Ravn, Jesper Peter Johansen
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FROM

NORTH-EAST GREENLAND

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J. P. J. RAVN

WITH 7 PLATES

REPRINTED FROM »MEDDELELSER OM GRØNLAND« VOL. XLV
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I. Introduction.

One of the results of the Danmark Expedition has been a very considerable and important extension of our knowledge with regard to the marine, Jurassic and Cretaceous deposits of East Greenland and thus of the Arctic zone as a whole. The Expedition brought home a very complete material of these deposits, from regions whose geological structure had hitherto been quite unknown or only very imperfectly studied. This material was intrusted to me for investigation by the Committee for the Danmark Expedition, and as it proved to have come from deposits which were almost all younger than the Jurassic deposits investigated by the Danish expeditions of 1891—92 and 1900, in regions of East Greenland somewhat further south, and as no material for comparison existed in Copenhagen, the Committee voted me the necessary funds for a journey to Munich. Here Professor Rothpletz with the greatest willingness permitted me to use the rich collections of the Palæontological Museum there for comparison, and I would express my best thanks to him here for this permission. — On the return journey from Munich I made a short stay at Göttingen, where the well-known expert on the Jurassic deposits of the Arctic regions, Professor Pompeckj, was so kind as to look through a part of my material, especially the Ammonites. For the suggestions and information Prof. Pompeckj gave me on this occasion I am extremely indebted to him. As, further, a number of species occurred in the material, which had earlier been described by Tullberg and Lundgren from the Jurassic deposits of Nova Zembla and Spitzbergen, I desired to compare my material with theirs and journeyed to Stockholm on my return from Germany. For the friendly permission given me there to make the comparison, it is a pleasant duty to tender my best thanks to Professor G. Holm, the Director of the Zoopalæontological Department of the Riksmuseum.

II. Earlier investigations.

The Jurassic deposits in East Greenland were discovered for the first time by W. Scoresby (jun.) when he was exploring parts of Jameson's Land in 1822. He gives a brief description of the rocks found here (in Neill's Cliffs) and of the stratigraphical features, a description that was supplemented by Jameson. Both of these observers, however, made the mistake of referring these deposits to the Carboniferous system; later investigations have shown that they belong partly to the Rhaetic, partly to the Jurassic. On the Danish expedition to East Greenland in 1891—92 E. Bay and N. E. K. Hartz were able to make more detailled investigations on Jameson's Land and brought home a very considerable material of fossils. The Rhaetic layers proved to contain only plant fossils, which were described by Hartz[1], whilst the animal fossils of the upper layers were studied and described by B. Lundgren[2], who referred the fauna to the Callovian period and states, that the Brachiopods and Bivalves give the fauna a middle-European character. The Cephalopods were unfortunately so badly preserved, that no results could be obtained from them. Regarding this fauna Pompeckj[3] states later, that it possibly contains species from older zones, besides those of the Callovian. — Our knowledge of the Jurassic deposits of Jameson's Land was further extended by the Swedish expedition under the direction of A. G. Nathorst, which investigated the deposits occurring on the east side at Hurry's Inlet. Deposits were also found on the southwest side of Davy's Sound, which according to Nathorst must be referred to the Jurassic[4]. During a later Danish expedition to East Greenland (under the direction of Amdrup and Hartz) the Jurassic deposits on Jameson's Land were again examined in the year 1900. A large material of fossils was brought home, both from the coastal region and from the interior, among other things a quantity of Ammonites which O. Nordenskjöld and H. Deichmann had found in the interior of Jameson's Land. The material was examined and described by V. Madsen, who shows, that Jurassic deposits of different age

[1] N. Hartz: Planteforsteninger fra Cap Stewart i Østgrønland, med en historisk Oversigt. — Medd. om Grønland. 19. Hefte. Kbhvn. 1896.

[2] B. Lundgren: Anmärkningar om några Jurafossil från Kap Stewart i Ost-Grönland. — Medd. om Grønland. 19. Hefte. Kbhvn. 1895.

[3] J. F. Pompeckj: The Jurassic Fauna of Cape Flora, Franz Josef Land, p. 137. — The Norwegian North Polar Expedition 1893—96. Scientific Results. Vol. I. London, Christiania etc. 1900.

[4] A. G. Nathorst: Bidrag till nordöstra Grönlands geologi, p. 298. — Geolog. Föreningens i Stockholm Förhandl. Bd. 23. Stockholm 1901.

occur in this region[1]. The oldest of them must from their fauna be referred to the Dogger, the younger to the Lower Callovian and the youngest to the Lower Volgian (Middle Portlandian).

Jurassic deposits had already been found by that time, however, in the regions further north. On the second German North Pole Expedition (1869—70) investigations were made on Kuhn Island among others, and resulted according to Toula and Lenz[2] in the discovery on the south coast of a brownish, fine-grained, calcareous sandstone, which contained flakes of mica and enclosed coal-layers. In this sandstone were found a number of shells and imprints of various Bivalves. A coarse-grained, fossiliferous sandstone also occurred here. Toula states, that these deposits probably belong to the middle Dogger. A light-gray, very calcareous marl and fine-grained, micaceous sandstone were found on the east side of the same island[3]. As these deposits contained *Aucella* and others, Toula draws a parallel between them and the *Aucella*-layers in Russia (Younger Jurassic and Older Cretaceous). A. P. Pavlow has shown later, that the *Aucellae* to judge from Toula's figures would indicate the presence of the uppermost zone of the Lower Neocomian (and perhaps the Middle Neocomian)[4]. In addition to these *Aucellae* of the Cretaceous however, Toula also mentions, among others, *Belemnites Panderianus* d'Orb. from this locality. If this determination does not rest on a confusion with another species, then older layers must obviously also occur here, as this Belemnite is distributed in Russia from the zone with *Quenstedtoceras Lamberti* to the zone with *Cardioceras alternans*.

The German expedition also found Jurassic deposits at another locality and that over a very extensive region, namely the whole of Hochstetter's Foreland from the south point up towards Cape Seebach. Owing to the very bad state of preservation of the fossils, however, these deposits were misinterpreted and referred — with some doubt — to the Tertiary system (Miocene). The deposits consist mainly of yellowish, in part brick-coloured, fine-grained sandstone with

[1] Victor Madsen: On Jurassic Fossils from East-Greenland. — Medd. om Grønland. 29. Hefte. Kjbhvn. 1904.

[2] Franz Toula: Allgemeine Uebersicht der geologischen Beschaffenheit Ostgrönlands, p. 478. — Die zweite deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän Karl Koldewey. Bd. II. Leipzig 1874.
Oskar Lenz: Specielle Darstellung der geologischen Verhältnisse Ostgrönlands, p. 505. — Ibidem.

[3] Toula: l. c. p. 491.
Lenz: l. c. p. 497.

[4] A. P. Pavlow: Enchaînement des aucelles et aucellines du Crétacé russe, p. 80. — Nouv. Mém. Société imp. des naturalistes de Moscou. Tome 17, Livr. 1. Moscou 1907.

numerous casts and imprints hardly determinable to genus and species, which were referred by Toula to the genera *Lucina*, *Cytherea* and *Venus*[1]. Th. Fuchs, who later undertook a renewed investigation of the material, added here two other genera, namely *Astarte* and *Pecten*[2]. He also came to the result, that the fauna might probably be Miocene. As we shall see later, this determination of the age is incorrect, as the Danmark Expedition discovered fossils in the yellowish, sometimes brick-red sandstone on Hochstetter's Foreland, which quite definitely belong to the youngest Jurassic (Malm).

The sedimentary deposits discovered by the 2nd German North Pole Expedition at Flache Bay were also referred by Toula and Lenz[3] to the Tertiary system. Nathorst, who also investigated this part of East Greenland on his 1899 expedition, expressed some doubts as to the correctness of this determination of the age, various conditions seeming to him to suggest the Jurassic — at least for a portion of the sediments. Future investigations must decide this question.

I have thus given quite a brief summary of what has hitherto been known regarding the mesozoic deposits with marine fauna in East Greenland; in the sequel I shall discuss the results of my investigation of the material brought home by the Danmark Expedition from these deposits.

III. The marine, mesozoic deposits investigated by the Danmark Expedition.

1. Stratigraphical conditions.

As already mentioned above, the Danmark Expedition found Jurassic deposits on Hochstetter's Foreland, deposits that had hitherto been erroneously referred to the Tertiary system. The principal collections of mesozoic, marine fossils were made, however, on Store Koldewey Island; not only were fossiliferous Jurassic deposits of somewhat different age found there, but also — at one point — interesting Neocomian deposits with a fauna which is very nearly related to that on the east side of Kuhn Island. Mesozoic fossils were also found further north, in the district round Danmarks Havn, but only in boulders. These boulders are referable partly to the youngest Jurassic, partly to the oldest Cretaceous.

[1] Toula: l. c., p. 477 and 495.

[2] Th. Fuchs: Ueber die während der schwedischen geologischen Expedition nach Spitzbergen im Jahre 1882 gesammelten Tertiärconchylien, p. 5. — Bihang till K. Svenska Vet.-Akad.'s Handlingar, Bd. 8. Stockholm 1883.

[3] Toula: l. c., p. 477.
Lenz: l. c., p. 486.

Regarding the features of the deposits at the different localities I am only able to give a little information, for which my thanks are due to the geologist of the Expedition, HAKON JARNER. A more detailled description of these will be given later in the general part on the geology of North-East Greenland, which H. JARNER has under preparation.

