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TERTIARY FAUNAS FROM KAP BREWSTER, EAST GREENLAND

BY

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WITH 1 FIGURE IN THE TEXT AND 5 PLATES

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I. INTRODUCTION

The 1951 Danish Expedition to East Greenland, under the leadership of Dr. LAUGE KOCH, discovered new fossiliferous Tertiary deposits overlying the basalts at Kap Brewster, south of Scoresby Sund. The Kap Brewster party consisted of Mr. D. MACKNEY and Mr. F. W. SHERRELL, past and present students of the University of Bristol who, in the limited time at their disposal, first, prepared a topographical map on the scale of $1^1/_2$ inches to the mile to which preliminary geological observations were added, and, secondly, measured, described and collected from five sections. There was insufficient time to prepare a geological map of what proved to be an extensive area over which Tertiary sediments crop out at the surface. The collection was sent to Professor W. F. WHITTARD who entrusted the author[1]) with the description of the fauna and with the determination of the stratigraphical ages of the deposits. In addition to many lithological specimens, the collection consists of fairly well preserved and otherwise fragmentary fossil molluscs, crustaceans, a few representatives of the corals and foraminiferans, and various plant remains. The latter have been sent to Mr. W. N. EDWARDS of the British Museum who will write a separate report.

The Mollusca, particularly the Lamellibranciata, have provided new information regarding the stratigraphy of East Greenland. The Tertiary fauna of Kap Brewster is found to fall into two divisions of different palaeontological character, though in roughly similar facies. The result is the recognition of two sedimentary series developed at Kap Brewster, and each carries a bed of conglomerate at the base. One of the series is found to correlate palaeontologically and stratigraphically with the Kap Dalton Series of Eocene age. The other contains a younger fauna and should be classified in the Neogene. Although the stratigraphical relations of the two groups of rocks are not yet established, and further field work and detailed mapping are needed, yet these correlations are believed to be justified by the faunal assemblages. The fauna of the older series is found to bear a strong affinity with the fossils from the

[1]) On study leave from the University of Alexandria.

Eocene of the London and Paris Basins and other parts of west and northwest Europe. The fauna of the younger series is related to the Oligocene and Miocene of the west Atlantic coast, with Miocene forms from west Europe, and indeed includes forms ancestral to those of the English Lower Crag.

The structural conditions responsible for the preservation of the deposits seem to be strikingly similar to those discussed by RAVN (1933, p. 5) and WAGER (1934, p. 27 & 1935, pp. 11—12) at Kap Dalton, and MACKNEY and SHERRELL believe that the Tertiary deposits are preserved at Kap Brewster in downfaulted areas.

The writer is indebted to Dr. LAUGE KOCH for permission to study the material, and to Professor W. F. WHITTARD who has shown keen interest in the problem, has read through the manuscript and has provided research facilities in the laboratory of the Geological Department of the University of Bristol. The stratigraphical data and maps are entirely the work of Mr. MACKNEY and Mr. SHERRELL, who placed this information, as well as their field notes and sketches, at the disposal of the author. The photographs were taken by Mr. E. W. SEAVILL to whom I record my thanks for his assistance.

II. HISTORICAL ACCOUNT

Tertiary deposits occur at numerous localities over the Arctic Region. They are associated with basaltic lava flows, coal deposits, fossil wood and plants, and freshwater sediments. Marine fossiliferous strata are known only at a few of these localities, viz., East Greenland, North Iceland, West Spitzbergen, Sakhalin, North and West Alaska. Unfortunately the fossil species are usually present in insufficient numbers for statistical analysis, which is the only safe procedure to adopt for the determination of the stratigraphical age of Tertiary rocks, and it is the uncertainty regarding the exact ages of the Arctic Tertiary rocks which often makes it difficult to establish reliable correlations between the different localities.

In Greenland described Tertiary deposits are few indeed. In fact, sediments with marine faunas have so far only been recorded and described from two localities, both from the east coast. These are the strata at Kap Dalton, studied by RAVN (1904, pp. 95—140 & 1933, pp. 3—15) and by WAGER (1934, pp. 22—47 & 1935, pp. 5—31), and those from Kap Brewster which are the subject of the present communication (text-figure). Plant-bearing sediments have been recorded from Disko Island and the Peninsulas of Nûgssuaq and Svartenhuk on the west coast. They are found lying conformably on marine Senonian, and are considered to be either early Tertiary in age or Upper Senonian. On the east coast the plant remains of the Sabine Ø and those of Kap Dalton were believed at one time to be Miocene; later, a Palaeocene-Eocene age was assigned to them by MATHIESEN (1932, p. 61).

Tertiary faunas are said to have been discovered on Little Pendulum Island, east of the Sabine Ø, but they were never described and nothing significant was published on the said discovery. At Kap Gustav Holm, south-west of Kap Dalton, Wager (1934), pp. 22—24) recorded fossiliferous marine sediments lying between the peneplained surface of the metamorphic complex and the basaltic lavas. The assemblage is poor, and WAGER, on the advice of HAWKINS, placed the rocks in the Tertiary, being probably older than the Eocene deposits of Kap Dal-

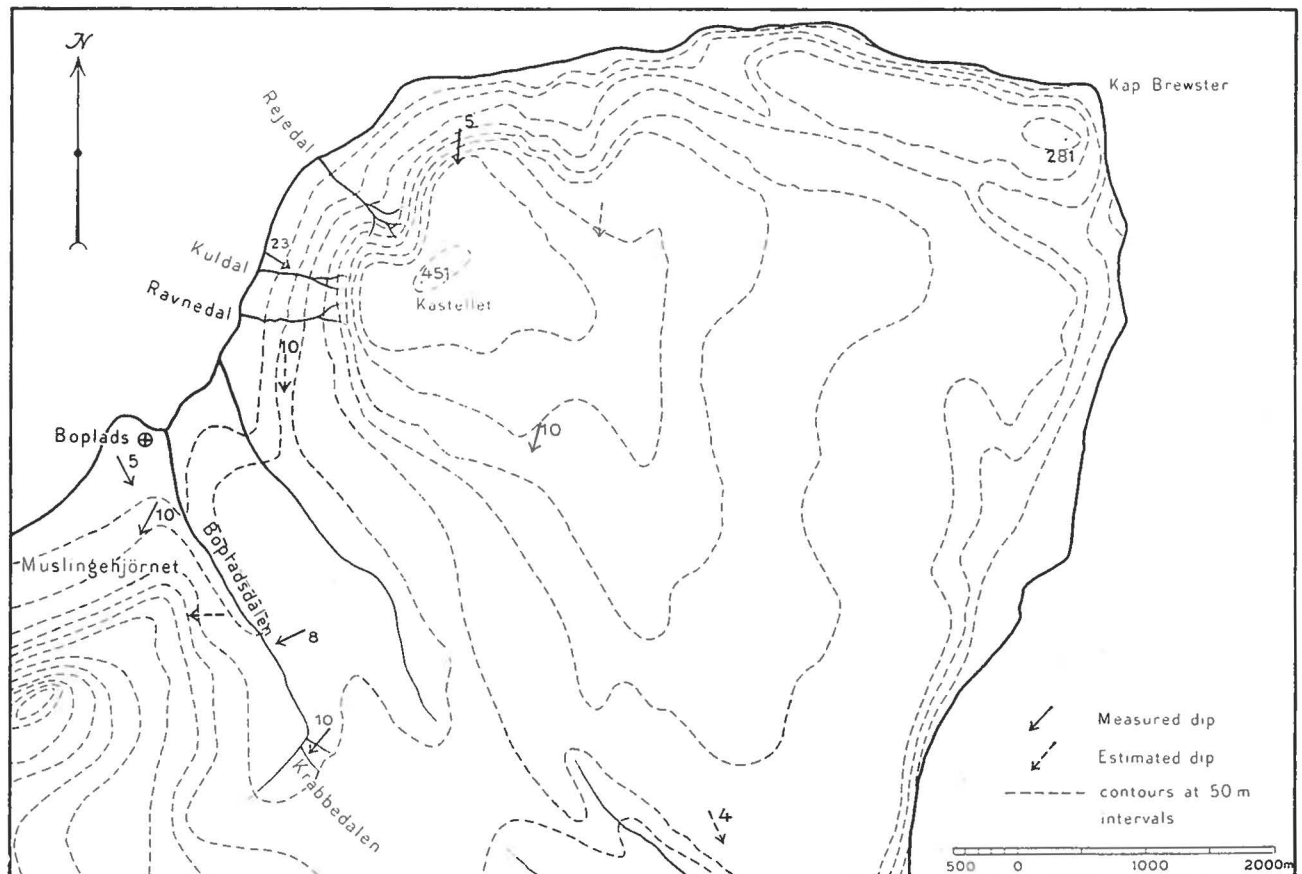

Fig. 1. Locality Map of Kap Brewster.

ton; RAVN (1933, p. 9), on the other hand, is inclined to date them as pre-Tertiary.

The Kap Dalton Tertiary strata are by far the richest in marine fossils in Greenland and according to RAVN (1904 & 1933) and KOCH (1929) they are of Eocene, probably Lower Eocene, age. RAVN also believes that the two horizons in the succession, viz. the *Cyrena* and the *Coeloma* Beds, do not differ much with regard to age. However, SORGENFREI (1940, pp. 126—127), from a comparison with Miocene faunas in Denmark, favours a younger age, say about Oligocene to Miocene.

III. STRATIGRAPHY

Immediately south of the Eskimo Settlement, at the base of the cliffs of basalt in a section measured on the south bank of Bopladsdalen[1]), is the only locality in the whole area where marine sediments have been found to lie with certainty below the basaltic flows. Two incomplete impressions of echinoid tests were collected but no diagnostic fossils were found which provide a reliable clue as regards their age. The basaltic flows, which separate these sediments from the rest of the higher fossiliferous strata, attain a thickness of roughly 500 metres and they form the main topographical feature of Kap Brewster. The fossiliferous strata overlying the basalts seem to be confined to the area occupied by the two main streams flowing between the north-east plateau and the mainland. The rocks crop out in the cliffs of the north-west coast and at isolated localities in the south. The post-basalt sediments fall into two categories marked by distinct faunal assemblages. The older series belongs to the Palaeogene, most probably of late Eocene age. The younger series certainly bears a newer fauna and should be classified in the Neogene, and is most probably of Miocene age. The relations between the two series are obscure and can be elucidated only by further field studies.

The following is a scheme of the generalised succession in the area beginning with the youngest beds.

D. *The Neogene Sediments (Kap Brewster Series)*

8. *The Chlamys Beds.*

c. Brown, reddish-weathering sandstone with interbedded agglomerate. Fossils include *Chlamys*, various other bivalves and limpids..... Approximate thickness 6 m

b. Black to olive green sandstone with thin interbedded ag-

[1]) Bopladsdalen is the southern of the two main valleys south-east of the Eskimo Settlement.

glomerate. Fossils are abundant, mostly consisting of *Chlamys*, *Mytilus*, *Perna* and *Terebratula*.....
Approximate thickness 15 m

a. Agglomerates, tuffs and unfossiliferous sandstones.....
Approximate thickness 3 m

7. Conglomerate-breccia with ungraded basalt fragments as well as sedimentary material ..... Approximate thickness 21 m

Field Relationships Unknown.

