. Shallow tangential section showing hemisepta dividing the zooecial tubes into small distal openings and large proximal openings. Capillaries are variable in diameter and may occur in a radiating cluster. × 100.



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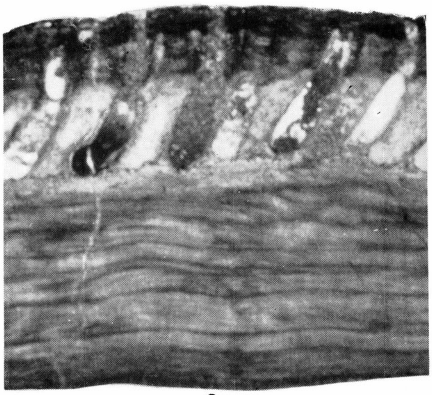

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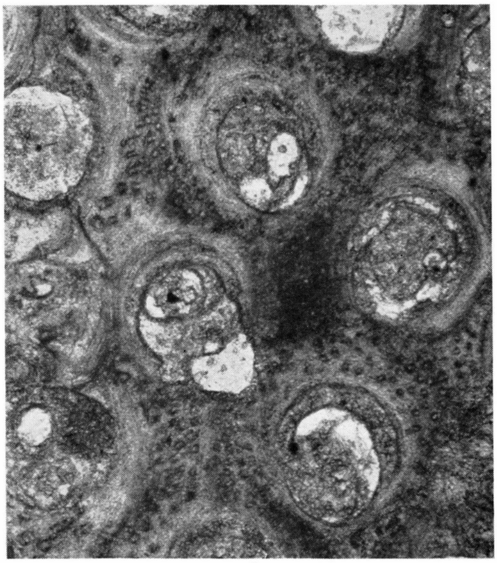

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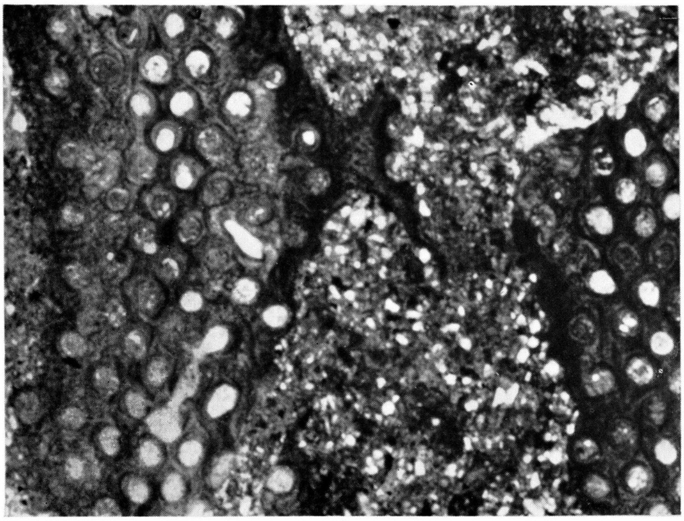

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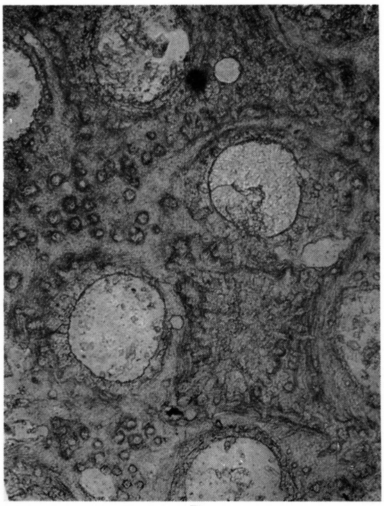

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Plate 17.

Fig. 1. *Polypora* sp. cf. *P. russiensis* SHULGA-NESTERENKO.
Wolfcampian? GRÖNWALL's Collection, Sample No. 210. Holm Land. MMUH no. 9139.
Tangential section of a coarse colony showing rhomboidal and hexagonal zooecial basal sections. × 20.

Fig. 2. *Penniretepora* sp.
Desmoinesian. Profil N, Sample N 130. Holm Land. MMUH no. 9141.
External view of a pinnate colony carrying two rows of zooecia on each branch. × 2.

Fig. 3. *Fenestella* sp.
Wolfcampian. Profil G, Sample G 341. Amdrup Land. MMUH no. 9142.
External aspect of zoarium. × 2.

Figs. 4, 5. *Rhombotrypella gigantea* sp. nov.
Wolfcampian? Profil G, Sample G 300. Amdrup Land. Holotype: MMUH no. 9124.

4. External view of a cylindrical branch having low monticules. × 1.
5. Surficial aspect of the monticular and intramonticular areas on a zoarial branch. × 2.