The widest distribution is shown by the deposits mentioned on the east coast of Store Koldewey. The whole of the east coast of this island is formed, according to information from JARNER, of a plateau, which has a height of about 120 m. above the sea in the northern part of the island; towards the south the plateau sinks more and more. It is only in towards the middle of the island that we meet with the high hills of gneiss. Whether this plateau is an abrasion surface or has been formed in another way, I must leave uncertain. Uppermost we find Quaternary formations (moraine, *Yoldia*-clays) and below these the solid rock, which in the middle of the island is formed of sandstone interrupted at a couple of places by gneiss, so that we have 3 sandstone regions on the east coast, the northernmost being the largest and the middle one the smallest (see accompanying Chart, pl. XXXVIII). At the southernmost of the two gneiss points JARNER found the sandstone resting directly on the gneiss, and a few samples of the sandstone further north, which were brought home, contain pieces of gneiss. We thus have here a case of transgression.

In the following the different, marine, mesozoic deposits from North-East Greenland will be discussed, beginning with the oldest and ending with the youngest.

a. **Callovian.**

Deposits belonging to the Callovian were only found at one locality, namely, in the southernmost sandstone region on the east coast of Store Koldewey, down from "Trækpasset". A number of fossils were found here in a characteristic, brownish, fine-grained sandstone. The fossils were found mainly in pieces of sandstone which lay loose on the surface of the plateau, but the same sandstone formed a solid layer underground. The accompanying list of the fauna (p. 451) will show the species and genera of the fossils from this locality, which I have been able to determine. The principal are undoubtedly the 3 Ammonite species; although they all 3 probably belong to new species, there seems hardly any doubt that we have here a Callovian fauna, as they all appear to be most nearly related to Callovian species, and the other fossils do not seem in any way opposed to this determination of the age. It is interesting, that

representatives of the genera *Cosmoceras* and *Kepplerites* are found here for the first time in Arctic regions in Jurassic deposits; these give the fauna quite a characteristic appearance, recalling that of the West and Middle European Dogger. The genus *Quenstedtoceras* belongs on the other hand to the most typical of the Russian Callovian; yet its presence in the North-East Greenland Jurassic is not by any means certain, as the only specimen available is too imperfect to make a determination of the genus quite safe.

b. **Séquanian-Kimmeridgian.**

Deposits belonging to this series have not hitherto been discovered in Greenland. It is certain, as we shall see later, that the sandstone deposits found by the 2nd German North Pole Expedition on Hochstetter's Foreland must be referred to these layers, but as mentioned above a great error was made in determining the age of these deposits owing to imperfect material, as they were believed to belong to the Tertiary system. This mistake is excusable, as the fossils (almost exclusively casts of Bivalves) are very badly preserved, so that it is only in the fewest cases that the genus can be determined. The Danmark Expedition, however, succeeded in finding Ammonites in these deposits and, fortunately, Ammonites which are so characteristic that they can be determined with complete certainty. Deposits of the same age with a much better preserved fauna were also found by the Danmark Expedition at different parts of Store Koldewey, on which the two northernmost sandstone regions seem to belong to the Séquanian-Kimmeridgian. The different localities where deposits of this age have been found, may be quite briefly mentioned.

1. "Kløft I". This locality lies near the north end of the northern sandstone region on the east side of Store Koldewey. There is here a narrow ravine with steep walls. The north side of the ravine is covered by great masses of snow, which seem never to melt, whereas the south side, at least in summer, is free of snow. The wall of the ravine here is formed of sandstone layers, which lie approximately horizontal and are covered by moraine deposits. The sandstone is gray in colour, calcareous and contains a good deal of mica. It encloses the remains of a very rich fauna, unfortunately too often in a bad state of preservation. As is shown by the fauna list, 33 species are known from here, most of which however say nothing definite with regard to the age of the deposits. This applies especially to the numerous Lamellibranchs, which belong for the most part to species of little characterized form and appearance. Fortunately, however, we also find here 3 species of the genus *Aucella*, namely *A. kirghisensis*, *A. Bronni* and *A. Sinzovi*. The presence

of these 3 species alone shows, that we have here deposits which must be of the same age as the Alternans-strata in the Russian Jurassic and thus belong to the Séquanian-Kimmeridgian. This determination of the age is fully confirmed by the Cephalopods, which are found together with the *Aucellae*. Thus, we very frequently find *Cardioceras alternans*, the species which has given the Alternans-strata their name. Of doubtful occurrence, on the other hand, is *C. Nathorsti*, a species nearly related to *C. alternans* and described from deposits on Spitzbergen, which according to POMPECKJ[1] belong to the Séquanian-Kimmeridgian. Belemnites have also been found in "Kløft I", namely *B. Panderianus* and *B. breviaxis*. Both point in the same direction with regard to the age of the deposits, even though both are also said to occur in layers which are somewhat older than the Alternans-strata.

2. "Kløft II". Close to the south of "Kløft I" lies a second ravine of similar appearance and with quite similar sandstone. JARNER did not succeed in following the separate beds from the one ravine to the other; the layers show a tendency to thin out at the end and thus cannot be followed for any long distance. The sandstone in "Kløft II" contained portions with a very light colour and very glassy surfaces of fracture; the binding material between the sand-grains is formed here of large anhedra of calcite. It is probably some form of concretion. At this locality also a number of fossils, some of which occurred in "Kløft I", were found; for example, *Aucella Bronni* and *A. Sinzovi*. Further, we have *Macrodon Keyserlingi* from this locality, a species found in Europe in deposits that extend in age from the Middle Callovian to the Séquanian. Greater weight must be ascribed, however, to the occurrence of *Cardioceras Nathorsti*. It appears from the fauna, that the sandstone in "Kløft II" is almost of the same age as that in "Kløft I". Yet the faunas are somewhat different in the two ravines, as will be seen from the fauna list. Thus, in "Kløft II" we have such characteristic forms as *Tancredia Jarneri* and a large *Pecten*, which in the sequel is described as *P. cfr. validus*. The sandstone in "Kløft II" is possibly a little younger than in "Kløft I", though it still belongs to the Séquanian-Kimmeridgian.

3. "4. Sænkning". This locality lies much farther to the south that the two mentioned above, but it still belongs to the northernmost of the 3 sandstone regions on the east side of Store Koldewey. The sandstone has here a similar appearance as at the

[1] See A. G. NATHORST: Eine vorläufige Mitteilung von Prof. J. F. POMPECKJ über die Altersfrage der Juraablagerungen Spitzbergens, p. 1503. — Geol. Fören. i Stockholm Förhandl. Vol. 32. Stockholm 1910.

other two localities. Where the Mollusc shells are preserved, they seem on the whole somewhat more rubbed, but this probably arises from the fact, that all the fossils found here were taken in loose-lying stones, of the same nature, however, as the sandstone mass. The fauna from this locality is fairly rich, containing at least 26 species. Here again we have *Aucella Bronni* and *A. Sinzovi*, as also *Cardioceras alternans* and possibly *C. Nathorsti*. The discovery of these fossils marks this locality as also belonging to the age of the Séquanian-Kimmeridgian. The other species (mainly Bivalves and Gastropods) do not require to be mentioned in detail; but the occurrence of numerous *Tancredia*, *Cyprina (Cyprimeria?)* and *Astarte* species may be specially noticed.

In the northernmost of the 3 sandstone regions on Store Koldewey Island fossils are only known from the 3 localities mentioned above. The fauna shows, that the sandstone must be approximately of the same age at all 3 localities; it thus seems to form a continuous whole. Somewhat to the south of the southernmost of the localities, "4. Sænkning", the sandstone comes to an end and the gneiss reaches right out to the coast, forming here the northern Gneiss Naze. A little further to the south the gneiss is again replaced by the sandstone for a short distance, until the gneiss reappears once more in the southern Gneiss Naze. The sandstone of this region has the same appearance as in the northern region. On the boundary of the region towards the southern Gneiss Naze, Jarner found the sandstone lying directly over the gneiss. Of the fossils from here only *Macrodon Mylii* and *M. Hagenii* unfortunately are known, both of them new species which give no information regarding the age of the sandstone. We can hardly go wrong in concluding, however, that this sandstone must also be referred to the Séquanian-Kimmeridgian. South of the southern Gneiss Naze we have the southernmost sandstone region. As already mentioned above, the sandstone here has a different character and its fauna shows, that it belongs to the Callovian.

4. Hochstetter's Foreland. I have already mentioned, that the 2nd German North Pole Expedition found here extensive deposits of a yellowish, sometimes brick-red sandstone, which contained numerous, unfortunately badly preserved fossils, from which Toula and Fuchs were of opinion, that these deposits belonged to the Tertiary. The fossils brought home by the Danmark Expedition from this sandstone show, however, that we have to do with Jurassic deposits. We have first and foremost the occurrence of *Cardioceras alternans*, by which the age of the sandstone is determined to the Séquanian-Kimmeridgian. Of other fossils (see fauna list) may be noticed

Pecten Broenlundi and *Tancredia Jarneri*; both of these species as well as the other species determinable with a fair amount of certainty are known from the northernmost sandstone region on Store Koldewey. There can thus be no doubt, that the yellow and red sandstones on Hochstetter's Foreland and the gray sandstone farthest to the north on Store Koldewey belong to the same age.