C. *The Palaeogene Sediments (Kap Dalton Series)*

6. *The Coeloma Beds.*
Grey sandstones and marls, with thin bands of hard sandstones; other bands of hard calcareous concretions, almost black in colour, chiefly contain fossil crabs but sometimes yield gastropods and lamellibranchs in an excellent state of preservation ..... Approximate thickness 36 m

5. *The Cyrena Beds.*

c. Rusty-weathering, thin-bedded sandstone
Approximate thickness 15 m

d. Sphaeroidal-weathering sandstones with many examples of *Cyrena* and other lamellibranchs
Approximate thickness $3^1/_2$ m

c. Grey, green, feldspathic sandstone with some hard and siliceous bands each about half a metre thick. Fossils are rare..... Approximate thickness 42 m

b. Grey and green sandstones, with some massive hard bands weathering pink, and casts and moulds of various marine lamellibranchs and some sharks' teeth .....
Approximate thickness 15 m

a. Grey, brownish, flaggy sandstone with *Cyrena* and other mostly freshwater lamellibranchs .....
Approximate thickness $1^1/_2$ m

4. A basal conglomerate is composed almost entirely of igneous pebbles..... Approximate thickness 2—3 m

B. *The Plateau Basalts*

3. Pillow lavas, amygdaloidal and columnar basalts with layers of brittle shale and hard brittle sandy shale with silicified wood and many plant remains.

2. Columnar basalt interbedded with pink brecciated volcanics,

coal, and unfossiliferous shales and sandstones especially near the top.

Approximate thickness of the Plateau Basalts ..... 500 m

A. *The Infra-basalt Sediments*

1. Thinly bedded, easily comminuted, bluish-grey, micaceous shales. Fragments of unidentifiable impressions of irregular sea-urchins occur. The base of the sediments is not seen...

Approximate thickness 126 m plus

A. The Infra-Basalt Sediments.

The Plateau Basalts throughout the area have a general inclination south to south-east, which results in high and steep cliffs along the north and north-west coasts; these are cut through by short and quick-flowing streams running in deep valleys rendering the examination of the basalt sections possible. The base of the basaltic flows is shown near the Eskimo Settlement on the north-west coast, where an argillaceous series different from all other sediments at Kap Brewster was discovered to lie beneath the basalt. They are here named the Infra-basalt Sediments and the detailed succession measured near the Eskimo Settlement is appended.

Altitudes in metres	Succession	Fossils
	Fine-grained, blue-hearted basalt becoming more amygdaloidal at top.	
73	Top of the shales.	
	Bluish-grey, micaceous shales, thinly bedded and easily friable, interbedded with occasional layers of hard, grey mudstone about 35 mm in thickness	Impressions of spatangid echinoids at 61 metres
31	Base of the shales?	

Indications of micaceous, yellowish grey sandstones were found in the scree but no bands were observed in situ.

B. The Plateau Basalts.

Detailed study of the Plateau Basalts, including the intercalated sediments with coal and plant remains, were made farther to the north-east. At Kuldal, where the Eskimos collect coal, the following succession was measured and the dip was estimated as approximately 23° to the south-east.

Altitudes in metres	Succession at Kuldal
	Columnar basalt
	Third coal-shale bed about 0.5 metre in thickness and tending to be lenticular.
	Alternation of columnar and amygdaloidal basalt.
167	Basalt with much fossil wood bored with *Teredo*.
150	Second coal-shale bed.
	Heavily veined basalt.
97	First coal-shale bed.
78	Columnar basalt.
	Amygdaloidal basalt.
	Gap in succession
61	Medium-grained melanocratic rock.
57	Coarse-grained melanocratic rock.
10	Amygdaloidal basalt.

The columnar basalt at the base of the succession at Rejedal, given below, is considered to be the continuation of the basalt at the top of the succession at Kuldal. The succession at Rejedal is estimated to dip at approximately 5° due south.

Altitudes in metres	Succession at Rejedal
371	Amygdaloidal basalt.
365	Pillow lavas cemented by easily-weathered igneous material. Pieces of shale are caught between some of the pillows.
	Thin shale horizon.
	Columnar basalt.
	Gap in succession
146	Pinkish, brecciated, volcanic material in which pieces of the amygdaloidal basalts are easily identified.
	Gap in succession
	Columnar basalt.
6	Conglomerate — breccia.
	Columnar basalt.

The dip at Ravnedal is approximately 10° almost due south. The succession is given below.

Altitudes in metres	Succession at Ravnedal
	Columnar basalt.
360	Thin, brittle, sandy shale, bleached white, with various fossil leaves, twigs and cones.
	Gap due to inaccessible slopes.
142	White-pinkish sandstone.
	Gap in succession.
100	Porphyritic basalt.
	Gap in succession.
	Amygdaloidal basalt.

Altitudes in metres	Succession at Ravnedal	
	Gap in succession	
69	Basalt, with banding of amygdaloidal material.	

The strata in this section, excluding the thin brittle shale, seem to be equivalent to the top parts of the section at Kuldal; the thin brittle shale yielded a rich collection of fossil plants, and it is believed to represent the topmost parts of the Plateau Basalts and to indicate a lacustrine phase.

C. The Kap Dalton Series.

The rocks which succeed the Plateau Basalts have been best studied in the beds, flanks, and tributaries of Bopladsdalen where they seem to be of limited distribution. A reconnaissance traverse established the likelihood of similar successions appearing to the south of the valley, but bad weather conditions prevented any detailed study of these beds.

The following section in beds referred to the Kap Dalton Series has been compiled from measurements on the east and west banks of Bopladsdalen, south of Muslingehjørnet, and at Krabbedalen.

Thickness in metres	Succession	Fossils
	Coeloma Beds	
36	Grey, sandy marl with thin grey and purple sandstone bands containing limestone concretions of dark colour; the concretions vary in size and contain fossils, especially crabs, in an excellent state of preservation.	*Turbinolia* sp., *Nucula brewsterensis*, *N. laevigata*, *N. subtransversa*, *Cyprina prae-rustica*, *Psammobia* cf. *plana*, *Anomia* cf. *scabrosa*, *Chlamys squamula* var. *groenlandica*, *Thracia* sp., *Natica* sp., *Aporrhais speciosa*, *Fusus* sp., *Coeloma bicarinatum*.
15	Rusty-weathering, thinly-laminated, brown sandstone.	*Astarte* cf. *omalii*, *Aporrhais speciosa*, *Fusus* sp.
	Cyrena Beds	
3.5	Sphaeroidal-weathering sandstone	*Corbicula altissima*.
20	Grey-green, feldspathic sandstone with calcareous nodules at the base and hard, thin, siliceous bands at the top.	?*Corbula* sp.
25	Grey-green sandstone with limestone nodules and hard thin bands of sandstone.	
15	Grey-green sandstone with hard and massive bands of coarse-grained sandstones weathering pink.	*Nucula brewsterensis*, *Panopaea intermedia*, *Otodus* sp.

Thickness in metres	Succession	Fossils
4.5	Grey, flaggy, brittle, micaceous sandstone.	*Pectunculus* sp.
3	Conglomerate, composed entirely of fine-grained basalt pebbles which are well rounded and vary in size from 2,5 to 45 cm in diameter. Suggestions of fossil wood in the matrix.	

The dip has been estimated on the right side of the glacier as between 8 to 10 degrees to the south-west, but the rocks are probably gently folded into a shallow syncline.

D. The Kap Brewster Series.

Another area of sediments occurs at Muslingehjørnet on the west bank of Bopladsdalen but its relations with the sediments to the south are entirely obscured by a large area of glacial debris. This succession at Muslingehjørnet is given below.

Altitudes in metres	Succession in the *Chlamys* Beds	Fossils
	Basalt[1])	
153	Brown, reddish-weathering sandstone, weathering sphaeroidally and rich in fossils.	*Terebratulina* sp., *Paphia* sp., *Chlamys scabrella*, *Chlamys* (*Placopecten*) sp., *C.* cf. *diprosopa.*
147	Black to olive-green sandstone, probably tuffaceous, interbedded with thin layers of agglomerates.	*Hemipatagus* sp., *Terebratula* cf. *grandis*, *Perna* cf. *maxillata*, *Chlamys princeps* var. *priori*, *C.* cf. *diprosopa*, *Chlamys* sp., *Pecten pseudo-solarium*, *Mytilus brewsterensis.*
142	Coarse-grained agglomerates and and tuffaceous sandstones.	
98	Conglomerate and breccia. The conglomerate is composed of basaltic, as well as sedimentary, boulders and pebbles, loosely cemented in a purple fine-grained matrix.	

The sediments of this section dip approximately to the west at a low angle.

[1]) The relation of the basalt to the sediments needs further field investigation.

IV. SYSTEMATIC PALAEONTOLOGY

PROTOZOA

Class FORAMINIFERA

Family **Miliolidae** d'Orbigny.

Genus **MILIOLA** Lamarck, 1804.

Miliola sp.

The two specimens available show a slight resemblance to the species group of *M. saxorum* Lamarck from the Middle Eocene of the Paris Basin.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

COELENTERATA

Class ANTHOZOA

Order SCLERACTINIA

Family **Turbinolidae** Edwards & Haime.

Genus ?**TURBINOLIA** Lamarck, 1816.

?*Turbinolia* sp.

One specimen of an indeterminate species probably belongs to the genus *Turbinolia*.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen.

ECHINODERMATA

Class ECHINOIDEA

Subclass *Exocyclica.*

Family **Spatangidae** Wright.

Genus **HEMIPATAGUS** Desor, 1858.

Hemipatagus sp.

(Plate A, fig. 1)

Material. One fairly well-preserved, slightly squashed specimen (MMC: 7408[1])).

Description. Test of moderate size, measuring 30 mm both in length and breadth, subcordiform in shape, presumably higher near the truncated posterior part than at the anterior; the general shape of the profile is obscured by the compression the specimen has suffered. The apical disc is perfectly preserved, small, slightly elongated antero-posteriorly, and ethmolysian. The two anterior genital plates 2 (the madreporite) and 3 are smaller than the remainder and each carries a small gonopore, oval in shape and disposed diagonally. The madreporite plate is long, has a slight constriction a little anterior to the middle and extends a short distance beyond the limits of the posterior genitals. The posterior genitals are bigger than the anterior, and carry wider gonopores. The oculars are small and not clearly defined. The apical disc measures 2 mm by 1.75 mm. The ambulacra are subpetaloid, nearly flush. The anterior ambulacrum (III) lies in a shallow but broad sulcus which passes the ambitus, its plates are bigger than those of the other ambulacra and more or less equidimensional; the pore-pairs are minute, almost vestigial, succeeding one another along a slightly slanting line, the lower pair being slightly inwards. The pore-pairs in the anterior area distally coalesce into singles when they approach the ambitus. The antero-lateral ambulacra are but slightly shorter that the postero-laterals. The extra-petaloidal parts of the areas are composed of larger plates, each carrying one pore only. The interambulacral areas of the test are rather badly preserved but there are indications of large, conspicuous, and widely spaced tubercles. It is unfortunate that the area of the periproct and the peristome cannot be exposed.

Discussion. The nearest forms are *Hemipatagus argatus* from the Middle Eocene, and *H. subrostratus* from the Upper Eocene and the

[1]) Type and figured specimens will be housed in the Mineralogical Museum Copenhagen (MMC).

Oligocene of the United States (CLARK, 1915, pp. 150—151, pl. lxix, figs. 1a—d and 2a—b). In shape, tubercles, and the anterior sulcus it approaches the latter species rather than the former. However, *H. subrostratus* shows the antero-lateral ambulacral areas to be a little longer than the postero-laterals in contrast with the Greenland form. It also has slit-like and connected pore-pairs, and the ambulacral areas are slightly sunken. In these last-mentioned characters the Greenland form is more related to *H. argatus*.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Genus Indeterminate.

Two impressions of echinoids which certainly belong to the Family Spatangidae show on the upper, or adapical, surface petaloid ambulacral areas which are flush or very slightly raised. Ambulacral area III is wide and carries small rounded oblique pore-pairs. The antero-lateral pairs of ambulacral areas are twice as long as the postero-laterals and the pores are connected and sunk in a deep depression. The impression of the apical system is not good but it seemingly shows four gonopores on a moderately sized apical system. The other impression is that of the lower, or adoral side, probably of the same form, and showing a pre-central peristome and a slightly raised and wide plastron.

