CHR. POULSEN

SILURIAN PELECYPODA, MONOPLACOPHORA, AND GASTROPODA FROM THE REEFY FACIES OF THE OFFLEY ISLAND FORMATION OF WASHINGTON LAND AND OFFLEY ISLAND (NORTHWEST GREENLAND)

Det Kongelige Danske Videnskabernes Selskab
Biologiske Skrifter **20, 7**

Kommissionær: Munksgaard
København 1974

DET KONGELIGE DANSKE VIDENSKABERNES SELSKAB udgiver følgende publikationsrækker:

THE ROYAL DANISH ACADEMY OF SCIENCES AND LETTERS *issues the following series of publications:*

	Bibliographical Abbreviation
Oversigt over Selskabets Virksomhed (8°) *(Annual in Danish)*	Overs. Dan. Vid. Selsk.
Historisk-filosofiske Meddelelser (8°) Historisk-filosofiske Skrifter (4°) *(History, Philology, Philosophy, Archeology, Art History)*	Hist. Filos. Medd. Dan. Vid. Selsk. Hist. Filos. Skr. Dan. Vid. Selsk.
Matematisk-fysiske Meddelelser (8°) Matematisk-fysiske Skrifter (4°) *(Mathematics, Physics, Chemistry, Astronomy, Geology)*	Mat. Fys. Medd. Dan. Vid. Selsk. Mat. Fys. Skr. Dan. Vid. Selsk.
Biologiske Meddelelser (8°) Biologiske Skrifter (4°) *(Botany, Zoology, General Biology)*	Biol. Medd. Dan. Vid. Selsk. Biol. Skr. Dan. Vid. Selsk.

Selskabets sekretariat og postadresse: Dantes Plads 5, 1556 København V.

The address of the secretariate of the Academy is:

Det Kongelige Danske Videnskabernes Selskab,
Dantes Plads 5,
DK-1556 Copenhagen V.
Denmark.

Selskabets kommissionær: MUNKSGAARD's Boghandel
Nørregade 6,
1165 København K.

The publications are sold by the agent of the Academy:

MUNKSGAARD, *Ltd.*
6, Nörregade,
DK-1165 Copenhagen K.
Denmark.

CHR. POULSEN

SILURIAN PELECYPODA, MONOPLACOPHORA, AND GASTROPODA FROM THE REEFY FACIES OF THE OFFLEY ISLAND FORMATION OF WASHINGTON LAND AND OFFLEY ISLAND (NORTHWEST GREENLAND)

Det Kongelige Danske Videnskabernes Selskab
Biologiske Skrifter **20**, 7

Kommissionær: Munksgaard
København 1974

CONTENTS

	Pages
Synopsis	2
Preface	3
Introduction	3
Descriptions of genera and species	5
Plates	15

Synopsis

The material described and discussed in the present paper originates from the reefy facies of the Silurian Offley Island formation of Northwest Greenland (Washington Land and Offley Island). The results of recent geological field work and their bearing on the interpretation of the structure and stratigraphy of the Silurian of North Greenland are briefly summarized. The description of the fossils embraces the following genera and species: *Pterinea* sp., *Tryblidium arcticum* n.sp., *Coelocyclus groenlandicus* n.sp., *Salpingostoma septentrionale* n.sp., *Offleya inexpectata* n.g. et n.sp., *Liospira perdepressa* n.sp., *Cyclonema boreale* n.sp., *Cyclonema? modestum* n.sp., *Platyceras (Platyostoma) cornutum* (Hisinger), and *Michelia? persimilis* n.sp.

PRINTED IN DENMARK
BIANCO LUNOS BOGTRYKKERI A/S
ISBN 87 7304 035 5

Preface

The present paper is the third of a series of publications dealing with fossils from the reefy facies of the Silurian Offley Island formation of Northwest Greenland. The palaeontological material, which was collected by the late Dr. LAUGE KOCH during the second Thule Expedition 1916–1918 and the Bicentenary Jubilee Expedition 1920–1923, is preserved in the Mineralogical and Geological Museum of the University of Copenhagen.

The writer is grateful to the late Dr. R. S. BASSLER, the late Dr. C. E. RESSER, and the late Dr. E. O. ULRICH of the U.S. National Museum, Washington, D.C. for having supported his study by personal advice and discussion, and by placing palaeontological material at his disposal for comparison; he also makes grateful acknowledgement of the financial support that has been extended to him by the Carlsberg Foundation. Finally he is much obliged to the photographers of the Mineralogical and Geological Museum of the University of Copenhagen, Mr. PREBEN NIELSEN and Mr. JAKOB LAUTRUP, who made the greater part of the photographs for the plates, and to Dr. JOHN PEEL of the Geological Survey of Greenland, who has corrected his English.