c. **Portlandian.**

In the district round Danmarks Havn, especially in the pass (Vesterdalen) which separates the so-called Harefjæld from the remaining part of the district, a number of sedimentary boulders were found which must have been brought down by the land-ice at a time, when the latter had a much greater extension than it has now. Where these boulders come from, is not known, as no trace whatsoever of fixed sedimentary masses has been found in the immediate neighbourhood. They have presumably been brought down from the north, as the ice seems to have come from this quarter, and it is possible, that a portion of them has come from the sedimentary deposits at Jøkel Bay, which contain a quantity of badly preserved fossil plants, whose age still remains undecided. The boulders proved to be very different, both as regards their petrographic character and their fossil contents; we can distinguish between sandstones containing mainly Portlandian fossils and calcareous concretions with the remains of a Neocom fauna. The former greatly resemble in appearance the sandstone from the northernmost of the 3 sandstone regions on Store Koldewey Island, as they are gray in colour and contain a quantity of calcium-carbonate and numerous flakes of mica. But the fauna is quite different. As the fauna list shows, *Dentalium nodulosum* is the only species, which is common to these boulders and the Alternans-strata on Store Koldewey. Of much more importance, however, is the occurrence of *Aucella tenuistriata* Lah. and *A. mosquensis* v. Buch, the first of which goes from the Séquanian to the Lower Portland, whilst the last-mentioned may well be considered as a species characteristic of the Portland. In any case a portion of these boulders must therefore be referred to the Portlandian. But we also find here a by no means small number of specimens of an *Aucella*, which seems to be very nearly related to *A. reticulata*, a species found on Spitzbergen in deposits, which according to Pompeckj must be referred to the Séquanian-Kimmeridgian, thus in layers which are of the same age as the Alternans-strata on Store Koldewey and on Hochstetter's Foreland. It is probable, therefore, that a portion of the boulders mentioned come from Alternans-strata, which

have perhaps been quite removed by an earlier land-ice with greater extension that the present.

d. **Neocomian.**

1. In addition to the boulders of sandstone just mentioned, boulders of quite a different character were also found in the district round Danmarks Havn, namely, calcareous concretions. These boulders seem to be comparatively rare, only 4 being found. They consist of a coal-black, clayey limestone with few flakes of mica. Their origin is unknown; it is possible perhaps, that they may have come from some sediments, which occur farther north at Jøkel Bay and consist mainly of black, slaty clay; but this is very doubtful, as such concretions — so far as I am aware — have not been found in these sediments. One of the concretions contained only an Ammonite, *Lytoceras polare n. sp.*, whilst two others were very rich in fossils, which however could only be prepared with great difficulty. The most common forms are *Garnieria pusilla n. sp.* and two species of *Aporrhais*. From the occurrence of a representative of the genus

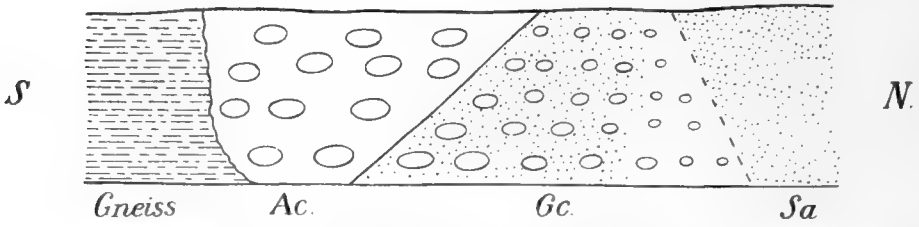

Fig. 1. Diagrammatic sketch of "Aucellabjerget" (H. Jarner). Ac. = "Aucella-conglomerate". Gc. = "Gneiss-conglomerate". Sa. = Sandstone.

Garnieria we may perhaps conclude, that these concretions come from deposits belonging to the Neocomian. Some young specimens of an *Aucella* found in these concretions seem to point in the same direction. These cannot be determined as to species, it is true, but so much seems certain, that they belong to a Neocomian type.

2. "Aucellabjerget". This locality lies at the south end of the southernmost of the sandstone regions on the east side of Store Koldewey Island. On a short stretch here Jarner found conglomerates of a very characteristic appearance. Both towards the north and the south the boundary of the conglomerates was fairly indistinct. Farthest to the north (thus nearest the sandstone) the conglomerate consisted of fragments of gneiss, between which a reddish limestone has been deposited. Further to the south the gneiss fragments became larger, from the size of a fist to that of the head; their interspaces were filled with a reddish sandstone, which macroscopically

at any rate greatly resembled the sandstone found down from "Trækpasset" and mentioned above (p. 441). This conglomerate is called "gneiss-conglomerate" in the sequel. After this followed a conglomerate of quite a different appearance. It consisted likewise of gneiss boulders, often larger than a man; the interspaces were here filled with a light-yellow or reddish-brown limestone, which was formed to a very great extent of shells of Aucellae; the reddish sandstone was likewise found in this conglomerate. In the following this conglomerate is called the "Aucella-conglomerate". Towards the south the conglomerate was bounded by gneiss. The two conglomerates mentioned were very different in appearance, when seen from a distance, but near at hand they seemed to grade into one another. In the section the boundary line between them formed an angle of ca. 45° with the horizontal line, the "gneiss conglomerate" being partly covered over by the "Aucella-conglomerate". The strike and dip of the boundary plane could not be determined.

No fossils were found in the "gneiss-conglomerate". On the other hand, fossils were very abundant in the "Aucella-conglomerate", as the limestone between the gneiss blocks was formed almost exclusively of shells of *Aucella concentrica, A. crassicollis* and *A. piriformis*, which evidently occur here in enormous quantities. These 3 species, according to Pavlow, are characteristic of the zone with *Polyptychites polyptychus*, and the "Aucella-conglomerate" thus belongs to the Neocomian.

How are we to explain this section? The most natural view seems to me the following. The gneiss-conglomerate belongs to the sandstone and indicates the transgression of the latter over the gneiss. That this seems to be the explanation would appear from the facts, (1) that there is no distinct boundary between the sandstone and conglomerate; (2) that the size of the gneiss fragments increases towards the south (thus in the direction away from the sandstone); and (3), that the interspaces between the gneiss fragments are filled with a sandstone, which macroscopically at least resembles the sandstone farther north. As the latter belongs to the Callovian, we thus find here a transgression of Callovian age. Unfortunately, no trace of fossils could be found in this conglomerate, from which its age might have been determined.

The Aucella-conglomerate is much younger than the gneiss-conglomerate, as it certainly belongs to the Neocomian, as mentioned above; it also has quite a different character. Like the gneiss-conglomerate it consists for a very great part of gneiss fragments, it is true, but the interspaces between these are filled with *Aucella* shells. Here also the reddish sandstone occurs, but — I expect — only as

fragments. This is undoubted evidence of a transgression of the Neocomian Sea. It is somewhat difficult to decide, on which deposits this Sea at that place has exercised its destructive action. Perhaps it has been both the gneiss and a Callovian sandstone, but it seems to me more probable, that it has just been the gneiss-conglomerate, which has been at that time exposed to erosion. Both the gneiss and sandstone fragments may have come from this. And just the fact, that the gneiss fragments in the Aucella-conglomerate reached a larger size than in the gneiss conglomerate, seems to me to point in favour of the same thing and in the gneiss conglomerate these fragments were larger towards the south in the direction of the Aucella conglomerate.

2. **Palæogeographical remarks.**

Deposits belonging to the Callovian were only found at one locality by the Danmark Expedition, namely on the east coast of Store Koldewey Island down from "Trækpasset". Unfortunately, only a small number of fossils were found here. Of the 8 species which could be determined, at least the half seem to be undescribed, and not one of them is known from the deposits of the same age on Jameson's Land. This is very remarkable, but it is doubtful if we are entitled to draw conclusions from it with regard to the distribution of sea and land in these regions in the Callovian period. To judge from the fauna, however, so much seems certain, that a connection has existed at that time ("Shetland Strait", Neumayr) between the "Arctic" Sea as it was then and the Sea which at that time covered parts of West and Middle Europe. The existence of this connection has already been suggested by other observers.

Whilst the fauna in the North-East Greenland Callovian thus clearly points towards the south, to West and Middle Europe, the fauna in the Séquanian-Kimmeridgian seems just as distinctly to point towards the east and south-east, to Spitzbergen, Nova Zembla and the Russian Jurassic. The agreement with the fauna in the Alternans-deposits of these countries is so great, that there can be no doubt, that a wide sea has extended in the Séquanian-Kimmeridgian period from Central and North Russia up over Nova Zembla and Spitzbergen to the coast of North-East Greenland. All the 3 *Aucella* species found in the Alternans-deposits in North-East Greenland (*A. kirghisensis*, *A. Bronni* and *A. Sinzovi*) have undoubtedly come from the east and south-east and the same is the case with all the Cephalopods (*Cardioceras alternans* and *C. Nathorsti*, as also *Belemnites Panderianus* and *B. breviaxis*). A number of the other species point also in the same direction, whilst others seem to in-

dicate a connection with the English and Middle European Jurassic. These last are, however, all more or less indifferent forms (species of the genera *Tancredia*, *Astarte*, *Chemnitzia*), on whose occurrence we can scarcely lay very much weight; to my mind they are unable to prove the existence of a "Shetland Strait" at that time. If such had existed, the Cephalopod fauna, for example, would also have contained West and Middle European forms as well as the Russian-Arctic. That hitherto unknown forms occur as well as earlier known and described species, is not so surprising, as we are here dealing with a region which is far removed from all the others, where deposits of this time have been found.

As mentioned, the Alternans-strata have been found at two places, on Store Koldewey Island and on Hochstetter's Foreland. Some samples of the sandstone from Store Koldewey contain pieces of gneiss, which shows, that the Séquanian-Kimmeridgian Sea has extended in over a gneiss region. A direct deposition of sandstone on gneiss has been observed by JARNER only in the middle sandstone region, which as already mentioned also belongs to the Alternans-strata in all probability. The conditions on Hochstetter's Foreland are not known with certainty. There is some reason to believe, however, that the sandstone here also rests on gneiss, as the sandstone region — so far as known — borders directly on the gneiss and we do not know of any dislocations between sandstone and gneiss.

The next stage represented in the material brought home by the Danmark Expedition, is the Portlandian. This stage was only found, however, as boulders in the surroundings of Danmarks Havn. These boulders probably come from deposits, which are of the same age as the sandstone at the Aucella River on Jameson's Land, which is referred by V. MADSEN to Middle Portlandian. The discovery of *Aucella tenuistriata* in the boulders, however, indicates Lower Portlandian, so that both the Lower and Middle Portlandian are possibly represented.