Geological horizon and locality. Infra-basalt Sediments of Eskimo Settlement.

MOLLUSCOIDEA

Class BRACHIOPODA

Order ARTICULATA

Family **Terebratulidae** Gray.

Genus **TEREBRATULA** Müller, 1776.

Terebratula cf. *grandis* Blumenbach

(Plate A, figs. 2—8)

1803 *Terebratula grandis* Blumenbach, table I, fig. 4.
1829 *Terebratula variabilis* Sowerby, p. 148, pl. 576, figs. 2—5.
1838 *Terebratula variabilis* Brown, pl. liv, figs. 19—22.
1839 *Terebratula variabilis* Nyst & Westendrop, p. 15, no. 37.
1844 *Terebratula sowerbii* Nyst, p. 335, pl. xxvii, figs. 3a—b.
1848 *Terebratula variabilis* Bronn, p. 1237.
1850 *Waldheimia variabilis* King, p. 60.
1852 *Terebratula grandis* Davidson, p. 16, pl. i, fig. 18 & pl. ii, figs. 1—8.
1872 *Terebratula grandis* Wood, p. 168, pl. viii, figs. 11a—c & pl. xi, figs. 5a—g.
1890 *Terebratula grandis* Reid, pl. ii, fig. 19.

1921 *Terebratula* cf. *grandis* Freidberg, p. 7.
1927 *Terebratula grandis* Lamouche, fasc. 6, pl. 50, fig. 1.
1939 *Terebratula grandis* Boni, p. 272, pl. xii, figs. 1—2.
1943 *Terebratula grandis* Albrecht & Yalk, p. 15, pl. xv, fig. 470.

Material. Fifteen specimens, of which some are more or less complete and the rest are badly distorted and fragmentary (MMC: 7409—7415).

Discussion. The material is not quite identical with *Terebratula grandis* of the Middle and Upper Tertiaries of Europe and especially of the Coralline Crag (Pliocene) of England. This species, however, is the nearest and most directly comparable with the Kap Brewster material. The difference is seen in the longer shape, especially in the specimen from the *Cyrena* Beds and also in some of the specimens from the *Chlamys* Beds, but this is not specific in rank.

No brachiopods have been described before from the Tertiary of Greenland, but in the Kap Gustav Holm beds there are shells which according to HAWKINS may be *Cyrena gravesi* but alternatively they may be brachiopods (RAVN, 1933, p. 9).

Geological horizon and locality. *Cyrena* Beds? and *Chlamys* Beds at Muslingehjørnet and south of Muslingehjørnet.

Genus **TEREBRATULINA** d'Orbigny, 1847.

Terebratulina sp.

The specimens are most allied to the Pliocene and Recent species *Terebratulina caput-serpentis* Linnaeus, especially to the figures given by DAVIDSON (1852, pl. 1), but unfortunately the material from Greenland is fragile and is in such a bad state of preservation that it cannot be identified with certainty.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

MOLLUSCA

Class LAMELLIBRANCHIATA

Order TAXODONTA

Family **Nuculidae** Adams.

Genus **NUCULA** Lamarck, 1799.

Nucula brewsterensis sp. nov.

(Plate A, figs. 9—10)

Description. Shell markedly trigonal in outline, longer than high, transversely ovate and moderately inflated; inequilateral; beak distance

is less than one fifth. Pedal margin is roundly angulated and continuous with the gently curved ventral margin. Anterior margin is acutely rounded, dorsal margin is gently curved, and the ventral margin is crenulated. Lunule is indistinct; escutcheon is oval, swollen and sharp in the median line. Ornamentation consists of strong and dense radial ribbing, decussated with the concentric lines of growth which become more conspicuous periodically. The ribs become denser with maturity of the shell and are separated by spaces narrower than themselves near the anal area; they are less packed and separated by spaces wider than themselves in the anterior area, until ultimately near to the lunule a narrow laevigate area remains.

Holotype. MMC: 7416.

Paratype. MMC: 7417.

Discussion. The species stands near to *Nucula consors* Wood (1871, p. 111, pl. xix, figs. 7a—b) from the Middle Eocene of England, where the umbones are more prominent and the umbonal angle is slightly more acute. The radial ribs are much stronger and in the new species are characterised by the special arrangement described above and the small laevigate area near the lunule.

Geological horizons and localities. *Cyrena* Beds and *Coeloma* Beds of the east bank of Bopladsdalen and of Krabbedalen.

Nucula laevigata Sowerby

(Plate A, fig. 11)

1818 *Nucula laevigata* Sowerby, p. 207, pl. 192, figs. 1—2.
1840 *Nucula laevigata* Goldfuss, p. 157, pl. 125, figs. 19a—c.
1844 *Nucula laevigata* Nyst, p. 228, pl. 17, figs. 8a—b.
1861 *Nucula laevigata* Wood, p. 81, pl. x, figs. 8a—b.
1917 *Nucula laevigata* Newton, p. 16, pl. ii, fig. 11.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen (MMC: 7418).

Nucula subtransversa Nyst

(Plate A, fig. 12)

1844 *Nucula subtransversa* Nyst, p. 227, pl. xviii, figs. 7a—b.
1871 *Nucula subtransversa* Wood, p. 120, pl. xix, fig. 13.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen (MMC: 7419).

Order HETERODONTA

Family **Lucinidae** Deshayes.

Genus **LUCINA** Bruguière, 1797.

Lucina sp.

An internal cast of a *Lucina* which resembles, especially in the squarish appearance induced by a practically horizontal and straight hinge line, the members of the *borealis*-group abundant in the Pliocene and the Pleistocene of Europe and also living on many Recent shores of the Northern Hemisphere, but one important difference is that the shell from Greenland is slightly more inflated. Too much stress should not be made of the similarity between this species-group and an unidentified species because it is not sufficiently well preserved to admit of detailed treatment.

Geological horizon and locality. *Cyrena* Beds of south of Muslingehjørnet.

Genus **ASTARTE** Sowerby, 1816.

Astarte cf. *omalii* Delajonkaire

(Plate A, fig. 13)

1823 *Astarte omalii* Delajonkaire, p. 129, pl. vi, figs. 1 a—c.
1840 *Astarte concentrica* Goldfuss, p. 195, pl. 135, figs. 7 a—b.
1861 *Astarte omalii* Wood, p. 180, pl. xvii, figs. 1 b, c & e.
1890 *Astarte omalii* Reid, pl. ii, fig. 11.
1940 *Astarte concentrica* Sorgenfrei, p. 20, pl. iv, fig. 8.

Geological horizon and locality. *Cyrena* Beds of north of Krabbedalen (MMC: 7420).

Family **Cyrenidae** Adams.

Genus **CYRENA** Lamarck, 1816.

Cyrena cf. *gravesi* Deshayes

1824 *Cyrena gravesi* Deshayes, p. 120, pl. 19, figs. 3—4.
1860 *Cyrena gravesi* Deshayes, p. 498.
1904 *Cyrena gravesi* Ravn, p. 107, pl. iii, figs. 6—9.

This species is the commonest fossil at Kap Dalton, after which the *Cyrena* Beds (Lower Kap Dalton Beds) were given their name by Ravn (1904). At Kap Brewster, where the same beds have been identified, this species is rare, and only three incomplete shells are recorded.

Geological horizon and locality. *Cyrena* Beds of eastern bank of Bopladsdalen, opposite Muslingehjørnet.

Cyrena difficilis Deshayes

1860 *Cyrena difficilis* Deshayes, p. 513, pl. xxxvii, figs. 3—5.

Casts of the complete shell are present in the collection and they exhibit the characteristic shape and ornamentation which are specific characters. The species is common in the higher horizons of the *Cyrena* Beds.

Geological horizon and localities. *Cyrena* Beds of south of Muslingehjørnet.

Genus **CORBICULA** Megerle, 1811.

Corbicula altissima (Ravn)

(Plate B, fig. 1)

1922 *Cyrena* (*Corbicula*) *altissima* Ravn, p. 16, pl. i, figs. 1—2.

The material from Greenland agrees in all diagnostic characters with the Spitzbergen species, but it may be remarked that the furrow and the carina are fainter in the specimens from Greenland. The shells also tend to be more rounded in outline and one is even slightly longer than high.

Geological horizon and locality. *Cyrena* Beds of south of Muslingehjørnet (MMC: 7421).

Corbicula cf. *britannica* (Wood)

1818 *Cyclas deperdita* Sowerby, p. 139, pl. 162, fig. 1.
1877 *Cyrena britannica* Wood, p. 11, pl. B, figs. 2a—b.

An external and an internal cast occurring side by side may belong to one and the same shell. If so, the specimens are not of identical species because from WOOD's and SOWERBY's excellent figures the concentric ornament is periodically accentuated, whereas in the present specimens it is regularly spaced.

Geological horizon and locality. *Cyrena* Beds of south of Muslingehjørnet.

Family **Isocardiidae** Gray.

Genus **CYPRINA** Lamarck, 1818.

Cyprina prae-rustica sp. nov.

(Plate B, figs. 2—3)

Description. Shell is tumid, gibbous, almost equidimensional and of marked isocardoid shape. Umbones are almost touching and slightly incurved. The cardinal area is narrow but deep; escutcheon is indistinct; lunule is wide, heart-shaped and deep. The impressions of the hinge line

show in the right valve a triangular, strong and protruding anterior cardinal tooth and a long, slanting and blade-like posterior cardinal. The left valve shows an anterior, less prominent, but wider cardinal tooth; the posterior cardinal is stouter and rather more vertical compared with the corresponding tooth in the right valve. There are no anterior laterals but there is one long and blade-like posterior lateral for each valve. The ornamentation comprises simple and indistinct growth lines and fine closely packed radiating lines which are especially clear on the anterior area.

Holotype. MMC: 7422.

Discussion. The species is represented only by one internal mould which closely resembles *Cyprina rustica* Sowerby (1818, p. 217, pl. 196) and especially var. *tumida* (Wood, 1861, p. 197, pl. xviii, figs. 1a, c, e), which are common in Neogene deposits of West Europe and in the Pliocene of the British Isles. The new species is more tumid and gibbous, has the umbones more incurved and the radial striations clearer than in *C. rustica* or any of its varieties.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen.

Family **Veneridae** Leach.

Genus **PAPHIA** Bolten, 1798.

Paphia cf. *parisiensis* (Deshayes)

(Plate B, fig. 4)

1860 *Tapes parisiensis* Deshayes, p. 415, pl. 29, figs. 5—6.

The single available specimen measures 30 mm in length compared with 20 mm for the type of this species. The umbo is also less conspicuous and the ventral margin is slightly more curved than in the type which comes from the Middel Eocene of the Paris Basin.

Geological horizon and locality. *Cyrena* Beds of south of Muslingehjørnet (MMC: 7423).

Paphia sp.

(Plate A, fig. 14)

Only one external cast is available (MMC: 7424), from which the general shape and the impressions of the ornamentation are clearly indicated. The shell is transversely ovate and there are indications that the complete shell was compressed. The ornament consists of concentric rounded ridges separated by deep groves. The ridges are generally parallel but sometimes they anastomose.

The shell recalls *P. texturata* (Lamarck) of the Pliocene and Recent, especially in the form of the ornamentation, but due to the poverty of the material, the specimen from Greenland cannot be placed in that species or in *Tapes habilis* from the Crag (WOOD, 1861, p. 204, pl. xx, figs. 3a—c). There seem to be slight differences in shape, in the position of the umbo, and in the strength and spacing of the concentric ornament.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Genus **MACROCALLISTA** Meek, 1876.