Introduction

The presence of Silurian rocks in North Greenland was established by ETHERIDGE (1878) who described a few fossils collected during the British Expedition under Captain Sir GEORGE NARES. Such was the scarce knowledge of the North Greenland Silurian when LAUGE KOCH started his work, first as a member of KNUD RASMUSSEN's 2nd Thule Expedition 1916–1918, and later as a leader of the Bicentenary Jubilee Expedition 1920–1923; during these expeditions he collected large quantities of fossils, including a fairly rich material from Silurian sediments. Tentative, not published determinations of these fossils were made by the present writer in 1928, and by means of this knowledge KOCH constructed the following stratigraphy for the Silurian of Northwest Greenland (KOCH 1929):

Polaris Harbour formation (about 500 m.)
Cape Tyson formation (about 500 m.)
Hiatus (intense erosion)
Offley Island formation (about 500–800 m.)
Hiatus (intense erosion)
Cape Schuchert formation (about 100–200 m.)
Hiatus

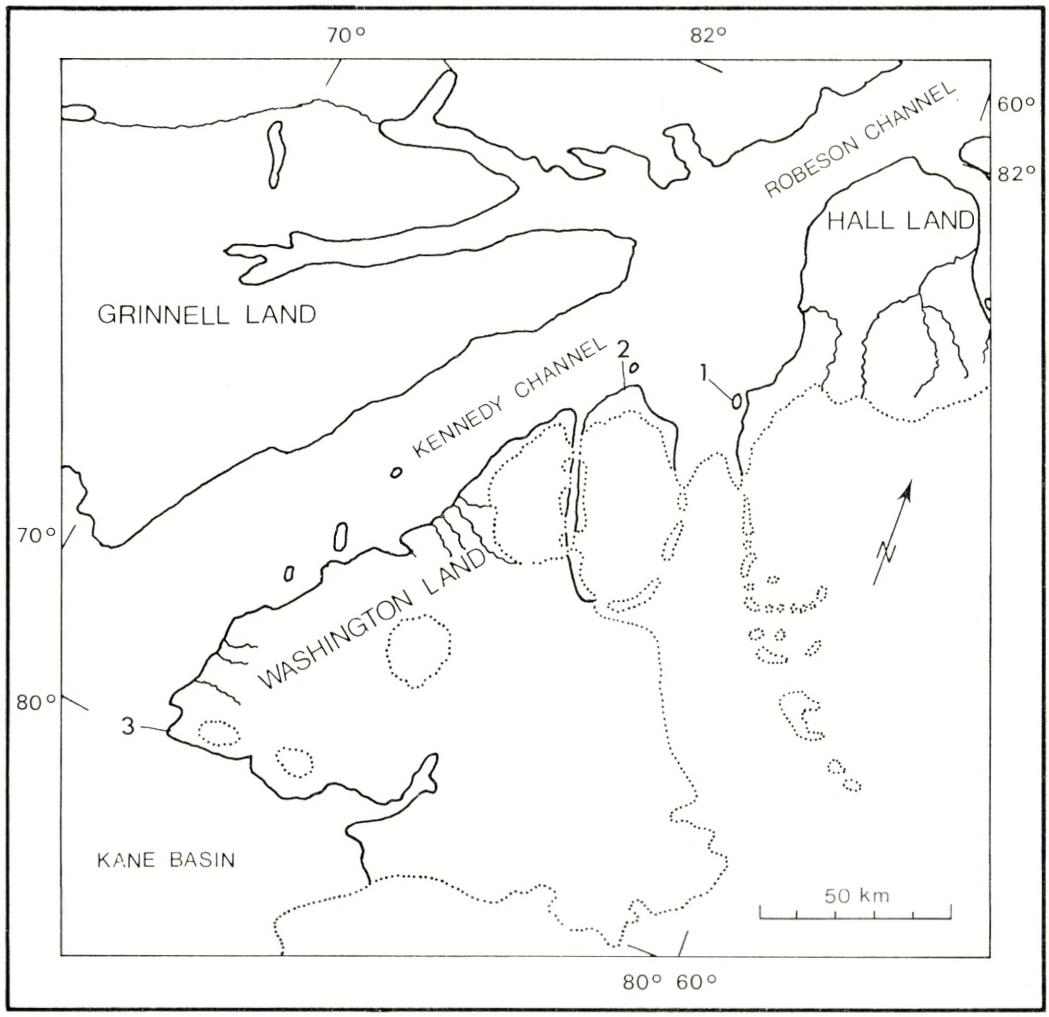


Fig. 1. Map (scale 1:200000), showing the localities mentioned in the text. 1. Offley Island. 2. Kap Morton. 3. Western coast of Washington Land at 80° northern latitude.