Along with these boulders, as already mentioned, 4 boulders of quite a different character and fauna were found, namely, black calcareous concretions with a species of the genus *Garnieria*, which shows that these belong to the Neocomian. These concretions probably come from deposits which were laid down in much deeper water than all the Jurassic sediments mentioned in the foregoing. In this also they form a contrast to the other Neocomian deposits known from North-East Greenland, namely, the "Aucella-conglomerate" from Aucellabjerget on the east coast of Store Koldewey Island, which must be considered as a pure strand-formation. The

Neocomian beds discovered by the 2nd German North Pole Expedition on the east side of Kuhn's Island must also be regarded as deposits from shallow water. As already indicated above, the conditions at Aucellabjerget show, that we have here a Neocomian transgression, and it appears distinctly from the fauna, that this overflowing sea must have been in communication with the Russian Neocomian Sea.

A tabular summary is given below of all the known, mesozoic deposits on the east coast of Greenland, the age of which has been determined. As will be seen, there are still various lacunae to fill up and questions to solve, even though it may be said, that the Danmark Expedition has made considerable contributions to our knowledge of the mesozoic formations on this portion of the globe.

Neocomian	Boulders at Danmarks Havn. East coast of Kuhn's Island. Aucellabjerget on Store Koldewey Island.
Middle Portlandian (& Lower Portl.)	Boulders at Danmarks Havn. Aucella River on Jameson's Land.
Séquanian-Kimmeridgian	"Kløft I", "Kløft II" and "4. Sænkning" on Store Koldewey Island. Hochstetter's Foreland.
Callovian	Down from "Trækpasset" on Store Koldewey Island. ? South coast of Kuhn's Island. Cape Stewart, Dinosaurus River, Ammonite Mountain } Jameson's Land. ..... "Vardekløft" on Jameson's Land.
Lower Bathonian or Upper Bajocian	Mount Nathorst on Jameson's Land.
Rhaetian-Liassic....	Deposits with plants at Cape Stewart.

3. List of the fauna.

	Vesterdalen	Harefjeld	Danmarks Havn	"Kløft I"	"Kløft II"	"4. Sænkning"	Middle sandstone region	Down from "Trækpasset"	Aucellabjerget	Hochstetter's Foreland
1. *Pentagonaster* (?) sp.	.	.	.	.	.	+	.	.	.	.
2. *Serpula cfr. convoluta* GOLDF.	.	.	.	.	.	+	.	.	.	.
3. — sp.	.	.	.	.	.	.	.	+	.	.
4. *Rhynchonella* sp.	.	.	.	+	.	.	.	.	.	.
5. *Terebratula* sp.	.	.	.	+	.	.	.	.	.	.
6. *Oxytoma inaequivalvis* SOW., *var. macroptera* ROEM.	.	.	.	.	.	.	.	+	.	.
7. *Oxytoma inaequivalvis* SOW., *var. Münsteri* BRONN.	+	.	.	.	.	.	.	.	.	.
8. *Pseudomonotis* (?) sp.	+	.	.	.	.	.	.	.	.	.
9. *Aucella kirghisensis* SOK.	.	.	.	+	.	.	.	.	.	.
10. — *Bronni* LAH.	.	.	.	+	+	+	.	.	.	.
11. — *Sinzovi* PAVL.	.	.	.	+	+	+	.	.	.	.
12. — *cfr. reticulata* LUNDGR.	+	.	+	.	.	.	.	.	.	.
13. — *mosquensis* v. BUCH.	.	+	.	?	.	.	.	.	.	.
14. — *tenuistriata* LAH.	+	.	.	.	.	.	.	.	.	.
15. — *crassicollis* KEYS.	.	.	.	.	.	.	.	.	+	.
16. — sp.	.	.	.	.	.	.	.	.	+	.
17. — *piriformis* PAVL.	.	.	.	.	.	.	.	.	+	.
18. — *concentrica* FISCH.	.	.	.	.	.	.	.	.	+	.
19. *Posidonomya ornati* QUENST. sp.	.	.	.	.	.	.	.	+	.	.
20. *Pinna* sp.	+	.	.	.	.	.	.	.	.	.
21. *Perna groenlandica* n. sp.	.	.	.	+	.	.	.	.	.	.
22. *Gervilleia* sp.	.	.	.	.	.	+	.	.	.	.
23. *Pecten* (*Entolium*) *demissus* BEAN.	.	+	.	.	.	.	.	.	.	.
24. — — *cingulatus* PHILL.	.	.	.	.	.	.	.	+	.	.
25. — — *erraticus* FIEB.?	+	+	.	.	.	.	.	.	.	.
26. — (*Camptonectes*) *Broenlundi* n. sp.	?	.	.	+	.	.	.	.	.	?
27. — — — sp.	.	.	.	.	+	.	.	.	.	.
28. — — — sp.	.	+	.	.	.	.	.	.	.	.
29. *Ostrea* sp.	.	.	.	+	.	+	.	.	.	+
30. *Modiola Strajeskiana* D'ORB. sp.	.	.	.	+	+	.	.	.	.	+
31. — sp.	+	.	.	.	.	.	.	.	.	.
32. — *hannoverana* STRUCKM. ?	.	.	.	+	.	.	.	.	.	.
33. *Yoldia* sp.	+	.	.	.	.	.	.	.	.	.
34. *Macrodon Keyserlingii* D'ORB. sp.	.	.	.	.	+	?	.	.	.	.
35. — *Schourovskii* ROUIL. sp.	+	.	.	.	.	.	.	.	.	.
36. — *Mylii* n. sp.	.	.	.	.	.	.	+	.	.	.
37. — *Hagenii* n. sp.	.	.	.	.	.	.	+	.	.	.
38. *Astarte striato-costata* MÜ.	.	.	.	+	.	.	.	.	.	.
39. *minima* PHILL.	.	.	.	+	.	+	.	.	.	.
40. — *alta n.* sp.	.	.	.	+	.	.	.	.	.	.
41. *"Astarte" retrotracta* ROUIL.	.	.	.	.	.	+	.	.	.	.

	Vesterdalen	Harefjæld	Danmarks Havn	"Kløft I"	"Kløft II"	"4. Sænkning"	Middle sandstone region	Down from "Trækpasset"	Aucellabjerget	Hochstetter's Foreland
42. *Tancredia curtansata* Phill. sp.	..	..	..	..	..	+	..	..	..	..
43. — *planata* Morr. & Lyc.	..	..	..	+	..	+	..	..	..	..
44. — *axiniformis* Phill. sp.	..	..	..	+	..	+	..	..	..	+
45. — *Jarneri* n. sp.	..	..	..	..	+	+	..	..	..	+
46. *Lucina substriata* Roem. ?	..	..	..	..	+	?	..	..	..	..
47. *Protocardia* sp.	..	..	..	+	..	+	..	..	..	..
48. *Cyprina cfr. mosquensis* d'Orb.	..	..	..	+	..	..	..	..	..	..
49. — *Sharoschovensis* Rouil.	..	..	..	+	..	+	..	..	..	+
50. — *Syssollae* Keys.	..	..	..	+	..	+	..	..	..	+
51. — *cfr. inconspicua* Lindstr.	..	..	..	+	..	+	..	..	..	..
52. — *Panderi* Rouil. sp. ?	..	..	..	+	..	..	..	..	..	..
53. *Pleuromya peregrina* d'Orb. sp.	..	..	..	+	..	+	..	..	..	..
54. *Goniomya* sp.	..	..	..	..	..	..	..	..	..	+
55. *Dentalium nodulosum* Lundgr.	+	..	..	+	..	+	..	..	..	..
56. *Amberleya groenlandica* n. sp.	..	..	..	..	..	..	..	+	..	..
57. — *Jasicofiana* d'Orb. sp.?	..	..	..	..	..	+	..	..	..	..
58. *Natica* sp.	..	..	..	+	..	+	..	..	..	..
59. *Turritella* sp.	..	+	..	+	+	..	..	..	..	..
60. *Chemnitzia undulata* Tullb. sp.	..	..	..	+	..	+	..	..	..	..
61. — *hamptonensis* Morr. & Lyc.	..	..	..	+	..	+	..	..	..	..
62. *Aporrhais* sp.	..	..	+	..	..	..	..	..	..	..
63. — sp.	..	..	+	..	..	..	..	..	..	..
64. *Lytoceras polare* n. sp.	+	..	..	..	..	..	..	..	..	..
65. *Cardioceras alternans* v. Buch.	..	..	..	+	..	+	..	..	..	+
66. — *Nathorsti* Lundgr. sp.	..	..	..	?	+	?	..	..	..	..
67. — sp.	..	..	..	+	..	..	..	..	..	..
68. *Quenstedtoceras* (?) sp.	..	..	..	..	..	..	..	+	..	..
69. *Cosmoceras boreale* n. sp.	..	..	..	..	..	..	..	+	..	..
70. *Kepplerites Tychonis* n. sp.	..	..	..	..	..	..	..	+	..	..
71. *Aulacostephanus* (?) *groenlandicus* n. sp.	..	..	..	..	+	..	..	..	..	..
72. *Garnieria pusilla* n. sp.	+	..	+	..	..	..	..	..	..	..
73. *Belemnites Panderianus* d'Orb.	..	..	..	+	..	..	..	..	..	..
74. — *breviaxis* Pavl.	..	..	..	+	..	..	..	..	..	..

IV. Description of the fossils.

1. **Pentagonaster** (?) sp.

A single marginal plate of an Asteroid, which seems to belong to the genus *Pentagonaster* Linch, was found in one of the free-lying stones at "4. Sænkning" on Store Koldewey Island. The material is too imperfect for a closer determination.

2. **Serpula cf. convoluta** Goldfuss.