Macrocallista proxima (Deshayes)

(Plate B, fig. 5)

1860 *Cythera proxima* Deshayes, p. 435, pl. xxx, figs. 31—34.

The species is confined to the Upper Palaeocene and the Lower Eocene beds of the Paris Basin. It is by far the most abundant fossil in the *Cyrena* Beds of Kap Brewster and is confined to its two lowermost horizons, where the rocks seem to be made up wholly of the species. A general survey of the material from Kap Brewster shows that the shells are on the whole less elongated antero-posteriorly which results in the umbo appearing to be slightly higher than in the Paris Basin material, but otherwise there is a complete agreement with the essential diagnostic features of the species (MMC: 7425).

Geological horizon and localities. *Cyrena* Beds of east bank of Bopladsdalen, opposite Muslingehjørnet, and south of Muslingehjørnet.

Macrocallista fallax (Deshayes)

1860 *Cytherea fallax* Deshayes, p. 493, pl. xxxii, figs. 18—20.

This is another characteristic species of the Sables Inférieurs (Palaeocene-Lower Eocene) of the Paris Basin, and is represented by one internal mould, found in association with the previous species.

Geological horizon and locality. *Cyrena* Beds of east bank of Bopladsdalen, opposite Muslingehjørnet.

Family **Psammobiidae** Dall.

Genus **PSAMMOBIA** Lamarck, 1818.

Psammobia cf. *plana* Deshayes

(Plate B, fig. 6)

1860 *Psammobia plana* Deshayes, p. 379, pl. xxiii, figs. 8—9.

The present material is near to *P. plana* of the Marnes Supérieurs au Gypse (Lower Oligocene) of the Paris Basin, but the shells attain larger sizes, are higher and show a more curved ventral margin.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen (MMC: 7426).

Order ARCACEA

Family **Arcidae** Dall.

Genus **PECTUNCULUS** Lamarck, 1799.

Pectunculus sp.

A few specimens of a badly preserved, unidentifiable species of *Pectunculus* may be related to the slightly oblique species of the Lower Eocene of the Paris Basin, viz. *P. heterodon* Deshayes and *P. angustidens* Watelet.

Geological horizon and locality. *Cyrena* Beds of east bank of Bopladsdalen, opposite Muslingehjørnet.

Family **Pernidae** Zittel.

Genus **PERNA** Bruguière, 1789.

Perna cf. *maxillata* Lamarck

1819 *Perna maxillata* Lamarck, p. 142.
1840 *Perna maxillata* Goldfuss, p. 106, pl. cviii, figs. 3a—c.

The specimen from Kap Brewster is less quadrate and the anterior margin is more excavated with the result that the beak appears more acute.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Family **Anomiidae** Gray.

Genus **ANOMIA** Linnaeus, 1758.

Anomia sp.

The material is represented by two right (upper) valves, but it is so badly preserved that confident designation or identification is impossible. Nevertheless, traces of the characteristic imbricate and scabrose ornamentation are still left on one of the valves; this is sufficient to show that *Anomia scabrosa* (Wood, 1871, p. 14, pl. xi, figs. 5a—c) from the Eocene of England is the nearest, if not the identical, species to our form. However, there is little doubt that the tubercles, which are composed of folded-up lamellae in *A. scabrosa*, are more compact, probably more solid, and smaller in size in the present form.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen.

Family **Pectinidae** Lamarck.

Genus **CHLAMYS** Bolten, 1798.

Subgenus **Aequipecten** Fischer, 1886.

Chlamys (*Aequipecten*) *scabrella* (Lamarck)

(Plate B, fig. 7)

1819 *Pecten scabrellus* Lamarck, p. 183, no. 24.
1819 *Pecten seniensis* Lamarck, p. 182, no. 20.
1840 *Pecten scabrellus* Goldfuss, p. 62, pl. xcv, figs. 7a—b.
1840 *Pecten sarmenticius* Goldfuss, p. 63, pl. xcv, figs. 7b—c, non. fig. 7a.
1861 *Pecten dubius* Wood, p. 38, pl. iv, fig. 3.
1898 *Pecten scabrellus* Mayer-Eymar, p. 74, pl. xii, figs. 12—15.
1897 *Pecten subsarmenticius* Almera & Bofill, p. 6, pl. iii, fig. 5.
1897 *Pecten subambiguus* Almera & Bofill, p. 7, pl. iii, fig. 6.
1897 *Pecten tarraconensis* Almera & Bofill, p. 7, pl. iii, fig. 7, and pl. iv, figs. 8 & 15.
1914 *Chlamys* (*Aequipecten*) *scabrella* Cossmann & Peyrot, p. 320, pl. xvii, figs. 18—21.
1933 *Chlamys scabrella* Boni, p. 122, pl. vi, figs. 3, 4, 5 & 7 and pl. vii, figs. 2, 3 & 4a—b.
1936 *Pecten* (*Aequipecten*) *seniensis* Friedberg, p. 220, pl. xxxvii, figs. 3—10.
1938 *Chlamys* (*Aequipecten*) *raricosta* Stchepinsky, p. 38, pl. iii, figs. 3, 4 & 4a.
1939 *Chlamys scabrella* Roger, p. 104, pl. xii, figs. 8, 9, 9a, 10 & 10a and pl. xiii, figs. 3—12.

This very useful species has not been recorded before from the Tertiary of East Greenland. It is represented by only an incomplete external cast which shows the characteristic *scabrellus* ribbing and ornamentation (MMC: 7427). The shell must have been of small size, measuring about 12 mm in width and a little more in length. Probably there are not more than fourteen ribs, moderately raised and with a rounded cross section. The species is a characteristic Neogene fossil which attained a world-wide distribution especially in the late Neogene.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Subgenus **Placopecten** Verrill, 1897.

Chlamys (*Placopecten*) *princeps* (Sowerby) var. *priori* nov.

(Plate B, figs. 8—9)

Description. The material is represented by three incomplete specimens; one is a fairly well preserved half and measures 42 mm in height and about as much in breadth. The material belongs to SOWERBY's species from the Coralline Crag of England (1829, p. 80, pl. 542, fig. 2). The variety designated here is much smaller in size, rather equant, and carries not more than 70 ribs of the dense imbricate scaly type characteristic of the species, compared with 80 ribs in SOWERBY's type and nearly 200 ribs in the variety *pseudo-princeps* (WOOD, 1861, p. 31).

Holotype. MMC: 7428.

Paratype. MMC: 7429.

Distribution. This species has been so far found only in Pliocene rocks, that is, from the Diestian of Belgium and from the Coralline Crag of England.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Chlamys (*Placopecten*) sp.

(Plate B, fig. 10)

An external cast of a fragment of presumably a right valve of a *Placopecten* most probably belongs to *Ch.* (*Placopecten*) *virginianus* (Conrad) or a closely related species (MMC: 7430). It shows the crowded, strong, and scabrous ribbing characteristic of that species. *Ch.* (*P.*) *virginianus* (Conrad, 1840, p. 46, pl. 21, fig. 10) is recorded from the Miocene rocks of the United States.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Subgenus **Plagioctenium** Dall, 1898.

Chlamys (*Plagioctenium*) cf. *diprosopa* (Fontannes)

(Plate C, figs. 1—3)

1878 *Pecten diprosopus* Fontannes, p. 91, pl. iv, fig. 1.
1878 *Pecten amoebius* Fontannes, p. 92, pl. iv, fig. 2.
1939 *Chlamys diprosopa* Roger, p. 62, pl. ii, fig. 5—7 and pl. vi, figs. 3 & 9.

Specimens of four internal casts of shells of this species are available, fortunately with a small piece of shell encrusting one of the specimens which shows the external ornamentation (MMC: 7431—7433). The specimens from Greenland attain much larger sizes than the European ones and the secondary ribs in the interspaces are more persistently developed. The interspaces are almost equal, only becoming gradually narrower at the side of the shell. The ornamentation consists of fine concentric rings crossed by fine radial lines forming a decussate pattern in the interspaces which is almost obsolete on the ribs. In this there is a close approach to the type of ornamentation found in *Chlamys scabriuscula* Matheron, and thus stresses a near relationship to the type species of this group of *Chlamys* in Roger's classification (1939). Both species mentioned come from the Miocene of several localities in Europe, ranging in age from the Burdigalian to the Tortonian.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Subgenus **Pseudamussium** Hermannsen, 1847.

Chlamys (*Pseudamussium*) cf. *cornea* (Sowerby)

(Plate C, fig. 4)

1821 *Pecten cornea* Sowerby, p. 1, pl. 204, figs. 1—2.
1871 *Pecten corneus* Wood, p. 39, pl. ix, figs. 7a—d.
1887 *Chlamys* (*Pseudamussium*) *corneola* Cossmann, p. 182, pl. 8, figs. 26 & 31.
1922 *Pecten corneus* Ravn, p. 13, pl. i, fig. 3.
1927 *Pecten corneus* Lamouche, p. 20, pl. 49, fig. 12.
1933 *Chlamys* (*Pseudamussium*) *corneola* Ravn, p. 11.

An incomplete specimen is available of a smooth, very thin, almost circular, slightly convex species with two moderately sized, almost equal, ears (MMC: 7434). There can be but very little doubt concerning the identification of this specimen with SOWERBY's species from the London Clay and from the Lower and Middle Eocene of the Paris Basin.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Subgenus **PROPEAMUSSIUM** De Gregorio, 1884.

Chlamys (*Propeamussium*) *squamula* (Lamarck) var. *groenlandica* nov.

(Plate B, fig. 11)

Description. One excellently preserved internal cast of a left valve, with small parts of the actual shell preserved, was obtained. Shell is rounded, orbicular, measuring 10 mm in both length and breadth, very thin, translucent, most probably smooth apart from concentric lines of growth as seen on the preserved parts of the shell. Internally there are thirteen, very narrow, sharp and equally spaced costae, which originate at a distance from the umbo and do not reach the periphery of the shell. The internal cast shows faint impressions of secondary internal costae which are not always clear. The spaces between the costae are flat and striated by extremely fine and closely spaced radial striations. The margin of the shell is entire. The auricles are big, the anterior is almost double the size of the posterior. Both auricles are ornamented by radial and concentric lines, the concentric ones being more pronounced.

Holotype. MMC: 7435.

Discussion. The variety has a greater number of internal costae, thirteen compared to about nine in the main species which also does not show the internal secondary costae; also in this variety the auricles possess radial as well as concentric ornamentation.

Distribution. The species is of wide occurrence mainly in the Eocene, and has been reported from the Middle Eocene of France, England and the United States. The fossils attributed by GOLDFUSS, (1840,

p. 75) to this species from the Cretaceous of Westphalia probably belong to a distinct variety or a closely related species.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen.

Chlamys sp.

1933 *Chlamys*? sp. Ravn, p. 11.

Two badly preserved specimens of a small *Chlamys*, most likely belonging to Ravn's unnamed species from Kap Dalton, are larger than broad and possess a rather acute umbonal angle of about 85°. The anterior ear is conspicuously developed, aliform and much bigger than the posterior which is inclined posteriorly. The shell is thin, slightly convex and the ornamentation is composed of rather narrow, low ribs, separated by shallow spaces. The ribs and spaces carry very fine costae, of which the ribs carry from four to five and the spaces two or three.

The nearest species for comparison is *Chlamys fasciculata* (Millet, 1854, p. 171, no. 306) and especially the figures of that species given by Roger (1939, pl. xxvi, figs. 13—17), and it has so far been recorded from Miocene strata. The specimens from Kap Brewster exhibit a slightly wider umbonal angle, and show fewer costae both on the ribs and the furrows which are also lower and shallower than in *Ch. fasciculata*.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Genus **PECTEN** Müller, 1776.