The limestones of this series of strata contain fossils which should probably be regarded as members of a rather isolated, arctic fauna; this is clearly apparent from the occurrence of a great many new species. The approximate stratigraphic position of the limestones, however, has been determined by the present writer in 1934 by means of more or less well preserved graptolites which occur in adjacent shales. The writer arrived at the conclusion that the Cape Schuchert formation and the Offley Island formation should be referred to the Llandovery and that the Cape Tyson formation includes beds of Wenlock and Lower Ludlow age. Koch's Polaris harbour formation, said to consist of coarse sandstone and to overlie the Cape Tyson formation limestones in the Hall Land-Wulff Land area (Koch 1929, 1961), was found in its type locality,

in 1965, to consist of Quaternary moraines. Accordingly, the stratigraphic term has been discredited and its use should be abandoned (DAWES 1971). It deserves notice, however, that an erratic boulder (calcareous sandstone), collected by KOCH in 1922 at Newmann Bay, contains trilobite pygidia which are extremely similar to (or identical with?) that of *Trochurus ptyonurus* (HALL & CLARKE), known from the McKenzie formation of Maryland (Lower Cayugan) and from the Cobbleskill limestone of New York (Upper Cayugan). In other words, the erratic from Newmann Bay indicates the presence of late Silurian (Ludlow) sandstone beds somewhere in North Greenland.

Geological field work since 1965 (ALLAART 1965, 1966; DAWES 1966, 1967; NORFORD 1967) has revealed that the structure and stratigraphy of the North Greenland Silurian is so complicated as to necessitate a new interpretation. According to these authors the Silurian of Northwest Greenland consists of complexly intertonguing reefal, off-reefal, and graptolitic facies. Consequently, DAWES (1971) "extends the Offley Island formation to include the limestones and associated rocks of KOCH's Cape Tyson formation, which at Kap Tyson is but the upper part of a limestone reef build-up". It is possible that KOCH's Cape Schuchert formation should also be included in the Offley Island formation, but the present writer is of opinion that the black, highly bituminous rocks of the former differ so much from those of the latter that the problem cannot be solved without further observations in the field.

In 1934 the present writer depended on KOCH's information concerning the stratigraphy of the Northwest Greenland Silurian, and, accordingly, KOCH's Offley Island formation was inserted in the sequence of graptolite zones so as to be equivalent to the zone of *Monograptus sedgwicki* (PORTLOCK). In the light of present knowledge, however, the existence of the mentioned graptolite zone in the graptolite-bearing strata of Northwest Greenland appears fairly probable.

Descriptions of Genera and Species

Phylum Mollusca

Class Bivalvia LINNÉ, 1758

Subclass Pteriomorphia BEURLEN, 1944

Order Pterioida NEWELL, 1965

Superfamily Pteriacea GRAY, 1847

Pterineidae MILLER, 1897

Genus *Pterinea* GOLDFUSS, 1826

Pterinea sp.

Pl. 1, fig. 1.

Material: A poorly preserved, fragmentary internal mould of the left valve.

Description: Valve approximately semicircular, moderately convex, with slightly projecting umbo near anterior end of rectilinear hinge line. The presence of an auricle and a rear dorsal wing is indicated although the outline of the valve is somewhat broken anteriorly and posteriorly. A very small preserved part of the shell itself indicates the presence of concentric, rather coarse growth wrinkles.

The height of the valve is about 40 mm.; the length is estimated to have been 65 mm.

Remarks: A specific determination of the specimen must be left out of consideration owing to the unfavourable state of preservation.

Locality: Northern coast of Offley Island.

Class Monoplacophora Wenz in Knight, 1952
Order Tryblidioidea Lemche, 1957
Superfamily Tryblidiacea Pilsbry in Zittel-Eastman, 1899
Family Tryblidiidae Pilsbry in Zittel-Eastman, 1899
Subfamily Tryblidiinae Pilsbry in Zittel-Eastman, 1899
Genus *Tryblidium* Lindström, 1880
Tryblidium arcticum n.sp.

Pl. 1, figs. 2–4.

Material: Two fairly well-preserved shells.

Diagnosis: A *Tryblidium* having the external shell surface completely covered with ornament consisting of low ridges that arise alternately from opposite sides and integrate so as to make a very regular reticulate pattern.

Description: Shell subovate, about 1.4 times as long as wide, moderately convex, with short, overhanging apex; apical angle almost 90°; external shell surface completely covered with ornament consisting of low ridges that arise alternately from opposite sides and integrate so as to form a very regular reticulate pattern with very small meshes increasing slightly in size abapically.

Dimensions of holotype: Length of shell, measured from apex to abapical extremity, 22 mm.; width of shell about 15 mm.

Remarks: The shape of the above-described shells is very similar to that of *Pilina* Koken, 1925; the ornament, however, is clearly related to the reticulate pattern of *Tryblidium reticulatum* Lindström (the type species).

Locality: Western coast of Washington Land at 80° northern latitude.