Fig. 6. *Tabulipora arcticensis* sp. nov.
Wolfcampian. Profil H, Sample H 119. Amdrup Land. Holotype: MMUH no. 9129.
External aspect of a zoarial branch broken in a longitudinal section showing the well marked arcuate growth bands. × 2.

Fig. 7. *Stenopora jungersenensis* sp. nov.
Wolfcampian? Profil H, Sample H 141. Amdrup Land. Holotype: MMUH no. 9131.
External view of a cylindrical zoarial branch. × 2.

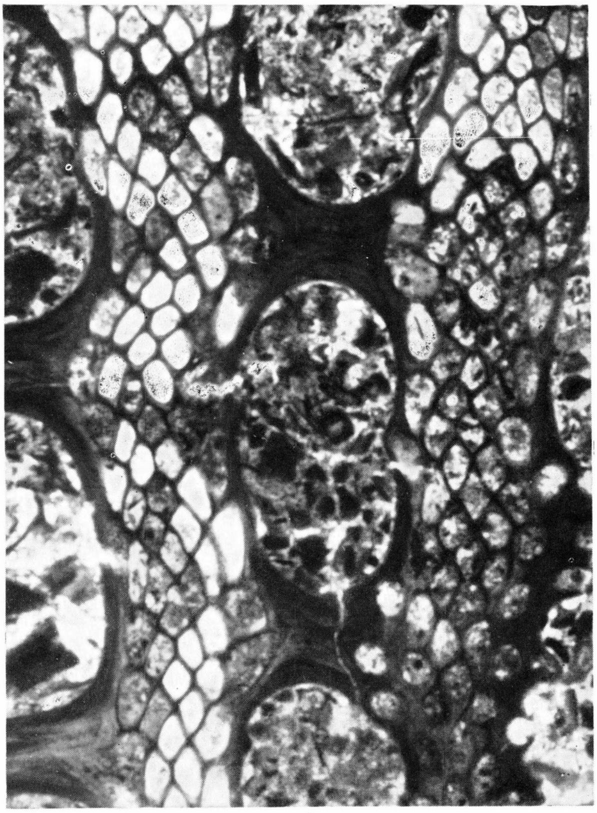
Fig. 8. *Tabulipora* sp. C.
Wolfcampian? GRÖNWALL's Collection, Sample No. 213. Holm Land. MMUH no. 9128.
External aspect of a broad ramose colony. × 1.

Fig. 9. *Fenestella* sp.
Desmonesian. Profil N, Sample N 130. Holm Land. MMUH no. 9143.
Tangential section showing hexagonal basal zooecial sections on delicate zoarial branches. × 20.

Fig. 10. *Fenestella* sp.
Wolfcampian? Profil G, Sample G 341. Amdrup Land. MMUH no. 9142.
Deeply weathered zoarium showing triangular zooecial basal sections. × 5.

Fig. 11. *Fenestella* sp.
Wolfcampian? Profil G, Sample G 341. Amdrup Land. MMUH no. 9121.
External view of a zoarium. × 2.

Fig. 12. *Stenopora thula* sp. nov.
Wolfcampian? Profil H, Sample H 139. Amdrup Land. Holotype. MMUH no. 9133.
External view across the zoarial branches in quartzose calcarenite. × 2.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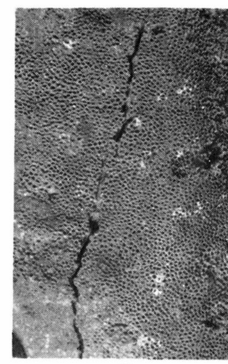
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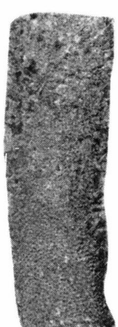
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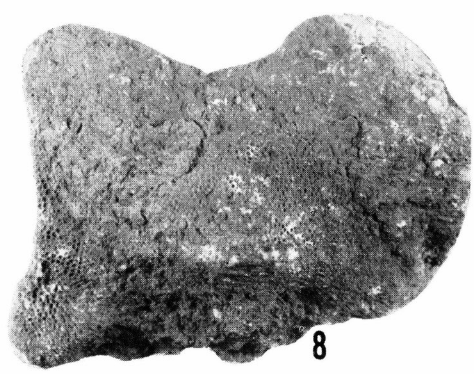
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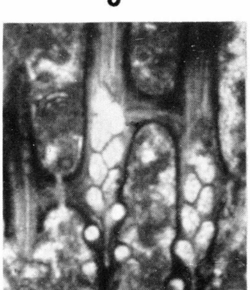
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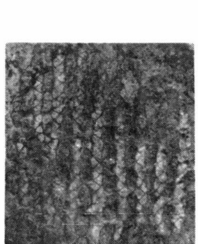
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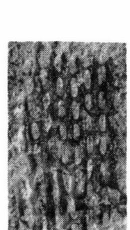
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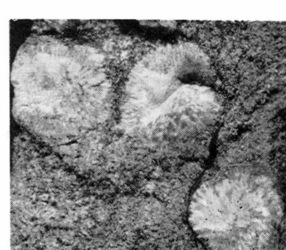
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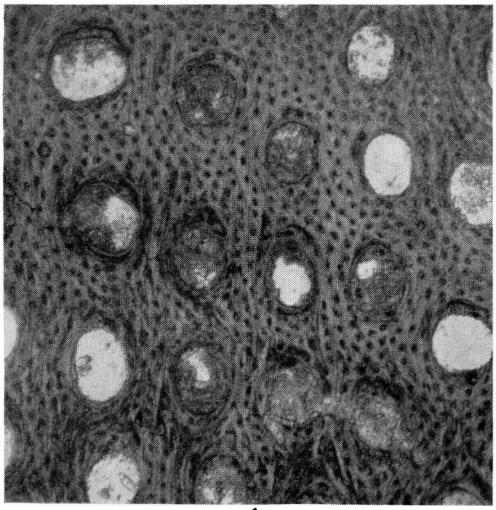
Plate 18.