1831. *Serpula convoluta* Goldfuss, Petref. Germ., Vol. I, p. 228; Pl. 67, fig. 14.

Cylindrical, thick-walled, spirally twisted tube with transverse wrinkles on surface; only the older whorls attached to the understratum.

Of the two available specimens, one is twisted to the right, the other to the left. They are distinguished from Goldfuss' species, which was found in the Dogger, by the absence of a sharply marked spiral ridge; further, they seem to be considerably thicker in the shell, so that they possibly cannot be referred to this species, with which however they show fairly great agreement.

Distribution. North-East Greenland: Store Koldewey Island, lying loose on the tenting ground, 2—6. June 1907 (1 spec.); Store Koldewey Island, exact locality not stated (1 spec.).

3. **Serpula** sp.

Attached to a specimen of *Amberleya groenlandica* n. sp. in a loose-lying stone, from the locality down from "Trækpasset" on Store Koldewey Island, was the hind part of a *Serpula* tube triangular in section. Closer determination was impossible.

4. **Rhynchonella** sp.

Two valves belonging to one or other species of the genus *Rhynchonella* are so defective, that even an approximately certain determination of the species is impossible. They have few, but well-marked radial folds and a narrow and deep sinus. Both were found at "Kløft I" on Store Koldewey Island.

5. **Terebratula** sp.

Some specimens of a fairly large *Terebratula* species could unfortunately not be prepared entirely free from the rock, so that the species could not be determined. They all come from "Kløft I" on Store Koldewey Island.

6. **Oxytoma inaequivalvis** Sowerby, var. **macroptera** Roemer.
Pl. XXXII, fig. 1.

1835. *Avicula macroptera* F. A. Roemer, Verstein. d. norddeutsch. Oolithen Gebirges, p. 86; Pl. 4, fig. 5.
1902. *Oxytoma inaequivalve* Sow., var. *macroptera* Roem.; L. Waagen, Der Formenkreis des *Oxyt. inaequiv.* Sowerby, p. 14; Pl. 1. figs. 7 and 14.

Only the mould of the hindmost part of a left valve.

The shell strongly arched with up to 10 rounded, primary radial ribs, with intermediate secondary ribs, which reach the same size as the primary a little below the beak. Further, on the younger parts of the shell finer tertiary ribs and on the very youngest a further system of quite fine ribs, all in perfectly regular series. On the very hindmost part of the valve only uniform, fairly fine ribs, a sculpture repeated on the large, deeply emarginated wing which is not sharply marked off from the rest of the valve.

The available specimen must undoubtedly be referred to *O. inaequivalvis* Sow. in spite of its incompleteness, and according to Waagen's description and figures it seems quite clearly to belong to his var. *macroptera* Roem.

Distribution. North-East Greenland: Down from "Trækpasset" on Store Koldewey Island, in a loose-lying stone, 50 m. above the sea.

North Germany: in the Hils deposits.

7. **Oxytoma inaequivalvis** Sowerby, var. **Münsteri** Bronn.

1829. *Avicula Münsteri* Bronn in Leonhard: Zeitschr. f. Mineralogie, 1829, p. 76.
1836. — — — ; Goldfuss, Petref. Germ., Vol. II; p. 131; Pl. 118, fig. 2.
1902. *Oxytoma inaequivalve* Sow., var. *Münsteri* Bronn; Waagen, Der Formenkreis des *Oxyt. inaequiv.* Sowerby, p. 13; Pl. 1, figs. 9 and 11.

For the remaining synonymy reference may be made to the above-cited work of Waagen.

A few left valves of this variety are present, unfortunately so badly preserved that a complete description cannot be given.

The valve very oblique, strongly arched, covered with a large number of radial ribs of almost the same size. The posterior wing large, distinctly marked off from the rest of the valve.

Distribution. North-East Greenland: North side of Vesterdalen at Danmarks Havn (1 spec.); south side of Vesterdalen (2 spec.).

Europe: in Liassic—Malm (cf. Waagen, l. c.).

8. **Pseudomonotis** (?) sp.

A single valve found in a boulder on the south side of Vesterdalen at Danmarks Havn, which seems to belong to one or other species of the genus *Pseudomonotis*.

The valve almost symmetrical and somewhat arched. Its surface covered with numerous radial ribs, which seem to vary somewhat in size and have possibly borne small, short spines or teeth.

In other boulders from Vesterdalen are some fragments of valves, of which only the inner side can be seen; these have also had ribs, alternately finer and coarser. How far these valves belong to the same species as the above, cannot be determined.

9. **Aucella kirghisensis** Sokolow.

Pl. XXXII, fig. 2.

1903. *Aucella kirghisensis* Sokolow, Aucellen aus Ost-Russland, p. 374; Pl. 14, figs. 1-5.
1907. — — — ; Pavlow, Enchaînement etc., p. 13; Pl. 2, figs. 18—19.
1908. — — — ; Sokolow, Aucellen vom Timan und von Spitzbergen, p. 10; Pl. 1, figs. 12—14.

Some fairly perfect casts agree exceedingly well with the above-cited descriptions and figures.

The form of the shell oblong-oval, somewhat oblique. The left valve strongly inflated, right valve somewhat less so. The beak comparatively little prominent. Ear indistinct. Surface of the casts covered with little prominent, concentric lines of growth and still more indistinct radial ribs.

The length[1] of the left valve figured is ca. 22 mm, its breadth ca. 16 mm and its thickness 6 mm; the angle at the beak is ca. 95°.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (5 spec.).

Russia: in deposits with *Cardioceras alternans*.

10. **Aucella Bronni** Lahusen.

Pl. XXXII, fig. 5.

1888. *Aucella Bronni* Rouill.; Lahusen, Ueber die russischen Aucellen, p. 32; Pl. I, figs. 1—7.
1901. — — — ; Pompeckj, Aucellen im Fränkischen Jura, p. 24; Pl. 4, fig. 4.
1907. — — Lahus.; Pavlow, Enchaînement etc., p. 14; Pl. 1, fig. 31.

The left valve oblong-oval, very oblique, somewhat strongly arched, flatter towards the posterior margin. The beak comparatively small and little prominent, curved inwards. The anterior margin and ventral margin forming a flat curve; the posterior margin slightly concave, almost straight. Surface of the cast covered with numerous, distinct, concentric folds and with numerous, fine, less distinct radial

[1] The method used in measuring this and the following *Aucella* species is that of Pavlow (l. c., p. 10—11).

lines. — The right valve somewhat less arched, but otherwise in the main with the same circumference and the same sculpture.

A left valve has the following dimensions: length 41 mm, breadth 26 mm and thickness ca. 9 mm; the angle at the beak 70°. — The largest specimen has a length of 59 mm.

Distribution. North-East Greenland: "Kløft I" (1 spec.), "Kløft II" (at least 4 spec.) and in loose-lying stone at "4. Sænkning" (1 spec.) on Store Koldewey Island.

Russia: in deposits with *Cardioceras alternans.*

Germany: in Kimmeridgian deposits in Franconia.

Mexico: ?

11. **Aucella Sinzovi** A. P. Pavlow.

Pl. XXXII, fig. 3.

1881. *Aucella mosquensis* Tullberg, Verst. Aucellen-Schichten Novaja-Semljas. p. 22; Pl. 2, figs. 16—18.

1907. — *Sinzovi* Pavlow, Enchaînement etc., p. 17; Pl. I, fig. 12.

A number of more or less perfect casts of an *Aucella* must certainly be referred to this species.

The shell very oblique, oblong-oval. The left valve fairly strongly arched. The beak on both valves small, little prominent and curved inwards. The surface with irregular interspaces covered with stronger and fainter, concentric folds, and with more regular, distinct, somewhat undulating radial striae.

Left valve: length 21 mm, breadth 14·5 mm and thickness 8·5 mm; angle at the beak ca. 95°.

The available specimens agree well with Tullberg's original specimens, which I have seen in the Riksmuseum in Stockholm. They likewise seem to be in perfect agreement with Pavlow's description and figures of specimens from Khanski.

A single right valve resembles greatly in form *A. solodurensis* de Lor., but is probably nothing else but a compressed (and thus probably very broad) valve of the species above.

Distribution. North-East Greenland: "Kløft I" (7 spec.), "Kløft II" (3 spec.) and in free-lying stones at "4. Sænkning" (5 spec.) on Store Koldewey Island.

Nova Zembla: in deposits with *Cardioceras alternans.*

Russia: in deposits with *A. Bronni.*

12. **Aucella cf. reticulata** Lundgren.

Pl. XXXII, fig. 4.

1883. *Aucella reticulata* Lundgren, Jura- und Trias-Fossilien von Spitzbergen, p. 16; Pl. I, figs. 6—7.

1907. — — ; Pavlow, Enchaînement etc., p. 18.

Some specimens of an *Aucella* seem — to judge especially from their characteristic sculpture — to be nearly related to *A. reticulata*. A cast with a small portion of the shell preserved forms the basis of the following description.

Circumference short-oval. Left valve strongly arched; beak strongly bent backwards; anterior margin forming an even curve with the ventral margin; posterior margin long and straight, meeting the very convex ventral margin in a sharp bend. Right valve only slightly arched, most strongly in the direction from the front to the hind margin. Both valves covered with very prominent, concentric lines, crossed by equally strong radial lines; no distinct knots at the points of crossing.

Left valve: length ca. 21 mm, breadth 19 mm and thickness 7 mm; angle at the beak ca. 80°.

In the Riksmuseum of Stockholm I have compared the available specimens with LUNDGREN's originals, from which they differ in two points, their length is not so great and the left valves are considerably more arched. As LUNDGREN noted, his original specimens were compressed, so that the disagreement in form is possibly only apparent.