Class Gastropoda Cuvier, 1797
Subclass Prosobranchia Milne Edwards, 1848
Order Archaeogastropoda Thiele, 1925
Suborder Bellerophontina Ulrich & Scofield, 1897
Superfamily Bellerophontacea M'Coy, 1851
Family Bellerophontidae M'Coy, 1851
Subfamily Bucaniinae Ulrich & Scofield, 1897
Tribe Bucaniides Ulrich & Scofield, 1897
Genus *Coelocyclus* Perner, 1903
Coelocyclus groenlandicus n.sp.

Pl. 1, figs. 5–6.

Material: A somewhat fragmentary, but otherwise fairly well-preserved shell.

Diagnosis: A *Coelocyclus* with very small umbilici, whorls strongly and evenly convex between umbilici, and selenizone between a pair of extremely low carinae.

Description: Shell isostrophic, with strongly convex whorls which increase rapidly in width; very small, deep umbilici with slopes conforming to uniform conical slope, and very narrow selenizone between a pair of extremely low carinae. Growth lines delicate, slightly prosocyrt, forming angles of about 80° with the selenizone. Aperture unknown.

Dimensions: Maximum diameter of shell 21 mm.; maximum diameter of last whorl 14 mm.

Remarks: The shell shows much resemblance to *Coelocyclus perplexus* (WALCOTT) from the Middle Devonian of Nevada, but it differs clearly from that species in having much more convex whorls, smaller umbilici and narrower selenizone.

Locality: Northern coast of Offley Island.

Tribe Salpingostomatides KOKEN, 1925

Genus *Salpingostoma* C. F. ROEMER, 1876

Salpingostoma septentrionale n.sp.

Pl. 1, figs. 7–8.

Derivation of name, *septentrionalis* (*e*) (latin) = northern.

Material: A fairly well-preserved shell apart from the lack of apertural margin.

Diagnosis: Shell very slowly increasing in width, with very wide umbilici, uncovered part of whorls regularly oval in section, welldefined selenizone between a pair of keels, and a short trema.

Description: Shell rather large, increasing very slowly in size, consisting of four rounded whorls which are a little higher than wide and only slightly in contact; umbilici shallow, very wide; trema very short, generating a narrow selenizone between a pair of keels; external surface of shell marked by opisthocyrt growth lines, indicating the presence of a broad, shallow sinus in the apertural margin.

Dimensions:

Diameter of shell, measured at anterior end of trema	36 mm.
Height of last whorl, measured at anterior end of trema	15 —
Width of last whorl, measured at anterior end of trema	11 —
Length of trema	about 10 —

Remarks: The principal features of this new species are the very wide umbilici and the short trema.

Locality: Kap Morton.

Tribe Salpingostomatides KOKEN, 1925?

Genus *Offleya* n.g.

Derivation of name, referring to the locality (Offley Island).

Diagnosis: A salpingostomatid with unusually wide umbilici, prominent, sharp median carina instead of normal selenizone, and very coarsely reticulate surface.

Offleya inexpectata n.sp.

Pl. 1, figs. 9–11.

Derivation of name, *inexpectatus* (*a, um*) (latin) = unexpected.

Material: A fragmentary, but otherwise fairly well-preserved shell (apertural portion lacking).

Description: Whorls increasing very slowly in size, evenly rounded, and fairly well in contact; the preserved part of the shell consists of five whorls. Umbilici very wide exposing all the whorls. Surface ornament forming a very coarse network of alternating, subrectangular to subhexagonal meshes; about 13 rows of meshes occur on each side of the outer whorl between the carina and the suture. Growth cords leaning backward so as to indicate the presence of a small, angular sinus in the outer lip. A trema has not been observed in the preserved part of the shell.

Dimensions: Diameter of the preserved part of the shell 39 mm., and maximum height and width of outer whorl about 11 mm.

Remarks: The relationship of *Offleya inexpectata* to the Salpingostomatides is admittedly somewhat doubtful; the number of whorls is a little greater than that of *Salpingostoma* and *Tremanotus*, and the presence of a prominent, sharp, keel-shaped "selenizone" is a very remarkable character. On the other hand the peculiar surface ornament shows considerable resemblance to that of *Salpingostoma sculptilis* Ulrich & Scofield, 1897 (p. 903, pl. 82, figs. 16–20) from the *Fusispira* bed of the Trenton group of Minnesota, the only gastropod in which the present writer has been able to find an ornament rather similar to that of *Offleya inexpectata*.

Locality: Northern coast of Offley Island.

Suborder Pleurotomariina Cox & Knight, 1960

Superfamily Pleurotomariacea Swainson, 1840

Family Raphistomatidae Koken, 1896

Subfamily Liospirinae Knight, 1956

Genus *Liospira* Ulrich & Scofield, 1897

Liospira perdepressa n.sp.

Pl. 1, figs. 12–15.

Derivation of name, *perdepressus* (*a, um*) (latin) = very low, referring to the very low spire.