Pecten pseudo-solarium sp. nov.

(Plate C, figs. 5—6)

Description. The material is represented by two right valves. The shell is of moderate size and sub-orbicular in shape. The holotype measures 30 mm in height and about 25 mm in breadth; another but incomplete specimen shows that the species might have reached larger sizes. The right valve is moderately convex, and shows a steeply inclined umbonal point. The right valve carries twelve strong, elevated and wide ribs, which in profile are broadly convex with a flattish surface. They are separated by narrower interspaces with the same characteristic profile as the ribs. Ribs and furrows are provided with extremely fine, almost microscopic, concentric striations, crossed by radial, equally fine, and closely packed striations. Each rib carries some thirty to forty of these fine radial striations. The ears of the right valve are unequal; the posterior smaller one is incompletely preserved. The anterior ear is characteristically wide, alate, and trapezoidal in shape, there being two right angles in the outline situated at the outer corners. The ear is divided

into an upper and a lower triangular area by a slight ridge running diagonally from the umbo. The upper triangle carries six strong radial ribs, scabrous due to decussation by concentric striations, and they are separated by secondary smaller riblets. The lower triangle of the ear is almost smooth.

Holotype. MMC: 7436.

Paratype. MMC: 7437.

Discussion. The nearest species are *P. solarium* (Lamarck, 1819, p. 179), figured in GOLDFUSS (1840, p. 65, pl. xcvi, figs. 7a—b), and *P. vaughani* var. *flabellum* (COOKE, 1919, p. 134, pl. viii, figs. 6a—b & 7). The first comes from the Molasse (Swiss Miocene) and the second from the Oligocene of Cuba. The new species approaches *P. vaughani* var. *flabellum* in shape, being higher than broad, in the umbonal angle, which is narrower than that of *P. solarium*, and in the general shape and ornament of the right ear. A resemblance to *P. solarium* is evident in the profile of the ribs and the furrows. However, its own peculiarities, including shape, ornament of ear and the fine radial striations on the ribs, justify its separation into a new species.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Family **Spondylidae** Fleming.

Genus **PLICATULA** Lamarck, 1801.

Plicatula sp. *α*

A small pyriform valve of a *Plicatula* ornamented with small, rounded, closely packed, longitudinal ribs which can be seen from the internal side of the shell.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Plicatula sp. *β*

A small pectiniform *Plicatula* with a tiny projecting beak, ornamented by clear radial ribs and an obscure concentric ornamentation.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Family **Ostreidae** Lamarck.

Genus **Ostrea** Linnaeus, 1758.

Ostrea cf. *submissa* Deshayes

1864 *Ostrea submissa* Deshayes, p. 120, pl. lxxxiv, fig. 11.

The solitary specimen is a free valve which is nearly related to *O. submissa* from the Calcaire Grossier Inférieur of the Paris Basin

(Middle Eocene). Further material may prove that the Kap Brewster form is a distinct species, but at the present nothing more need be stated except that the free valve is less curved, is higher at the umbo, and shows a better defined and straight cardinal area.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Family **Mytilidae** Fleming.

Genus **MYTILUS** Linnaeus, 1758.

Mytilus brewsterensis sp. nov.

(Plate D, figs. 1—2)

Description. Shell is of moderate thickness, elongate, gently carinate and almost straight. The hinge margin is straight; the lower edge is only slightly curved, and the posterior is almost straight; the shell is flattened posteriorly where it is terminated by a curved edge. The shell is tumid at the anterior end and tapering. Ornamentation is indistinct, being lamellar and concentric due to the accentuation of the growth lamellae at widely-spaced intervals. The smallest specimen measures about 35 mm in length and about 15 mm at the widest part; corresponding measurements for the largest shell are 120 mm and 40 mm.

Holotype. MMC: 7438.

Paratype. MMC: 7439.

Discussion. The species belongs to the group of the common edible mussel represented in the English Red Crag and still living on many modern shores. It differs from *M. edulis* in being almost straight, more elongated, rather more carinate near the umbo and in attaining much larger sizes, and approaches variety *giganteus* described from the Red Crag (Wood, 1874, p. 110, pl. viii, fig. 4). In the carination it recalls the Eocene species *M. affinis*, a close relative to *M. edulis*, but *M. affinis* is different because the carination runs the full length of the shell, the outline is more or less triangular, and it never reached the size of our new species.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Mytilus affinis Sowerby

1829 *Mytilus affinis* Sowerby, p. 59, pl. 532, fig. 1.
1871 *Mytilus affinis* Wood, p. 61, pl. xii, figs. 1a—d.
1904 *Mytilus affinis* Ravn, p. 105, pl. iii, figs. 2—3b.

Geological horizon and locality. *Cyrena* Beds of south of Muslingehjørnet.

Genus **VOLSELLA** Scopoli, 1777.

Volsella sp.

An external impression of a *Volsella* shell resembles in most features *V. modiola* and *V. barbata* (Linnaeus) from the Pliocene and Recent, but appears more nearly to be related to the latter as shown by the distinct and prominent growth lamellae.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Order DESMODONTA

Family **Anatinidae** Dall.

Genus **THRACIA** Leach, 1823.

Thracia sp.

One valve of a *Thracia* occupies a position between *T. pubescens* Pulteney, especially the specimens from the Coralline Crag of England (WOOD, 1861, pl. xxvi, fig. 1), and *T. ventricosa* Philippi, also from the Crag (WOOD, 1861, pl. xxvi, fig. 5). It is probably nearer the latter, from which it differs in a wider and less protruded siphonal area and a less ventricose anterior area.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen.

Family **Teredinidae** Scacchi.

Genus **TEREDO** Linnaeus, 1758.

Teredo sp.

Geological horizon and locality. *Cyrena* Beds of east bank of Bopladsdalen, north of Krabbedalen.

Family **Saxicavidae** Gray.

Genus **PANOPAEA** Menard, 1807.

Panopaea intermedia (Sowerby)

(Plate D, figs. 3—4)

1812 *Mya intermedia* Sowerby, p. 173, pl. 76, fig. 1.
1825 *Mya intermedia* Sowerby, p. 20, pl. 419, fig. 2.
1840 *Panopaea intermedia* Goldfuss, p. 275, pl. clix, figs. 6a—c.
1850 *Panopaea intermedia* d'Archiac, p. 256.
1852 *Panopaea intermedia* d'Orbigny, p. 303, no. 123.
1860 *Panopaea intermedia* Deshayes, p. 177, pl. 8, figs. 10—11.

A single specimen in the form of an internal mould measures about 90 mm in length, 30 mm in thickness and 44 mm in height (MMC: 7440).

The specimen is slightly distorted, with the result that the left valve appears slightly higher than the right; the impressions of the hinge teeth, pallial line, muscle scars and ornament are well preserved.

There is no essential difference which separates the Greenland specimen specifically from those of Sowerby or of continental authors. There are, however, some slight differences between the English and the French material. The French shells are more elongated and of more uniform width throughout their length, resembling in this respect the specimen from Greenland rather than those of SOWERBY which gradually widen posteriorly. On the other hand, strong and widely spaced concentric ornament on our shell shows greater affinity with the English rather than with the French specimens.

Geological horizon and locality. *Cyrena* Beds of east bank of Bopladsdalen, opposite Muslingehjørnet.

Family **Corbulidae** Fleming.

Genus ?**CORBULA** Bruguière, 1797.

A doubtful and indeterminable specimen of a *Corbula*-like shell has a remote resemblance to *C. striatina* Deshayes from the Sables Inférieur of the Paris Basin.

Geological horizon and locality. *Coeloma* Beds of east bank of Bopladsdalen, opposite Muslingehjørnet.

Class GASTROPODA

Order ASPIDOBRANCHIATA

Suborder *Docoglossa.*

Family **Patellidae** Carpenter.

Genus **ACMAEA** Eschscholtz, 1830.

Acmaea actina Woodring var. *elevata* nov.

(Plate C, figs. 7—8)

The new variety is represented by one complete specimen measuring 19 mm in length and 13 mm at the greatest breadth. The aperture is oval, the apex lies at about the anterior third of the length and leans slightly anteriorly. The shell is higher than the type of the species but the ornamentation is nearly the same, being composed of wide radial ribs alternating with one, or more, narrower ribs crossed by fine, closely spaced, concentric striations. The radial ornament is more prominent

on the posterior part of the shell and on the whole is more distinct than in *A. actina.*

Holotype. MMC: 7441.

Paratype. MMC: 7442.

Remarks. *Acmaea actina* (WOODRING, 1928, p. 458, pl. 40, figs. 8—12) comes from the Miocene rocks of Bowden in Jamaica and it bears a similarity to *A. antillarum* (Sowerby) which is still living in West Indian seas.

Geological horizon and locality. *Chlamys* Beds of Muslingehjørnet.

Order PECTINIBRANCHIATA

Family **Aporrhaidae** Philippi.

Genus **APORRHAIS** Da Costa, 1778.

Aporrhais speciosa (Schlotheim)

1820 *Strombites speciosus* Schlotheim, p. 155.
1854 *Aporrhais speciosa* Beyrich, p. 170, pl. 11, figs. 1—6.
1904 *Aporrhais speciosa* Ravn, p. 112, pl. iv, figs. 4—5.
1913 *Aporrhais speciosa* Harder, p. 74, pl. 6, figs. 1—2.
1933 *Aporrhais speciosa* Ravn, p. 12.
1940 *Chenopus speciosus* Sorgenfrei, p. 37, pl. v, fig. 12.

Several specimens of this ubiquitous Tertiary species have been recovered from the *Coeloma* Beds. The species ranges from the Eocene to the Miocene and has been recorded by RAVN from both the *Cyrena* and the *Coeloma* Beds at Kap Dalton.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen.

Family **Fusidae** Tryon.

Genus **FUSUS** Lamarck, 1801.

Fusus sp.

(Plate C, fig. 9)

An internal cast of a specimen from the *Cyrena* Beds most probably belongs to an unidentified species described by RAVN (1904, p. 114) from the *Cyrena* Beds of Kap Dalton (MMC: 7443).

Geological horizon and locality. *Cyrena* Beds of Krabbedalen.

CRUSTACEA

Class MALACOSTRACA

Order DECAPODA

Family **Carcinoplacidae** Ortmann.

Genus **COELOMA** Milne-Edwards, 1865.

Coeloma bicarinatum Ravn

(Plates D, fig. 5, and E, figs. 1—3)

1904 *Coeloma bicarinatum* Ravn, p. 120, pl. iv, fig. 6 and pl. v, figs. 1—6.
1933 *Coeloma bicarinatum* Ravn, p. 14.

In the rich collection from Kap Brewster the author has noticed moderately sculptured individuals which recall the closely related Danish Miocene form *Coeloma incarinatum* (Sorgenfrei, 1940, p. 61, pl. vii, figs. 1—3 & pl. viii, figs. 1—3); other individuals are comparatively laevigate but the keels on the metabranchial lobes are much less defined than in Ravn's figures of the type of *C. bicarinatum*.

Geological horizon and locality. *Coeloma* Beds of Krabbedalen (MMC: 7444—7447).