A. reticulata is stated by LUNDGREN to have been found on Spitzbergen along with *A. radiata* and *A. spitzbergensis* (= *A. Bronni*?).

Distribution. North-East Greenland: in boulders on the south side of Vesterdalen at Danmarks Havn (4 spec., 2 of them connected). In boulders at Danmarks Havn (6 spec.).

13. **Aucella mosquensis** v. BUCH sp. (non KEYSERLING, non LAHUSEN). Pl. XXXII, fig. 6.

1844. *Avicula mosquensis* v. BUCH, Neue Verst. aus Moskau, p. 537; Pl. 6, fig. 1.
1846. *Aucella Pallasii* KEYSERLING, Petschora-Land, p. 299; Pl. 16, figs. 1—6.
1848. *Buchia* — — ; ROUILLIER, Études progr. Géol. Moscou, II, p. 272; Pl. D (Bull. Soc. naturalistes Moscou 1846), fig. 3.
1866. *Aucella mosquensis* v. BUCH var.; LINDSTRÖM, Trias- och Juraförsteningar från Spetsbergen, p. 14; Pl. 3, fig. 3.
1888. — *Pallasii* KEYS.; LAHUSEN, Ueber die russischen Aucellen, p. 34; Pl. 1, figs. 12—20.
1904. — — — ; MADSEN, Jurassic Fossils from East-Greenland, p. 178; Pl. 6, fig. 7.
1907. — *mosquensis* BUCH (non KEYS., non LAHUS.); PAVLOW, Enchaînement etc., p. 22; Pl. 2, figs. 5—8.

Of this species only the casts of a couple of left valves were found.

The left valve with ovoid circumference, somewhat strongly arched, very oblique. The umbo inclined backward and at the same time far over the right valve; its outermost point bent a little for-

ward. Front margin of the valve very steep, the hind margin very flatly curved. Surface of the cast covered with fairly prominent, concentric folds; no trace of radial sculpture.

Left valve: length 30 mm, breadth 20 mm and thickness 8·5 mm. Angle at the beak ca. 65°.

Casts of two small (7—8 mm long) left valves of an *Aucella* were found at "Kløft II" on Store Koldewey Island; in these the umbo is pointed and inclined strongly inwards; the surface only has fairly well-marked, concentric folds. These are possibly young specimens of the above species.

Distribution. North-East Greenland: in boulders near Harefjæld at Danmarks Havn (2 spec.). "Kløft I" on Store Koldewey (2 spec. ?).

East Greenland: in Middle Portlandian at Aucella River on Jameson's Land.

Spitzbergen: in Portlandian.

King Charles Land: Kimmeridgian—Portlandian.

Russia: Portlandian.

England: Portlandian.

Alaska: Lower Portlandian.

Mexico: Pavlow notes the species from here with some reservation.

14. **Aucella tenuistriata** Lahusen.

Pl. XXXII, fig. 7.

1846. *Aucella Pallasii* var. *polita* Keyserling, Petschora-Land, p. 299; Pl. 16, fig. 7.
1888. — — Keys. var. *tenuistriata* Lahusen, Ueber die russischen Aucellen, p. 34; Pl. 1, figs. 25—27.
1901. — — — — — ; Pompeckj, Aucellen im Fränkischen Jura, p. 25; Pl. 4, figs. 5—6.
1907. — *tenuistriata* Lahus. var.; Pavlow, Enchaînement etc., p. 33.

The left valve obliquely pyriform, fairly strongly arched, very oblique; umbo bent strongly backwards, concave in front, fairly flat above; the anterior and ventral margins together forming almost a semicircle; posterior margin somewhat concave. Surface of the cast covered with fine, concentric lines and of still finer radial striae, almost as in *A. Bronni*.

Left valve: length 30 mm, breadth 19 mm and thickness ca. 6 mm; angle at the umbo ca. 75°.

Along with this left valve was also a badly preserved right valve; it is almost completely flat and has the same sculpture as the left valve.

Distribution. North-East Greenland: in boulders on the

south side of Vesterdalen at Danmarks Havn (3 left valves and (?) 1 right valve).

Russia: Alternans deposits — Lower Portland.

Mexico:?

15. **Aucella crassicollis** KEYSERLING.

Pl. XXXII, fig. 8.

1846. *Aucella crassicollis* KEYSERLING, Petschora-Land, p. 300; Pl. 16, figs. 9—12.
1874. — *concentrica* var. *rugosa* KEYS.; TOULA (*pars*), Kuhn-Insel, p. 503; Pl. 2, fig. 3.
1888. — *crassicollis* KEYS.; LAHUSEN, Ueber die russischen Aucellen, p. 42; Pl. 5, figs. 9—13.
1895. — — — ; STANTON, Knoxville beds, p. 45; Pl. 5, fig. 8 and Pl. 6, figs. 3—5.
1907. — — — ; PAVLOW, Enchaînement etc., p. 62; Pl. 5, fig. 16.

Left valve almost equilateral, usually however obliquely triangular, very high and strongly inflated, from about the middle narrowing very rapidly up towards the umbo; the uppermost half of the valve thus narrow and elongated; beak inclined somewhat forwards and strongly inwards. On the surface of the cast sometimes a single, very deep, concentric furrow; further, rather faint traces of concentric folds. — Along with the left valves some fragments of fairly flat, almost completely smooth right valves were found, which probably also belong to this species.

None of the specimens are so complete, that measurements can be given.

Distribution. North-East Greenland: in reddish brown limestone in Aucellabjerget on Store Koldewey Island along with *A. piriformis* (many spec.). — East Greenland: Kuhn Island (collected by the 2nd German North Pole Expedition).

Russia: in deposits belonging to the zone with *Polyptychites polyptychus*.

America: in Knoxville Beds in British Columbia and California.

16. **Aucella** sp.

Pl. XXXIII, fig. 1.

In a gray limestone in Aucellabjerget on Store Koldewey Island was found a single left valve of an *Aucella*, which does not seem to be referable to any of the species mentioned in this paper. It is elongated, fairly equilateral and evenly arched; the beak is inclined slightly forward; angle at the beak ca. 77°. As the specimen is not complete and there is only this one example, I do not venture to refer it to any of the above-described species; it belongs in any case, however, to the *Keyserlingi*-group.

17. **Aucella piriformis** Lahusen, emend. A. P. Pavlow.

Pl. XXXII, figs. 11 and 12.

1874. *Aucella concentrica* var. *rugosa* Keys.; Toula (*pars*), Kuhn-Insel, p. 503; Pl. 2, fig. 2.
1881. — *Keyserlingiana* Trautsch., *forma majuscula* Tullberg, Aucellen-Schichten Novaja-Semljas, p. 23; Pl. 2, figs. 9—12.
?1884. — *concentrica* Fisch. var.; White, On Mesozoic Fossils, p. 13; Pl. 6, figs. 6—7.
1888. — *sublaevis* (Keys.) Lahus.; Nikitin, Période crétacée Russie centrale, p. 74; Pl. 2, figs. 13—14.
1888. — *piriformis* Lahusen, Ueber die russischen Aucellen, p. 42; Pl. 5, figs. 3—7.
1900. — *Keyserlingi* Lah.; Wollemann, Bivalven u. Gastrop. des deutschen u. holländ. Neocoms, p. 56; Pl. 2, figs. 6—9.
1907. — *piriformis* Lahus.; Pavlow, Enchaînement etc., p. 63; Pl. 5, figs. 20—22.
1908. — *sublaevis* Keys.; Sokolow, Aucellen vom Timan etc., p. 22; Pl. 3, figs. 3—5.

A fairly large number of specimens of *A. piriformis* were found in a reddish brown limestone in Aucellabjerget on Store Koldewey Island along with *A. crassicollis*. The rock consists for the most part of more or less well-preserved *Aucella* shells; it further contains a number of fragments of gneiss, as also small flakes of white and black mica, garnet etc. Secondary are here and there secreted groups of calcite.

The left valve short, pyriform, rather oblique, strongly inflated, thickest about the middle; the beak short, curved inwards and somewhat forwards; the surface covered with regular, fairly sharp, concentric folds. — The right valve obliquely oviform, evenly but much less strongly arched than the left valve; its greatest thickness lying above the middle and from here lessening evenly towards the ventral margin; the beak pointed, somewhat prominent and inclined forwards; the surface like that of the left valve.

Right valve: length 38 mm, breadth 32 mm and thickness 16 mm; angle at the beak ca. 70°.

The specimens seem to agree exceedingly well with Toula's form from Kuhn Island.

Distribution. North-East Greenland: along with *A. crassicollis* in Aucellabjerget on Store Koldewey (many spec.). — Kuhn Island (2nd German North Pole Expedition).

Nova Zembla: in the *Aucella* deposits.

Russia: the species has a wide distribution in deposits belonging to the zone with *Polyptychites polyptychus*.

Germany: Neocomian beds.

Alaska (?): Neocomian beds.

18. **Aucella concentrica** Fischer sp. (non Keyserling, non Eichwald).

Pl. XXXII, figs. 9 and 10.

1830—37. *Inoceramus concentricus* Fischer de Waldheim, Oryctographie du Gouvernement de Moscou, p. 177; Pl. 20, figs. 1—3.

1888. *Aucella piriformis* Lahusen (*pars*), Ueber die russischen Aucellen, p. 42; Pl. 5, figs. 1—2.

1907. — *concentrica* Fisch.; Pavlow, Enchaînement etc., p. 66; Pl. 5, figs. 27—28.

Numerous specimens of this species are present, all from Aucellabjerget, where they occur in a yellowish-white shell-breccia, which seems to be almost exclusively formed of larger and smaller specimens of this species.