Material: Two shells without apertural portion, but otherwise fairly well-preserved.

Diagnosis: Lenticular shell with rapidly expanding whorls, extremely low,

slightly arched spire, and very faintly marked selenizone between a pair of almost effaced threads.

Description: Shell lenticular, about 2.8 times as wide as high; whorls rapidly expanding, subtriangular in section, with very faintly marked selenizone between a pair of almost indistinguishable threads; base slightly arched, cryptomphalous; external surface smooth.

Dimensions: Height and width of holotype 5 mm. and 14 mm. respectively.

Remarks: *Liospira perdepressa* is easily distinguished from other species of the genus *Liospira* by its smooth shell surface, extremely low spire, and the almost effaced selenizone.

Locality: Northern coast of Offley Island.

Suborder Trochina Cox & Knight, 1960
Superfamily Platyceratacea Hall, 1859
Family Platyceratidae Hall, 1859
Genus *Cyclonema* Hall, 1852
Subgenus *Cyclonema* Hall, 1852
Cyclonema (*Cyclonema*) *boreale* n.sp.

Pl. 2, figs. 1–4.

Derivation of name, *borealis* (*e*) (latin) = northern.

Material: Five almost complete shells and ten somewhat fragmentary but otherwise well-preserved specimens.

Diagnosis: Shell subtrochiform, 1.1 to 1.3 times as high as wide, with apical angle about 60°, and somewhat deflated base; protoconch smooth, consisting of two whorls; teleoconch consisting of three to four almost flat whorls with extremely delicate, reticulate ornament, the spirals and costellae of which decrease in number toward the shell base.

Description: Shell conical, a little higher than wide, with apical angle about 60°, and somewhat deflated, anomphalous base; protoconch smooth, consisting of two somewhat inflated whorls; the other whorls almost flat or slightly convex in the central part of the exposed slope while at the top there is nearly always a very narrow, shoulder-like convexity which, with a similar convexity at the bottom, produces a distinctly impressed suture; base of last whorl somewhat deflated although broadly rounded at the periphery; aperture not preserved in any of the specimens, but, judging from the cross section of the last whorl and the growth lines, it has probably been oblique and rounded with an almost inappreciable quadrangular tendency; surface marked by an extremely delicate network consisting of numerous minute, thread-like spirals crossed by numerous collabral costellae; in well-preserved specimens, this reticulum is distinctly marked on the first and second whorls after the protoconch, while it is almost effaced on the last whorl; the number of spirals and costellae per mm. decreases gradually in abapical direction, as shown in the following diagram.

Specimens no. 1–5 (No. 1 is the holotype)	1	2	3	4	5
Number of spirals per mm.:					
1st whorl after protoconch	9	?	8	9	7
2nd — — —	7	8	6	9	6
3rd — — —	0	5	5	7	6
Number of costellae per mm.:					
1st whorl after protoconch	7	?	10	10	6
2nd — — —	6	8	8	9	6
3rd — — —	0	5	6	7	4

The last whorl of old individuals usually exhibits more or less irregular undulations and wrinkles of growth which generally cause some irregularity in the surface ornament; the growth lines are prosocline and parallel to the course of the costellae.

Dimensions: The height of the shells at hand varies between 15 and 24 mm. and the width ranges from 12 to 17 mm.

Remarks: *Cyclonema* (*Cyclonema*) *boreale* shows a striking resemblance to the type species, *Cyclonema* (*Cyclonema*) *bilix* (CONRAD, 1842) from the Upper Ordovician Richmond group of North America, but it is readily distinguished from that species by its less angular aperture and by the abapical decrease of the number of spirals and costellae per mm.

Three of the shells at hand differ from the above description in having gently and evenly convex whorls, but they agree with the description in all other respects; it is therefore probable that these specimens should be regarded as female individuals.

Locality: Kap Morton.

Cyclonema? modestum n.sp.

Pl. 2, figs. 5–7.

Derivation of name, *modestus* (*a, um*) (latin) = unpretentious.

Material: A somewhat fragmentary shell.

Diagnosis: Shell turbiniform, minutely phaneromphalous, with subcircular aperture, numerous, sharp spiral threads, and extremely indistinct, slightly prosocline lines of growth.

Description: Shell turbiniform, a little higher than wide; whorls rapidly increasing in size, ventricose; height of last whorl a little more than half that of the shell; aperture subcircular, umbilicus narrow; surface ornament consisting of numerous, sharp spiral threads which are distributed as shown in the following:

Number of threads on last whorl	33
Number of threads on first whorl above the last one	11
Number of threads on second whorl above the last one	5 (6?)

The threads are subequal in strength and irregularly spaced in places.