Figs. 1—6. *Timanodictya* sp. cf. *T. dichotoma* (STUCKENBERG).
Wolfcampian? GRÖNWALL's Collection, No. 212.
Float collected at Eskimonæs, Holm Land, MMUH no. 9144.

1. Tangential section showing large zooecial openings and wide laminate zooecial walls penetrated by small rod- or tube-like structures. × 50.
2. Portion of a longitudinal section showing zooecia growing from the mesotheca and the small rod- or tube-like structure crossing the laminate zooecial walls. × 50.
3. Transverse section of a bifoliate branch. × 20.
4. Tangential section showing small oval openings in the proximal region of the inner part of the zooecial openings. × 50.
5. Enlarged view of portion of a transverse section showing the partly recrystallised mesotheca which does not extend to the periphery. × 50.
6. Tangential section showing the arrangement of the zooecia, large zooecial openings at the right lie near the lateral margin of the branch. × 20.



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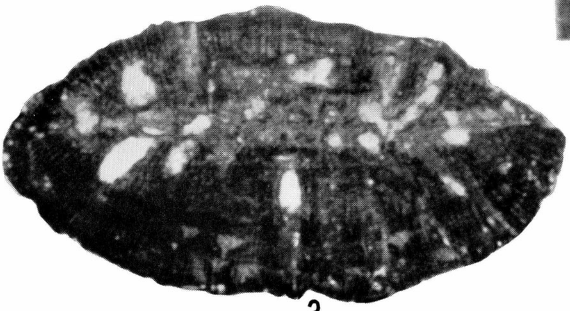

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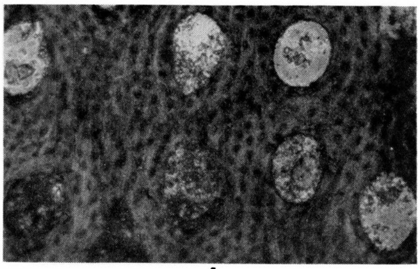

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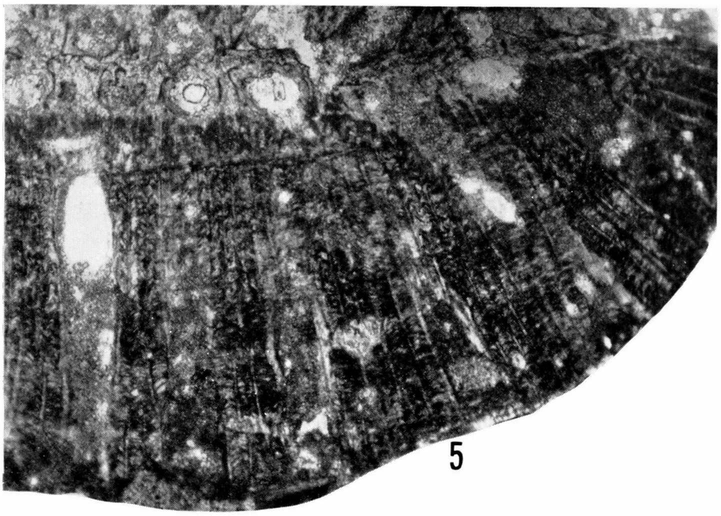

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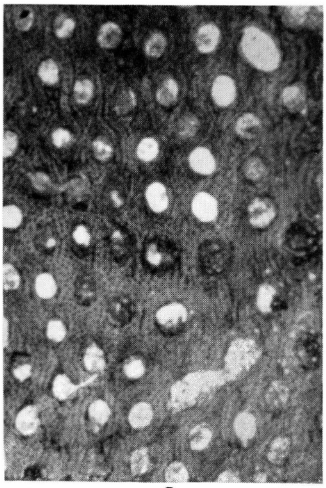

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