Oviform, very oblique. The two valves very different. The left strongly inflated, slightly elongated behind; the margins at the beak almost straight, continuing evenly through the lateral margins into the almost semicircular ventral margin; the beak pointed, inclined strongly inwards and somewhat backwards. The right valve considerably less arched, almost circular, but a little oblique and with projecting and pointed beak, which is bent slightly forwards. — Surface of the casts in the neighbourhood of the beak smooth or with few, faint, concentric folds; further down towards the ventral margin well-developed, fairly sharp, concentric folds; the folds of the left valve finer and denser than those of the right.

The following measurements are of two valves from different shells:

	Left valve	Right valve
Length	ca. 45 mm.	ca. 33 mm.
Breadth	- 34 —	31 —
Thickness	18 —	8 —
Angle at umbo	ca. 80°.	ca. 95°.

The specimens agree well with Pavlow's description and figures, among other things also in the fact, that smaller right valves have a more triangular outline.

Distribution. North-East Greenland: Aucellabjerget on Store Koldewey Island (very numerous specimens).

Russia: in the zone with *Polyptychites polyptychus*.

Germany: in Neocomian deposits.

A number of small specimens of an *Aucella* were found in 2 of the black calcareous concretions occurring as boulders in the neighbourhood of Danmarks Havn. They are unfortunately too small and imperfect for the species to be determined. They seem to show some resemblance however to *A. terebratuloides*.

19. **Posidonomya ornati** Quenstedt sp.

Pl. XXXIII, figs. 2 and 3.

1858. *Posidonia ornati* Quenstedt, Der Jura, p. 551; Pl. 72, fig. 29.
1883. *Posidonomya ornati* — ; Lahusen, Jurass. Bild. des Rjasanschen Gouv., p. 25; Pl. 2, fig. 8.
1895. — *Buchi* Roem.; Stremoouchow, *Posidonomya Buchi* Roem. des schistes de Balaclava, p. 391; Pl. 1, figs. 1—8.

The shell fairly small, oblique and oblong, slightly arched. The cardinal margin straight, very long. The beak pointed, but little projecting, curved slightly backwards. Surface covered with numerous regular, dense, concentric ribs.

None of the specimens are so complete, that measurements can be given.

Distribution. North-East Greenland: Down from "Trækpasset" on Store Koldewey Island in a loose-lying boulder, 50 m above the sea (numerous specimens).

Russia: in deposits belonging to the Bathonian and Callovian.

Germany: Callovian.

20. **Pinna** sp.

Fragments of a large *Pinna* species were found in boulders on the south side of Vesterdalen at Danmarks Havn. The available material is far too insufficient to permit of even an approximate determination of the species.

21. **Perna groenlandica** n. sp.

Pl. XXXIII, figs. 4 and 5.

The shell linguiform with pointed, but slightly curved, terminal umbo. Angle between cardinal and anterior margins ca. 70°. Cardinal margin straight. Anterior margin very slightly concave, almost straight, merging evenly into the ventral margin and this again into the posterior margin. The surface with broad, faint, concentric folds. The right valve but slightly, the left considerably arched, with the highest part lying nearest the anterior margin sloping evenly downwards towards the wing. The cardinal margin with 8—10 broad ligamentary grooves, separated by narrow interspaces.

Right valve: height (measured from point of umbo to furthest point of the ventral margin) 63 mm, greatest breadth (measured at right angles to height) 35 mm and the thickness ca. 5 mm. — A cast from a left valve measured: height 80 mm, breadth ca. 46 mm and thickness ca. 12 mm.

A small specimen (26 mm high and 16 mm broad) has most of both valves preserved; otherwise there is practically nothing but casts.

The shell described seems to have great resemblance with *P. lamellosa* LAHUS., which I only know however from LAHUSEN's description and figure [1]. It lacks however the regular, sharp lines of growth, has a straighter cardinal margin and seems to be less strongly arched. The *Perna* mentioned by LUNDGREN from Cape Stewart in East Greenland [2] is so badly preserved, that it is impossible to say with certainty, if it is identical with *P. groenlandica*; but this does not seem to be the case.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (15 valves, 6 of them connected in pairs).

22. **Gervilleia** sp.

A specimen of a small *Gervilleia* is so imperfect, that a certain determination of the species is impossible. The wing is comparatively large; the hinge seems to have many ligamentary grooves. The specimen was found in a loose-lying boulder at "4. Sænkning" on Store Koldewey Island.

23. **Pecten (Entolium) demissus** BEAN.

Pl. XXXIII, fig. 8.

(1829) 1835. *Pecten demissus* BEAN; PHILLIPS, Geology of Yorkshire, I. Pl. 6, fig. 5.
1836. *Pecten demissus* PHILL.; GOLDFUSS, Petref. Germ. II, p. 74; Pl. 99, fig. 2.
1854. — — — ; MORRIS and LYCETT, Mollusca from the Great Oolite. Part. III, p. 127; Pl. 14, fig. 7,
1858. — — — ; QUENSTEDT, Der Jura, p. 353, 381 and 553; Pl. 48, fig. 6 and Pl. 72, fig. 27.
1866. — — BEAN; LINDSTRÖM, Trias- och Juraförsteningar från Spetsbergen, p. 14; Pl. 3, figs. 9—10.
1869. — — PHILL.; BRAUNS, Der mittlere Jura, p. 270.
1881. — — — ; TULLBERG, Aucellen-Schichten Novaja-Semljas, p. 24.
?1883. — — BEAN; LAHUSEN, Jurass. Bild. des Rjasanschen Gouv., p. 24; Pl. 2, fig. 4.

Only a single specimen can be referred to this species.

The valve but slightly arched; circumference oval, very nearly circular. The angle at the umbo ca. 120°. The ears extending somewhat out over the cardinal margin, small; cardinal margin relatively short (ca. 1/3rd of the whole breadth of the valve). Both the wings with a blunt angle. Surface of the valve covered with fine, concentric striae.

Height 30 mm, breadth 27 mm; length of the cardinal margin 9 mm.

Distribution. North-East Greenland: in a boulder on the east side of Harefjæld at Danmarks Havn (1 spec.).

[1] LAHUSEN: Jurass. Bild. des Rjasanschen Gouv., p. 91; Pl. 2, fig. 9.
[2] B. LUNDGREN: Jurafossil från Kap Stewart i Ost-Grönland, p. 202.

? Spitzbergen: in deposits belonging, according to Pompeckj, to the "? Portlandian (-Lower Chalk)".

Nova Zembla: in the *Aucella* deposits.

Russia: Callovian.

Germany: Dogger (from the "Coronaten-Schichten" to the Parkinsonia zone).

England: Dogger—Lowermost Malm (from Lower Oolite to Coralline Oolite).

24. **Pecten (Entolium) cingulatus** Phillips.

Pl. XXXIII, fig. 7.

(1829) 1835. *Pecten cingulatus* Phillips, Geology of Yorkshire, I, Pl. 5, fig. 11.
1836. *Pecten cingulatus* Phillips; Goldfuss, Petref. Germ., II, p. 74; Pl. 99, fig. 3.

The valve oval, but little arched; the angle at the umbo ca. 90°; from each side of the umbo a narrow depression down along the sides, losing itself at about halfway down the valve. The ears small, with slightly blunt angles and somewhat rounded corners. The surface with fine, concentric rings of growth.

Height 21 mm, breadth 18 mm.

The species described resembles greatly the *Pecten* figured by Lahusen[1] as *P. demissus*, but its surface seems to have a different character. It is doubtful, whether a couple of valves from boulders found at Danmarks Havn on the south side of Vesterdalen can be referred to *P. cingulatus*, as the form of the ears cannot be seen. The same applies to a couple of specimens from the boulder with *Aucella mosquensis* from Harefjæld.

Distribution. North-East Greenland: in the reddish brown, loose-lying sandstone down from "Trækpasset" (50 m above the sea) on Store Koldewey Island (1 spec.).

Germany: Lias to Lowermost Malm.

England: Cornbrash (Upper Dogger).

25. **Pecten (Entolium) erraticus** Fiebelkorn ?

1893. *Pecten* (*Entolium*) *erraticus* Fiebelkorn, Geschiebe der oberen Juraformation, p. 400; Pl. 14, fig. 12.

Some specimens of a very flat *Pecten* seem from their whole form and their surface, covered with regular, concentric furrows, to be referable to this species. As the form of the ears could not, however, be seen on the available specimens, the determination is somewhat uncertain.

Pecten erraticus is given by Fiebelkorn as occurring in Pommerania in boulders, which he refers to the Middle Kimmeridgian.

[1] Lahusen, Die Fauna der Jurass. Bild. des Rjasanschen Gouv., Pl. 2, fig. 4.

Distribution. North-East Greenland: only found in boulders in the neighbourhood of Danmarks Havn, on the north side of Vesterdalen (2 spec.) and on the south side (3 spec.), also together with *Aucella mosquensis* at Harefjæld.

26. **Pecten (Camptonectes) Broenlundi** n. sp.

Pl. XXXIV, figs. 5 and 6.

Large, circular Bivalve with very unequal valves. Angle at the umbo ca. 120°.

Left valve strongly arched; ears fairly small, not reaching over the cardinal margin and not very sharply distinct from the rest of the valve; the outer corner of both ears forming a blunt angle.

Right valve almost perfectly flat; outer corner of its posterior ear almost a right angle; anterior ear not seen. — The surface of both valves with numerous fine and a few coarse lines of growth, and crossing these almost at right angles characteristic, somewhat undulating, fine, deepened lines, which are frequently interrupted especially by the stronger lines of growth. Under the lens other, very fine, depressed lines, usually cutting the first-named, radial lines at a very pointed angle. The sculpture stronger on the wings and in the neighbourhood of these, of a characteristic, papillose character.

Left valve: height 99 mm, breadth 97 mm and thickness ca. 18 mm; length of cardinal margin ca. 45 mm.