Dimensions:

Height of shell	about	14 mm.
Width of shell	—	13 —
Height of last whorl		8 —
Height of first whorl above the last one		3 —
Height of second whorl above the last one		1.5 —

Remarks: *Cyclonema? modestum* differs from other species of this genus in the lack of collabral threads, the only collabral surface markings being the extremely indistinct growth lines; the generic reference should therefore be regarded as tentative.

Locality: Western coast of Washington Land at 80°N.

Genus *Platyceras* CONRAD, 1840

The authors who described the palaeozoic gastropod genera in the "Treatise on Invertebrate Paleontology" (1960) have given the following statement concerning the Platyceratidae: "So great is the variability induced by the stationary habit that the systematics of the group are unusually difficult. One has trouble in deciding if two markedly unlike variations represent different genera or subgenera, or are actually conspecific". The Silurian material from Northwest Greenland presents the same problems, which should be appreciated by the reader of the present paper.

Subgenus *Platyostoma* CONRAD, 1842

Ptatyceras (*Platyostoma*) *cornutum* (HISINGER, 1837)

Pl. 2, figs. 8–12.

For synonymy see *Platyceras cornutum* (HISINGER, 1837) in LINDSTRÖM 1884, pp. 63–64 and *Diaphorostoma niagarense* (HALL, 1852) in BASSLER 1915 p. 407.

Material: Seven almost complete specimens.

Remarks: The specimens at hand are more or less "central" within the enormous range of variation typical of this species. For further information the reader is referred to LINDSTRÖM's exhaustive description of 1884.

The writer has compared numerous shells of *Platyceras* (*Platyostoma*) *cornutum* from the type locality (Klinteberg on the island of Gotland) with numerous specimens of *Platyceras* (*Platyostoma*) *niagarense* HALL, 1852 in the U.S. National Museum, Washington, D.C. and arrived at the conclusion that the American specimens should be referred to HISINGER's species.

Locality: Kap Morton.

Order Archaeogastropoda THIELE, 1925?
Suborder Murchisoniina COX & KNIGHT, 1960
Superfamily Murchisoniacea KOKEN, 1896
Family Murchisoniidae KOKEN, 1896
Genus *Michelia* F. A. ROEMER, 1852
Michelia? persimilis n.sp.

Pl. 2, figs. 13–15.

Derivation of name, *persimilis* (*e*) (latin) = very similar.

Material: Two somewhat fragmentary shells.

Diagnosis: Shell phaneromphalous, very high spired, with extremely acute apical angle, angular whorls, unelevated selenizone between a pair of very delicate threads, and ornament consisting of very indistinct growth lines and broad, very low, almost effaced costae.

Description: Shell very high spired, consisting of numerous angular whorls which increase slowly in size so as to indicate an apical angle of about 15°. Aperture not preserved. Diameter of whorl periphery about twice the whorl height; angulation of whorl a little beneath the middle; selenizone indistinctly marked, unelevated, bordered on each side by an extremely delicate thread, and situated just beneath angulation; upper and lower slope of whorls flat, the former twice as high as the latter. Suture simple, moderately impressed. Umbilicus narrow, leading to a continuous columellar cavity. Ornament consisting of scarcely visible, orthocline (?) growth lines and broad, very low-leveled, almost effaced costae which are separated from each other by spaces about equal to the height of the whorl.

Dimensions: Height and width of holotype surpassing 70 mm. and 20 mm. respectively.

Remarks: *Michelia? persimilis* shows much resemblance to *Michelia turritiformis* (HALL, 1852) as figured by WHITEAVES (1884, pl. 4, fig. 5, and pl. 12, fig. 4) and by BOLTON (1966, pl. 15, fig. 6); it is also very similar to *Michelia estella* (BILLINGS) (1862, p. 157, fig. 139); it agrees with BILLINGS' species in having the same apical angle and in the general shape of the shell, but it differs in having flatly depressed costae.

The "Treatise on Invertebrate Paleontology" (vol. I, 1960, p. 292) presents the following diagnosis of the genus *Michelia:* "Narrowly phaneromphalous; with angular sinus culminating in a short small notch without parallel sides, resulting pseudoselenizone not sharply limited; sutures shallow". The selenizone of *Michelia? persimilis* is very indistinctly marked, but it is bordered by a pair of delicate threads so as to become sharply limited; the other characters agree fairly well with those of *Michelia.* This difference is the reason why the present writer has referred the Greenland species to *Michelia* with much doubt; the figures of *Michelia turritiformis* given by BOLTON (1966, pl. 15, fig. 6) and WHITEAVES (1884, pl. 12, fig. 4) show an indistinctly marked but sharply limited selenizone. This character and the presence of a continuous co-

lumellar cavity serve to place *Michelia turritiformis* and the Greenland species into one and the same group of Murchisoniidae, which may eventually be removed from the genus *Michelia*.

Locality: Kap Morton.

References

ALLAART, J. H. 1965. "The Lower Paleozoic sediments of Hall Land, North Greenland", Grønlands Geol. Undersøgelse, unpubl. report.—Copenhagen.