Synoptical and Analytical Table of

I) Neogene or Kap Brewster

Names of fossils	Cyrena Beds	Coeloma Beds	Chlamys Beds			Regional distribution			
			b	c	Scree	Kap Dalton		Den-mark	Ger-many
						Cyrena	Coeloma		
Miliola sp.	..	..	..	..	+	..	..	..	..
Hemipatagus sp.	..	..	+	..	..	..	..	..	..
Terebratulina sp.	..	..	..	+	+	..	..	P	P
Terebratula cf. *grandis* Blumenbach	?	..	+	..	+	..	..	..	M, P
Paphia sp.	..	..	..	+	..	..	..	..	..
Perna cf. *maxillata* Lamarck	..	..	+	..	..	..	..	..	M
Chlamys (*Aequipecten*) *scabrella* (Lamarck)	..	..	..	+	..	..	..	..	M
Chlamys (*Placopecten*) *princeps* var. *priori* nov.	..	..	+	..	+	..	..	..	..
Chlamys (*Placopecten*) sp.	..	..	..	+	..	..	..	..	..
Chlamys (*Plagioctenium*) cf. *diprosopa* (Fontannes)	..	..	+	+	+	..	..	..	..
Chlamys (*Pseudamussium*) cf. *cornea* (Sowerby)	..	..	..	..	+	..	+	..	O
Chlamys sp. Ravn	..	..	+	..	..	+	..	..	..
Pecten pseudo-solarium sp. nov.	..	..	+	..	..	..	..	..	..
Plicatula sp.	..	..	+	..	..	..	..	..	..
Ostrea cf. *submissa* Dsehayes	..	..	..	..	+	..	..	..	..
Mytilus brewsterensis sp. nov.	..	..	+	..	+	..	..	..	..
Volsella sp.	..	..	+	..	..	..	..	..	
Acmaea actina var. *elevata* nov.	..	..	..	..	+	..	..	..	..

Explanation of symbols:

E = Eocene, lE = Lower Eocene, mE = Middle Eocene & uE = Upper Eocene.
O = Oligocene, M = Miocene, P = Pliocene.

the Tertiary Faunas at Kap Brewster.

Series (see page 8).

of identical or related species					Names of related species	Remarks
Belgium	Switzerland	France	England	Western Atlantic		
..	..	mE	..	..		
..	..	..	..	m&uE,O	*H. argatus & rostratus* Clark	
P	..	P	P	..	*T. caput-serpentis* Linnaeus	*T. caput-serpentis* common on many Recent shores
M, P	..	..	P	..		
..	..	..	P	..	*P. habilis* (Wood) & *P. texturata* (Lamarck)	*P. texturata* common on many Recent shores
..	..	..	..	..		
M	M	M	P	..		Miocene of Mediterranean Basin. World-wide distribution in the late Neogene
P	..	..	P	..	*C. (P.) princeps* (Sowerby)	
..	..	..	..	M	*C. (P.) virginianus* (Conrad)	
M	..	M	..	..	*C. (P.) diprosopa & C. scabriuscula* (Lam.)	
..	..	mE	E–O	..		
M	M	..	..	..	*C. fasciculata* (Millet)	
..	M	..	..	..	*P. solarium* Lamarck.	*P. vaughani* var. *flabellum* Cooke is a related form from the Oligocene of Cuba
..	..	mE	..	..		
..	..	..	..	..		
..	..	..	P	..	*M. edulis* var. *giganteus* Wood	*M. affinis* Sowerby is a related species from the Eocene of England & West Europe
..	..	..	P	..	*V. modiola & V. barbata* Linnaeus	The related species are still living on many Recent shores
..	..	..	..	M		

II) Palaeogene or Kap

	Cyrena Beds					Coeloma Beds	Regional distribution			
	a	b	c	d	e		Kap Dalton Cyrena	Kap Dalton Coeloma	Spitzbergen	Denmark
?*Turbinolia* sp.	..	..	..	..	..	+	..	..	..	..
Terebratula sp.	..	..	..	?	..	..	..	..	..	..
Nucula brewsterensis sp. nov.	..	+	..	..	..	+	..	..	..	..
Nucula laevigata Sowerby	..	..	..	..	..	+	..	..	..	..
Nucula subtransversa Nyst	..	..	..	..	..	+	..	..	..	..
Lucina sp.	..	+	..	..	..	..	..	..	..	..
Astarte cf. *omalii* Delajonkaire	..	..	..	..	+	..	..	..	..	M
Cyrena cf. *gravesi* Deshayes	..	+	..	..	..	..	+	..	..	..
Cyrena difficilis Deshayes	..	..	..	..	+	..	..	..	..	..
Corbicula altissima (Ravn)	..	..	..	+	..	..	..	..	E	..
Corbicula cf. *britannica* (Wood)	+	+	..	..	..	..	..	..	..	..
Cyprina prae-rustica sp. nov.	..	..	..	..	..	+	..	..	..	..
Paphia cf. *parisiensis*(Deshayes)	+	..	..	..	..	..	..	..	..	..
Macrocallista proxima (Deshayes)	+	+	..	+	+	..	..	..	..	..
Macrocallista fallax (Deshayes)	..	+	..	..	..	..	..	..	..	..
Psammobia cf. *plana* (Deshayes)	..	..	..	..	..	+	?	..	..	..
Pectunculus sp.	+	..	..	..	..	..	..	..	..	..
Anomia sp.	..	..	..	..	..	+	..	..	..	..
Chlamys (*Propeamussium*) *squamula* var. *groenlandica* nov.	..	..	..	..	..	+	..	..	..	..
Mytilus affinis Sowerby	..	..	..	+	..	..	+	..	..	..
Thracia sp.	..	..	..	..	..	+	..	..	..	M
Panopaea intermedia Sowerby	..	+	..	..	..	..	..	..	..	..
?*Corbula* sp.	..	..	+	..	..	..	..	..	..	..
Aporrhais speciosa (Schlotheim)	..	..	..	..	..	+	..	+	..	E–M
Fusus sp.	..	..	..	..	+	..	+	..	..	..
Coeloma bicarinatum Ravn	..	..	..	..	..	+	..	+	..	M

Dalton Series (see page 9).

of identical or related species					Names of related species	Remarks.
Germany	Belgium	France	England	Western Atlantic		
..	..	..	..	..		
..	..	..	? P	..		
..	..	..	mE	..	*N. consors* Wood	
P	P	..	P	..		
..	E	E	E	..		
..	..	..	P	..	*Lucina* of the group *borealis*	Related species in Pleistocene and Recent deposits
P	..	P	P	M		
..	..	lE	..	..		
..	..	lE	..	..		
..	..	..	..	..		
..	..	mE	mE	..		
P	..	P	P	..	*C. rustica* var. *tumida* Wood	
..	..	mE	..	..		
..	..	lE	..	..		
..	..	lE	..	..		
..	..	O	..	..		
..	..	lE	..	..		
..	..	..	mE	..	*A. scabrosa* Wood	
..	..	mE	mE	mE	*Ch. (P.) squamula* (Lamarck)	Related form known also from the Cretaceous of Westphalia
..	..	..	uE	..		
..	..	..	P	..	*T. ventricosa* & *T. pubescens*	
E	..	mE	m&lE	..		
..	..	?lE	..	..		
E–M	..	E–M	..	..		
..	..	..	..	..		
..	..	uE	..	..		

V. DISCUSSION AND SUMMARY

The discovery at Kap Brewster of new outcrops of Tertiary strata is of particular interest in view of the greater variety of fossils that has been obtained here as compared with the fauna recorded farther south at Kap Dalton. The main part of the succession, which immediately follows the Plateau Basalts, is in all probability contemporaneous with the sediments at Kap Dalton despite the fact that only a few fossils were found to be common to both localities. Nevertheless, these fossils are sufficiently reliable stratigraphically to justify a correlation of the rocks at the two localities, and furthermore there is not only a striking similarity in lithology and facies but the rocks occupy a corresponding position in direct succession to the Plateau Basalts.

RAVN (1904, p. 123) held the view that the *Coeloma* Beds are older than the *Cyrena* Beds and his arguments were founded on the palaeontological data then available to him. Detailed mapping carried out by WAGER at Kap Dalton has shown that this is not a correct interpretation and RAVN (1933, p. 5) has subsequently adjusted his conclusion. He contended, nevertheless, that the *Cyrena* and the *Coeloma* Beds still "cannot differ much with regard to age," an opinion shared by WAGER. Consequently, RAVN tended to treat the whole of the Kap Dalton fauna collectively and favoured a Lower to Middle Eocene age.

Stratigraphical and faunal investigations of the *Cyrena* and the *Coeloma* Beds at Kap Brewster have supported WAGER's findings at Kap Dalton, the *Cyrena* Beds certainly being the older. The faunal analyses indicate, however, a late rather than an early Eocene age for the *Cyrena* Beds, and a later Palaeogene age, probably Lower Oligocene, for the *Coeloma* Beds.

If the faunal list of the *Cyrena* Beds from Kap Brewster be analysed (see table, p. 36) we find that out of 16 species there are

(a) 11 species identical or closely related to known Eocene species, there being nearly as many from early as from late Eocene,

(b) 2 species identical or closely related to known Neogene species, one

being allied to a Pliocene species and the other to a species ranging from the Miocene to Pliocene and

(c) 3 forms with no certain specific relations.

The following fossils were recorded by RAVN from the *Cyrena* Beds at Kap Dalton but were not found in Kap Brewster; *Astarte* cf. *tenera*, of the Upper Palaeocene and the Lower Eocene of England; *Cryptodon* cf. *unicarinatum*, of the Oligocene of Belgium and Germany; *Chlamys* sp. Ravn (cf. *Ch. facsiculata*) of the Miocene of Belgium and Switzerland; *Tellina* sp., *Erycina* sp., *Donax* sp., and *Psammobia* sp.; *Aporrhais speciosa*, of the Eocene to Miocene of several places in Europe; *Glandina* sp. Ravn (cf. *G. costellata*), of the Eocene of England and *Fusus* sp. If these forms are also included in the fauna of the *Cyrena* Beds, the affinities of the 26 species are

(a) 13 species identical or closely related to known Eocene species,
(b) 1 species closely related to a known Oligocene species,
(c) 1 species ranging from the Eocene to the Miocene,
(d) 3 species identical or closely related to known Neogene species, and
(e) 8 species with no certain specific relation.

These results substantiate the determination of a late, rather than an early, Eocene age for the *Cyrena* Beds.

The list of species from the *Coeloma* Beds at Kap Brewster (see table, p. 36) provides out of 11 species

(a) 4 species identical or closely related to known Eocene species,
(b) 1 species identical with known Oligocene species,
(c) 2 species ranging from the Eocene to Miocene,
(d) 3 species identical or closely related to known Neogene species, and
(e) 1 species with no certain specific relations.

The following additional species were recorded from the *Coeloma* Beds of Kap Dalton but have not been found at Kap Brewster: bryozoan; *Nucula similis*, of the Eocene of England; *Cryptodon* cf. *unicarinatum*, of the Oligocene of Belgium and Germany; *Chlamys* cf. *cornea*, ranging from the Eocene to the Oligocene in England, Germany and Spitzbergen; *Modiola* cf. *simplex*, of the Eocene of England; *Cyprina* sp.; *Homarus groenlandicus* similar to a Lower Eocene form of England. The complete list from the *Coeloma* Beds of Kap Dalton and Kap Brewster shows that out of 18 species there are

(a) 7 species identical or closely related to known Eocene forms,
(b) 2 species identical or closely related to known Oligocene forms,
(c) 1 species closely related to a species ranging from the Eocene to the Oligocene,

(d) 2 species identical or closely related to species ranging from the Eocene to the Miocene,
(e) 3 species identical or closely related to known Neogene forms,
(f) 3 species with no certain specific relations.

These results indicate a probable Oligocene age for the *Coeloma* Beds.

A reasonable deduction to make from the foregoing analyses is that the *Cyrena* Beds are to be correlated with the middle to late Eocene, succeeded by the *Coeloma* Beds which probably range into the Oligocene.