— 1966. "Hall Land, Northwest Greenland" in JENNES, S. E. (editor): Report of Activities, May to October, 1965. Geol. Surv. Canada, paper 66–1, 4 only.—Ottawa.

BASSLER, R. S., 1915. "Bibliographic Index of American Ordovician and Silurian Fossils". U.S. Nat. Mus., Bull. 92.—Washington, D.C.

BILLINGS, E., 1862. "New species of fossils from different parts of the Lower, Middle, and Upper Silurian rocks of Canada". Geol. Surv. Canada, "Palaeozoic Fossils", vol. 1, part 4.—Montreal.

BOLTON, T. E., 1966. "Illustration of Canadian fossils, Silurian faunas of Ontario". Geol. Surv. Canada, paper 66–5.—Ottawa.

CONRAD, T. A., 1842. "Observations on the Silurian and Devonian Systems of the United States, with the descriptions of new organic remains". Journ. Acad. Nat. Sci. Philadelphia, vol. 8.

DAWES, P. R., 1966. "Lower Palaeozoic geology of the western part of the North Greenland fold belt", Rapp. Grønlands Geol. Undersøgelse 11.—Copenhagen.

— 1967. "Lower Palaeozoic rocks, western part of the North Greenland fold belt", in JENNES, S. E. (editor): "Report of Activities", part A: May to October 1966, Pap. geol. surv. Canada 67–1, pt. A., 4–6.—Ottawa.

— 1971. "The North Greenland fold belt and environs". Bull. Geol. Soc. Denmark, vol. 20, part 3.—Copenhagen.

ETHERIDGE, R. 1878. "Palaeontology of the coasts of the Arctic lands visited by the late British Expedition under Captain Sir George Nares, R.N., K.C.B., F.R.S.", Quart. Journ. Geol. Soc. London.

HALL, J., 1852. Palaeontology of New York, vol. 2.—Albany.

— 1859. Ibid., vol. 3.

— & CLARKE, J. M., 1888. "Palaeontology: Trilobites and other Crustacea", New York Geol. Surv., vol. 7.—Albany.

HISINGER, W., 1837. "Lethaea suecica".—Stockholm.

KOCH, L., 1929. "Stratigraphy of Greenland", Meddelelser om Grønland, vol. 73, 2nd. Afd. (2).—Copenhagen.

— 1961. "Precambrian and Early Palaeozoic structural elements and sedimentation: North and East Greenland" in RAASCH, G. O. (editor): "Geology of the Arctic" 1.—Toronto.

KOKEN, E., 1925. "Die Gastropoden des baltischen Untersilurs", Acad. Sci. Russie Mém. (J. PERNER ed.) Classe physico-mathématique, ser. 8, vol. 37, no. 1.—Leningrad.

LINDSTRÖM, G., 1884. "On the Silurian Gastropoda and Pteropoda of Gotland", Kungl. Svenska Vetenskaps-Akad. Handlingar, vol. 19, no. 6.—Stockholm.

NORFORD, B. S., 1967. "Biostratigraphic studies, Northeast Ellesmere Land and adjacent Greenland" in JENNES, S. E. (editor): "Report of activities," part A, May to October 1966, Geol. Surv. Canada, paper 67–1, part A, 12 only.—Ottawa.

PERNER, J., 1903. "Patellidae et Bellerophontidae" in BARRANDE, J., "Syssème silurien du centre de la Bohême", vol. 4. Gastéropodes.—Praha.

POULSEN, C., 1934. "The Silurian faunas of North Greenland, I, The fauna of the Cape Schuchert formation", Meddelelser om Grønland, vol. 72, 2nd. section (1).—Copenhagen.

ROEMER, F. A., 1852. "Beiträge zur Kenntnis des nordwestlichen Harzgebirges", Palaeontographica, vol. 3.—Cassel.

TREATISE ON INVERTEBRATE PALEONTOLOGY (MOORE, R. C. ed.), 1960, part I, Mollusca 1.—Lawrence, Kansas.

ULRICH, E. O. & SCOFIELD, W. H., 1897. "The Lower Silurian Gastropoda of Minnesota", Minnesota Geol. Surv., vol. 3, part 2.—Minneapolis.

WALCOTT, C. D., 1884. "Paleontology of the Eureka District", U.S. Geol. Surv., Mem. 8.—Washington, D.C.

WHITEAVES, J. F., 1884. "On some new, imperfectly characterized or previously unrecorded species of fossils from the Guelph formation of Ontario, Canada", Geol. Surv. Canada, "Palaeozoic Fossils", vol. 3.—Montreal.

Indleveret til Selskabet den 28. marts 1974.
Færdig fra trykkeriet den 24. juli 1974.

PLATES

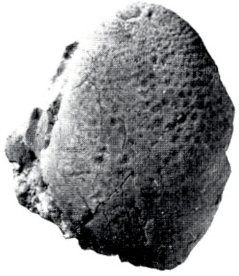
Plate 1

Fig. 1. *Pterinea* sp., poorly preserved left valve, ×1 5
— 2–4. *Tryblidium arcticum* n.sp. 6
— 2. Holotype, ×2.
— 3. Holotype, lateral view, ×2.5.
— 4. Fragmentary shell with well-preserved surface, ×2.
— 5–6. *Coelocyclus groenlandicus* n.sp. 6
— 5. Holotype, viewed at right angle to the axis, ×2.2.
— 6. Holotype, umbilical view, ×2.
— 7–8. *Salpingostoma septentrionale* n.sp. 7
— 7. Holotype, umbilical view, ×1.
— 8. Holotype, viewed at right angle to the axis, ×1.
— 9–11. *Offleya inexpectata* n.g. et n.sp. 8
— 9. Holotype, umbilical view, ×1.
— 10. Holotype, viewed at right angle to the axis, ×1.
— 11. Holotype, surface ornament, ×6.
— 12–15. *Liospira perdepressa* n.sp. 8
— 12. Holotype, top view, ×2.
— 13. Holotype, lateral view, ×2.5.
— 14. Top view of another specimen, ×2.
— 15. Lateral view of the same, ×2.5.

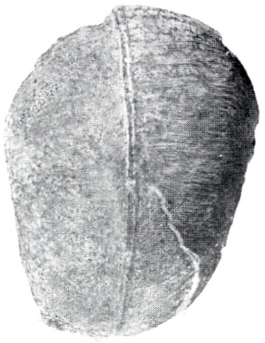
3

1

2



4



5

6

7

10

9

11

8

12

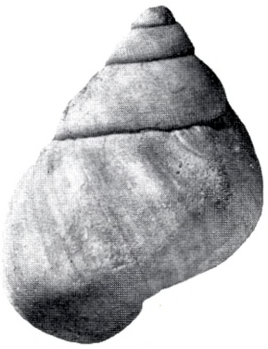
14

13

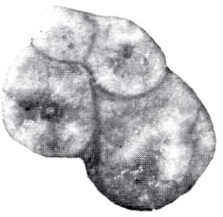
15

Plate 2

Fig. 1–4. *Cyclonema boreale* n.sp. 9
— 1. Holotype, ×2.
— 2. Holotype, apertural view, ×2.5.
— 3. Axial section of another specimen, ×2.
— 4. 2nd whorl below the protoconch of another specimen, enlarged (×10) to show the surface ornament.
— 5–7. *Cyclonema? modestum* n.sp. 10
— 5. Holotype, ×2.
— 6. Holotype, axial section, ×2.3.
— 7. Holotype, whorls enlarged (×10) to show the surface ornament.
— 8–12. *Platyceras*f*(Platyostoma) cornutum* (Hisinger) 11
— 8–9. Lateral views of a small shell, ×2.7 and ×2 respectively.
— 10. Large shell, lateral view, ×2.
— 11. Large shell with spine on apertural margin, ×3.
— 13–15. *Michelia? persimilis* n.sp. 12
— 13. Holotype, Lateral view, ×1.
— 14. Part of holotype enlarged (×10) to show the selenizone.
— 15. Axial section of another shell, showing columellar cavity, ×1.

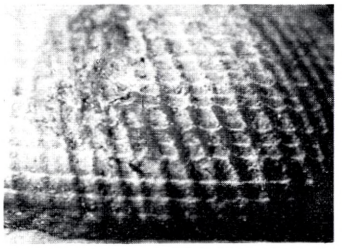


1

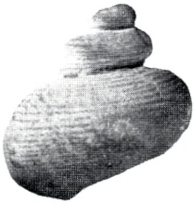


3

2

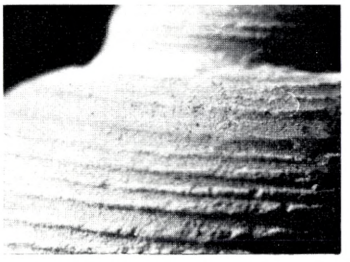


4



5

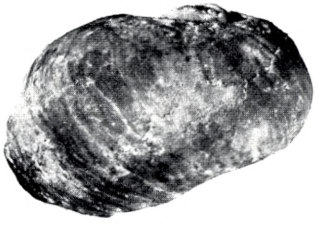
6



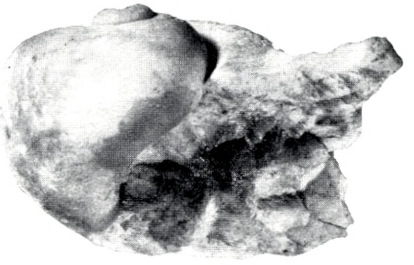
7

8

9



10



11

12

15

14

13