The remaining part of the faunas discovered at Kap Brewster are unknown elsewhere in Greenland and are here named the *Chlamys* Beds. Unfortunately, the stratigraphical relationships of the *Chlamys* Beds to the Kap Dalton series are unknown. For the time being it is necessary to rely principally on the palaeontology in order to arrive at a conclusion with regard to their probable age. Fortunately some of the fossils found are stratigraphically characteristic and well-known. The fauna consists of eighteen species, of which only *Chlamys* (*Pseudamussium*) cf. *cornea* and *Chlamys* sp. Ravn (1933) are common, and there is doubt with regard to their correct identification. A consideration of the accompanying table (page 34) shows that out of 18 species there are

(a) 4 species identical or closely related to species from Palaeogene,
(b) 6 species identical or closely related to species from Miocene,
(c) 2 species identical or closely related to species ranging from Miocene to Pliocene and
(d) 4 species identical or closely related to species from Pliocene or Pliocene and later sediments.

These results point to a Neogene age, most probably Miocene, for the *Chlamys* Beds at Kap Brewster, but it should be realised that this conclusion is tentative until it is supported or repudiated by further field evidence.

Our present state of knowledge concerning the stratigraphy and palaeontology of the Tertiary deposits of East Greenland, shows that there are two sedimentary series overlying the Plateau Basalts; one was deposited during the Palaeogene and can be subdivided into the *Cyrena* Beds succeeded by the *Coeloma* Beds, and the other, the *Chlamys* Beds, was laid down during the Neogene. The faunal assemblages from the three horizons bear closer relationships with the Old World arctic and boreal faunas than with those known from corresponding transatlantic provinces.

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PLATES

Plate A.

Fig. 1. *Hemipatagus* sp., apical view; *Chlamys* Beds, Muslingehjornet. MMC: 7408. × 1,5.

Figs. 2—8. *Terebratula* cf. *grandis* Blumenbach; *Chlamys* Beds, Muslingehjornet.

Fig. 2. Ventral valve. MMC: 7409. × 1.

Fig. 3. Anterior margin of ventral valve, showing the plication composed of a central ridge and one sinus on each side. MMC: 7410. × 1.

Fig. 4. Dorsal valve and pedicle foramen. MMC: 7411. × 1.

Fig. 5. Pedicle foramen, the delthyrium, and teeth. MMC: 7412. × 1.

Fig. 6. Ventral valve. MMC: 7413. × 1.

Fig. 7. Umbo and pedicle foramen. MMC: 7414. × 1.

Fig. 8 Dorsal valve with shell preserved only at umbo, and pedicle foramen. MMC: × 1.

Figs. 9—10. *Nucula brewsterensis* sp. nov.

Fig. 9. Side view of right valve showing ornamentation. *Coeloma* Beds, east bank of Bopladsdalen, opposite Muslingehjornet. Holotype. MMC: 7416. × 3.

Fig. 10. Side view of the interior of the left valve showing ornamentation and the narrow anterior laevigate area. *Coeloma* Beds, Krabbedalen. Paratype. MMC: 7417. × 1.

Fig. 11. *Nucula laevigata* Sowerby, side view of left valve; *Coeloma* Beds, Krabbedalen. MMC: × 1. 7418a.

Fig. 12. *Nucula subtransversa* Nyst, side of right valve; *Coeloma* Beds, Krabbedalen. MMC: 7419. × 1.

Fig. 13. *Astarte* cf. *omalii* Delajonkaire, side view of left valve; *Coeloma* Beds, Krabbedalen. MMC: 7420. × 2.

Fig. 14. *Paphia* sp., side view of left valve showing the characteristic strong and anastomosing concentric ornamention; *Chlamys* Beds, Muslingehjornet. MMC: 7424. × 2.

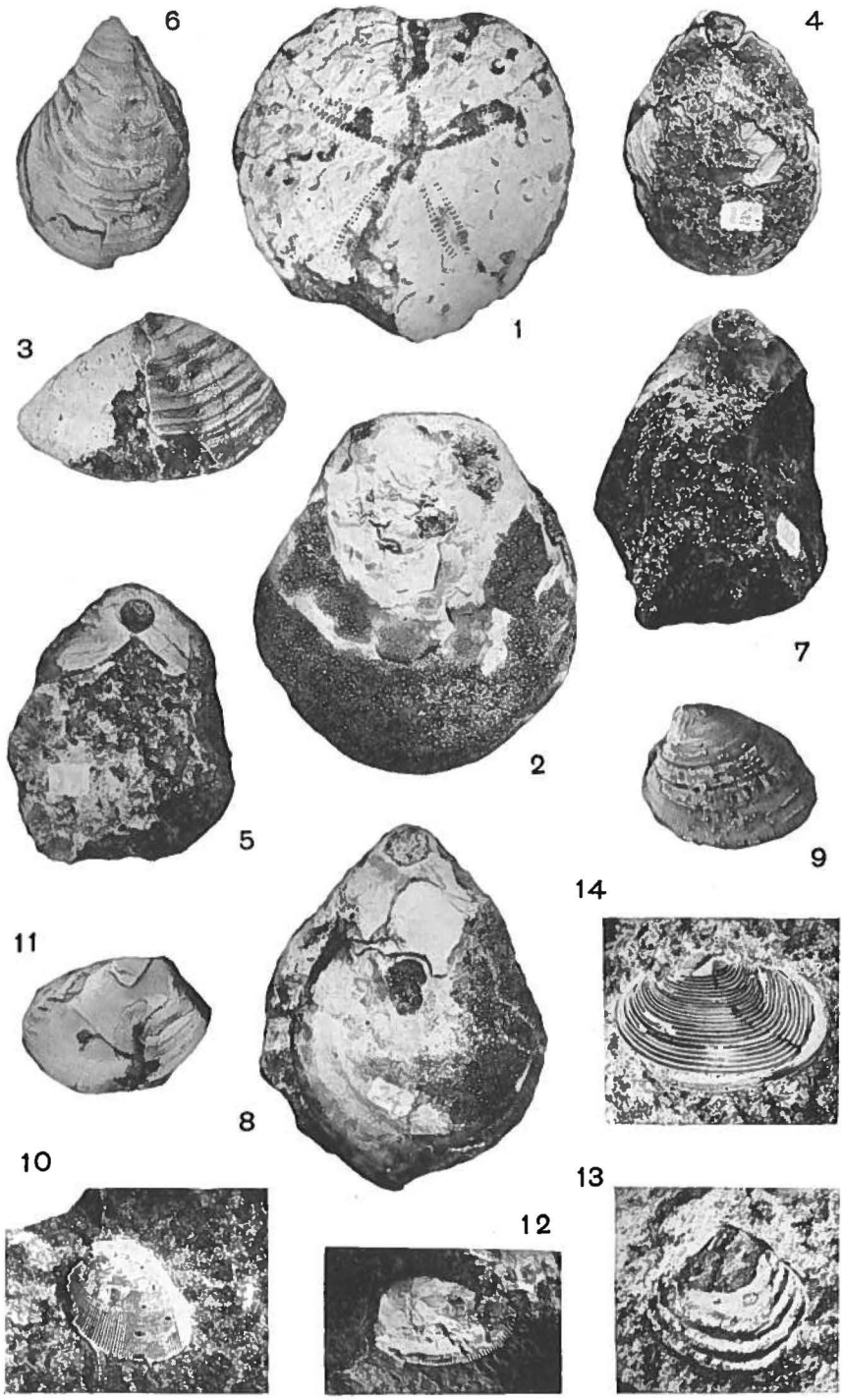


Photo: E. W. Seavill.

Plate B.

Fig. 1. *Corbicula altissima* (Ravn), showing the typical median ridge, teeth and muscle-scars; *Cyrena* Beds, south of Muslingehjornet. MMC: 7421. × 1,5.

Figs. 2—3. *Cyprina prae-rustica* sp. nov.; *Coeloma* Beds, Krabbedalen.

Fig. 2. Side view of left valve showing fine radial ornament. Holotype. MMC: 7422. × 1.

Fig. 3. Top view of same specimen showing umbones and traces of cardinal teeth. × 1.

Fig. 4. *Paphia* cf. *parisiensis* (Deshayes); *Cyrena* Beds, south of Muslingehjornet. MMC: 7423. × 1.

Fig. 5. *Macrocallista proxima* (Deshayes) showing shape and impression of teeth; *Cyrena* Beds, east bank of Bopladsdalen opposite Muslingehjornet. MMC: 7425. × 2.

Fig. 6. *Psammobia* cf. *plana* (Deshayes); *Coeloma* Beds, Krabbedalen. MMC: 7426. × 1.

Fig. 7. *Chlamys* (*Aequipecten*) *scabrella* (Lamarck), external mould showing characteristic ornamentation; *Chlamys* Beds, Muslingehjornet. MMC: 7427. × 3.

Figs. 8—9. *Chlamys* (*Placopecten*) *princeps* (Sowerby) var. *priori* nov; *Chlamys* Beds. Muslingehjornet.

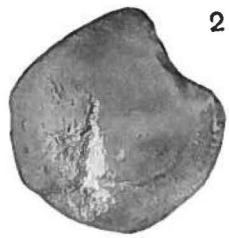
Fig. 8. Holotype. MMC: 7428. × 1,5.

Fig. 9. Paratype. MMC: 7429. × 2.

Fig. 10. *Chlamys* (*Placopecten*) sp., external mould; *Chlamys* Beds, Muslingehjornet. MMC: 7430. × 3.

Fig. 11. *Chlamys* (*Propeamussium*) *squamula* (Lamarck) var. *groenlandica* nov., showing internal ornament of left valve and of the ears; *Coeloma* Beds, Krabbedalen. Holotype. MMC: 7435. × 2.

1



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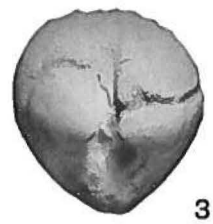

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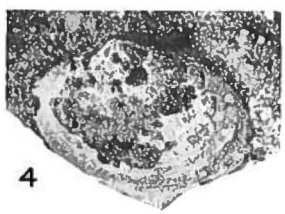

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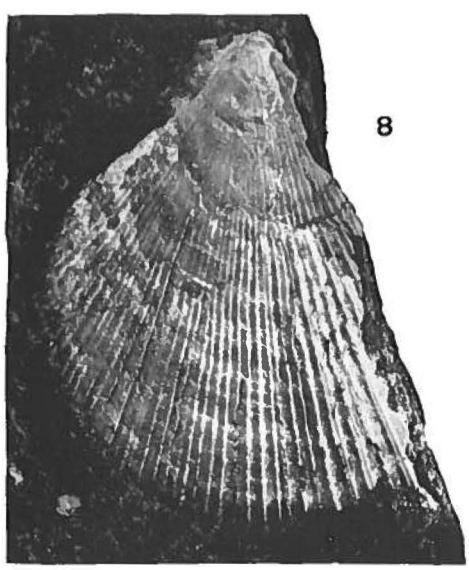

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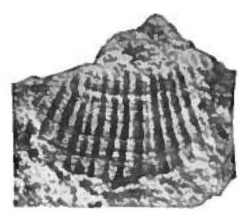

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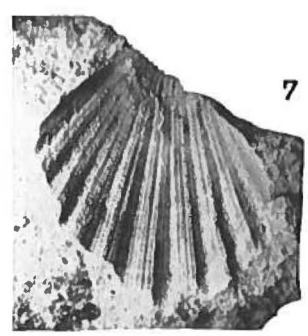

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Photo: E. W. Seavill.

Plate C.

Figs. 1—3. *Chlamys* (*Plagioctenium*) cf. *diprosopa* (Fontannes); *Chlamys* Beds, Muslingehjørnet.

Fig. 1. View showing strong primary ribs, some of the smaller secondary ribs, and parts of the shell carrying the fine decussate ornament. MMC: 7431. × 1,5.

Fig. 2. Internal cast. MMC: 7432. × 1.

Fig. 3. Internal cast showing the secondary ribs beginning near the umbo. MMC: 7433. × 2.

Fig. 4. *Chlamys* (*Pseudamussium*) cf. *cornea* (Sowerby); *Chlamys* Beds, Muslingehjørnet. MMC: 7434. × 1.

Figs. 5—6. *Pecten pseudo-solarium* sp. nov.; *Chlamys* Beds, Muslingehjørnet.

Fig. 5. View of right valve showing ornament. Holotype. MMC: 7436. × 1,5.

Fig. 6. Paratype. MMC: 7437. × 1.

Figs. 7—8. *Acmaea actina* Woodring var. *elevata* nov., *Chlamys* Beds, Muslingehjørnet.

Fig. 7. View showing ornament and position of apex. Holotype. MMC: 7441. × 2.

Fig. 8. Paratype. MMC: 7442. × 1.

Fig. 9. *Fusus* sp.; *Coeloma* Beds, Krabbedalen. MMC: 7443. × 1,5.

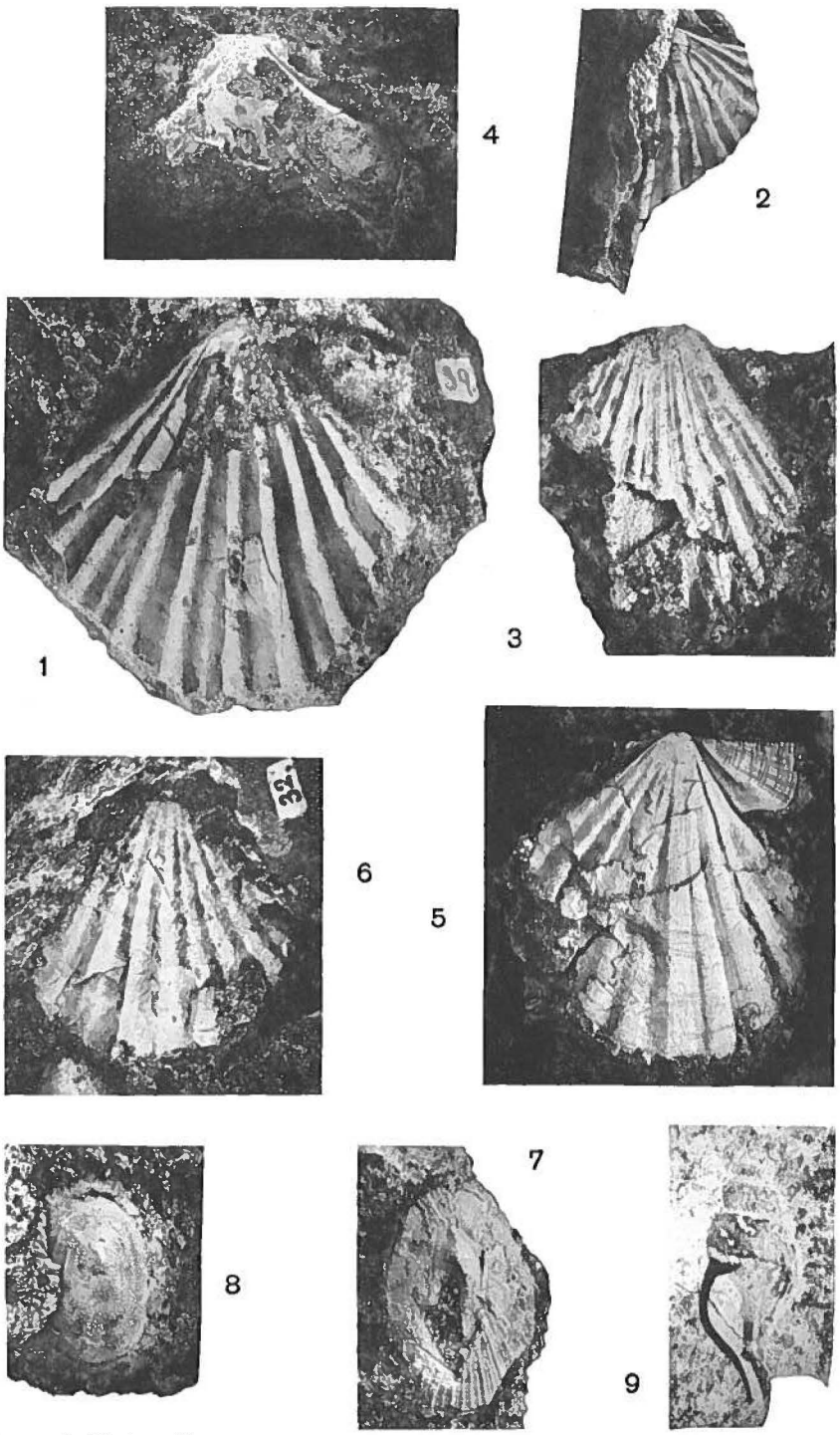


Photo: E. W. Seavill.

Plate D.

Figs. 1—2. *Mytilus brewsterensis* sp. nov., *Chlamys* Beds, Muslingehjørnet.

Fig. 1. Holotype. MMC: 7438. × 1.

Fig. 2. Paratype. MMC: 7439. × 1.

Figs. 3—4. *Panopaea intermedia* (Sowerby); *Cyrena* Beds, east bank of Bopladsdalen opposite Muslingehjørnet.

Fig. 3. Side view showing general shape, muscle scars, pallial line and sinus. MMC: 7440. × 1.

Fig. 4. Top view of same specimen showing impressions of teeth and hinge line. × 1.

Fig. 5. *Coeloma bicarinatum* Ravn; *Coeloma* Beds, Krabbedalen. MMC: 7445. × 1.

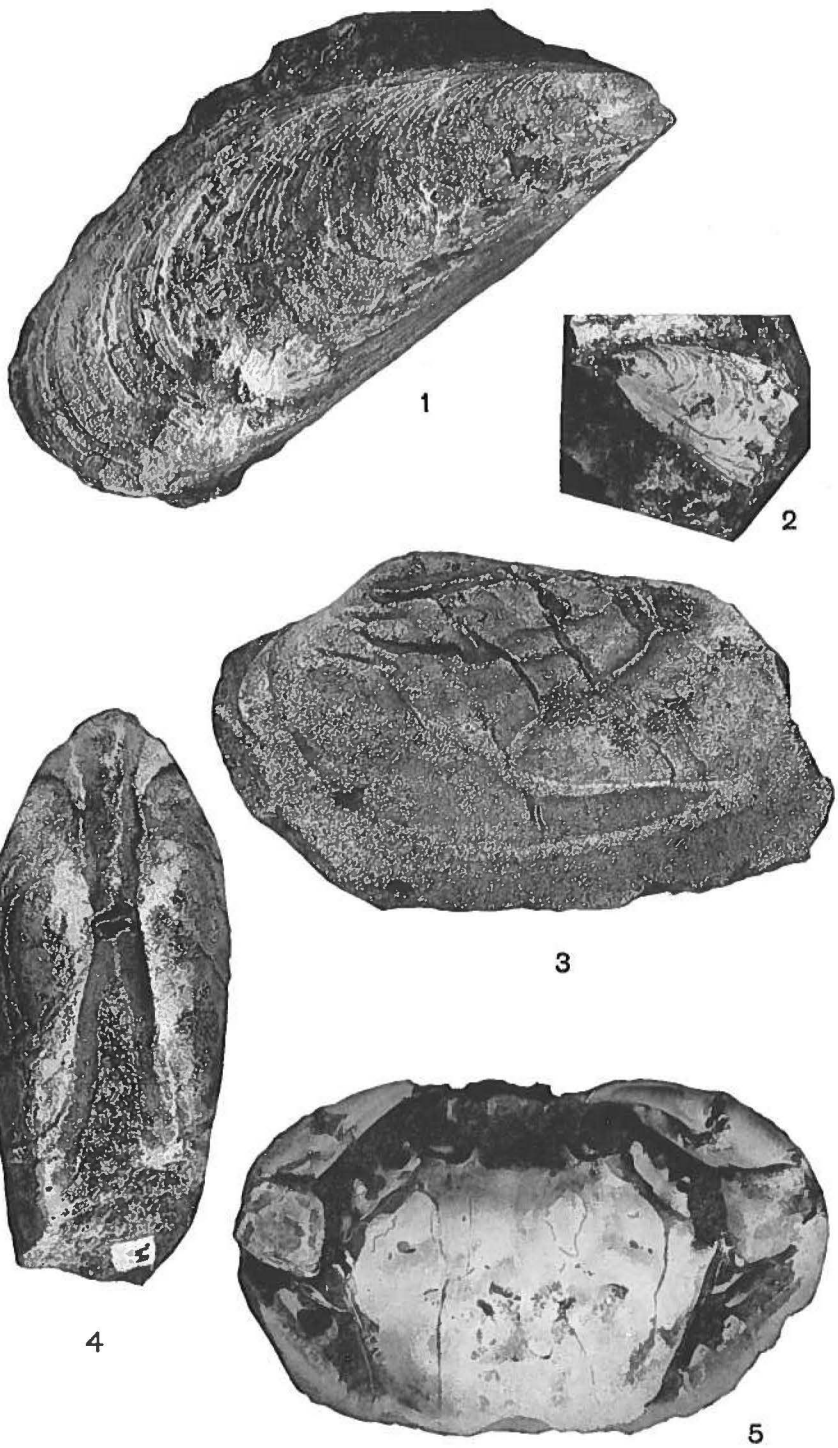
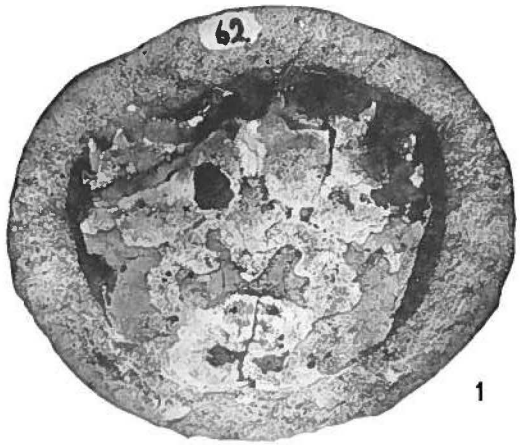


Photo: E. W. Seavill.

Plate E.

Figs. 1—3. *Coeloma bicarinatum* Ravn; *Coeloma* Beds, Krabbedalen.

Fig. 1. MMC: 7444. × 1.
Fig. 2. MMC: 7446. × 1.
Fig. 3. MMC: 7447. × 1.



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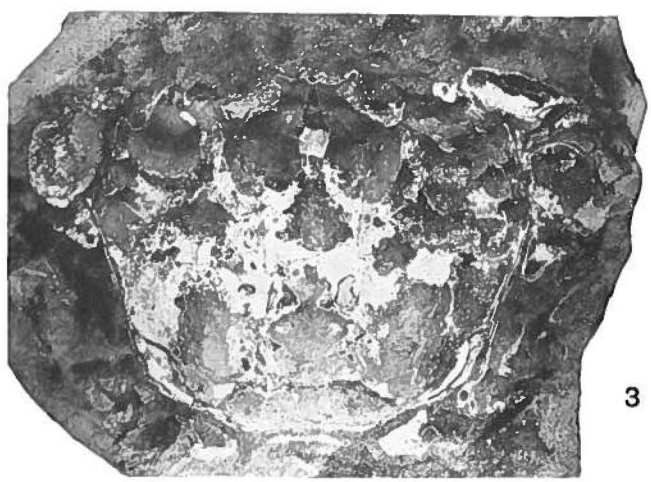

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Photo: E. W. Seavill.