In the light-gray sandstone from the top of Muschelberg on Hochstetter's Foreland some imprints were found of a large *Pecten*, which from their whole form might well belong to the same species as the above; unfortunately, small crystals of quartz have been secreted on the imprints, so that it is impossible to determine the nature of the surface of the valves. Thus, a certain determination cannot be made. This applies also to a cast found in a boulder on the south side of Vesterdalen at Danmarks Havn. It seems, however, to be distinct from *P. Broenlundi*, having a somewhat broader outline, a more pointed umbo and unusually flat lateral portions. It is thus even more doubtful, if this specimen can be placed under this species.

The form described resembles somewhat *P. imperialis* Keys., both in form and especially sculpture. It is readily distinguished from this, however, among other characters, by both its valves (and especially the right valve) being considerably less arched; further, its cardinal margin is relatively much shorter. *P. Broenlundi* has greater resemblance to *P. validus* Lindstr., but its left valve is more strongly arched, and the front margin below the anterior ear of the right

valve has a somewhat different form, its concavity being considerably fainter than is the case in *P. validus*.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (9 spec.). — ? Top of Muschelberg on Hochstetter's Foreland (3 spec.). — ? In a boulder from the south side of Vesterdalen at Danmarks Havn (1 spec.).

27. **Pecten (Camptonectes)** sp.

From "Kløft II" on Store Koldewey Island we have 3 double-valved specimens and a single left valve of a *Pecten*, which does not seem referable to any species hitherto described.

The valve is circular in outline with but little prominent umbo, which bends strongly forwards. The left valve strongly inflated; the posterior ear small, almost rectangular; the anterior ear not visible; the adductor scar rounded-triangular; no sculpture apparent on the surface. The right valve quite flat; its cast with a broad and deep furrow from the umbo down to the middle of the anterior margin; a similar, but less deep furrow along the upper part of the posterior margin; the surface — at least near the ventral margin — with fine, dense, fairly regular, concentric lines, as also radial lines of a similar nature; the surface of the valve thus has a characteristic, papillose character, similar to that in *P. lens* Sow.

Left valve: height 87 mm, breadth 84 mm and thickness ca. 15 mm.

The species described, the casts of which — owing especially to their obliquity — resemble to a certain extent casts of an *Ostrea*, has some resemblance to *P. validus* Lindstr., from which however it is distinguished by its left valve being not a little more arched; further, the two folds, which run on the inner side of the right valve along respectively the anterior and posterior margin, are much more marked and longer than in *P. validus*. The specimens probably belong to a new species, related to *P. lens* Sow.

28. **Pecten (Camptonectes)** sp.

In the same boulder which contained *Pecten demissus* and which came from the east side of Harefjæld at Danmarks Havn, there was also a single, small valve of another *Pecten*. The sculpture of the valve shows, that it belongs to the subgenus *Camptonectes*. A closer determination is impossible, however, as the whole of the region near the cardinal margin is wanting.

In addition to the species of *Pecten* mentioned above, the Danmark Expedition has also brought home 3 others from the Jurassic deposits in North-East Greenland. One was found in "Kløft II" on Store Koldewey Island; it is a shell of medium size, somewhat arched and with smooth surface. — The second species is fairly strongly arched and has had somewhat coarse radial ribs; it was found in a boulder of coarse-grained, gray sandstone lying at a height of 45 m above the sea down from "Trækpasset" on Store Koldewey Island. Lastly, in the sandstone from the top of Muschelberg on Hochstetter's Foreland a fragment was found of a cast of a left valve; the form of the ears shows, that this valve belongs to a species different from those described in the foregoing.

The imperfect state of preservation of all these shells prevents an exact determination.

29. **Ostrea** sp.

A few, more or less incomplete shells of an *Ostrea* of but little characteristic form were found at "Kløft I" on Store Koldewey Island. A couple of them seem partially to agree with *O. kharoschovensis* Rouill., but the imperfect material does not permit of a certain determination. The same applies to fragments of an *Ostrea* shell from "4. Sænkning" on Store Koldewey Island.

From the sandstone from the top of Muschelberg on Hochstetter's Foreland there is a cast of a single, large *Ostrea* valve. — Here also the species cannot be determined.

Probably these *Ostrea* fragments represent several species.

30. **Modiola Strajeskiana** d'Orbigny sp.

Pl. XXXIII, fig. 9.

1845. *Mytilus Strajeskianus* d'Orbigny in Murch., Verneuil et Keys., Géol. de la Russie d'Europe, II, 3., p. 463; Pl. 39, figs. 22—23.

A portion of a left valve, of which however only the inner side is to be seen, and the whole of the cast belonging to it seems referable to this species.

Elongated oval, considerably arched with a rounded ridge from the beak to the posterior end. The umbo somewhat behind the anterior end, but little prominent. The cardinal margin slightly curved, passing evenly over into the posterior margin; ventral margin straight. Surface with concentric lines of growth and — in the region above the ridge — with numerous fine radial striae. A furrow on the cast along the cardinal margin.

Height of cast 34 mm, length 82 mm and thickness 24 mm.

The only difference apparent between the specimen described and d'Orbigny's species is, that the posterior end in the Greenland form is somewhat less blunt and a little narrower; the result of the latter is that the cardinal margin is more curved. As there seems to be complete agreement otherwise, I do not think that there is reason for hesitating to refer this specimen to the species mentioned, especially as 3 other (less well-preserved) specimens agree in this regard with d'Orbigny's description and figures.

Distribution. North-East Greenland: "Kløft I" (3 spec.) and "Kløft II" (1 spec.) on Store Koldewey Island. — Top of Muschelberg on Hochstetter's Foreland (1 spec.). — ? Kuhn Island (2. German North Pole Expedition).

Russia: North Urals in Oxfordian.

31. **Modiola** sp.

In boulders from the south side of Vesterdalen at Danmarks Havn a couple of specimens were found of a *Modiola*, which belongs perhaps to a hitherto undescribed species. The material is however too incomplete to permit of a quite certain determination.

The best preserved valve is 30—35 mm long, but little arched, narrow in front and considerably broader behind. The umbo small, lying near the front end. A ridge fairly sharp at first, then more rounded, runs from the umbo obliquely downwards towards the lowermost part of the ventral margin. The surface with comparatively coarse, concentric lines.

The present form greatly resembles *M. Lonsdalei*, but is not nearly so much arched as the latter. It is probable, however, that it has originally been somewhat more arched than now, as its flatness is at least in part due to compression.

32. **Modiola hannoverana** Struckmann ?

1878. *Modiola hannoverana* Struckmann, Ob. Jura Hannover, p. 84; Pl. 2, fig. 1.
1906. — — — ; Borissjak, Pelecypoden der Jura-Ablagerungen im europ. Russland, III, p. 9; Pl. 2, figs. 1—4.

A couple of specimens of a *Modiola* greatly resemble this species, but they are so incomplete, that a certain determination is impossible.

Shell rather inflated; beaks nearly terminal, triangular-oval, narrowing towards the ventral margin; cardinal margin long and straight; the region in front of the umbo very short, separated from the rest of the valve by a broad furrow. The shell steep in front, sloping more gradually backwards, passing evenly into a relatively

large, flat "wing". Surface with fairly coarse, concentric ribs and with some fine, concentric lines.

Greatest length of the shell 14 mm, its breadth ca. 8 mm (measured at right angles to the length).

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (2 spec.).

Russia: in limestone deposits of the Donez-Jurassic.

Germany: Upper Jurassic.

33. **Yoldia** sp.

A specimen of a small *Yoldia* was found in one of the black calcareous concretions occurring as boulders in Vesterdalen at Danmarks Havn. Unfortunately the specimen is so badly preserved, that a certain determination is impossible.

34. **Macrodon Keyserlingii** d'Orbigny sp.

1846. *Arca elongata* Sow.; Keyserling, Petschora-Land, p. 305; Pl. 17, figs. 1—4.
1850. — *Keyserlingii* d'Orbigny, Prodrome de Paléont., I, p. 369.
1883. *Macrodon Keyserlingii* d'Orb.; Lahusen, Jurass. Bild. Rjasanschen Gouv., p. 28; Pl. 2, figs. 14—15.
1905. — — — ; Borissjak, Pelecypoden der Jura-Ablagerungen im europ. Russland, II, p. 2 and 42; Pl. 1, figs. 5—8.

A left valve of a large *Macrodon* seems referable with certainty to this characteristic species. Only the inner side of the valve is accessible for examination however. The valve is strongly arched, very elongated, with very unequal sides. The anterior margin meets the cardinal margin at a slightly blunt angle, and the ventral margin shows a relatively deep concavity.

Height ca. 20 mm, length 50 mm.

A fragment of a right valve probably belongs here also.

Distribution. North-East Greenland: "Kløft II" on Store Koldewey Island (1 spec.). ? In a loose-lying stone at "4. Sænkning" (1 spec.).

Russia: in deposits belonging to Middle Callovian — Séquanian.

35. **Macrodon Schourovskii** Rouillier sp.

1847—48. *Cucullaea Schourovskii* Rouillier, Études progr. Géol. Moscou, II, p. 428. Pl. H, fig. 39.
1900. *Macrodon* — — sp.; Pompeckj, Jurassic Fauna of Cap Flora, p. 67; Pl. 1, fig. 17.
1905. — — — - ; Borissjak, Pelecypoden der Jura-Ablagerungen im europ. Russland, II, p. 12 and 48; Pl. 2, figs. 10-12.

Only a left valve can be referred to this species.

The valve trapezoidal, strongly arched; the umbo somewhat in front of the middle, inclined forwards rather strongly. Ventral margin

straight, almost parallel to the cardinal margin; posterior margin without concavity. A rounded keel from the umbo down to the posterior part of the ventral margin, bounding in front the hindmost, concave region of the valve. Area low. Surface with concentric striae.

Height 9·5 mm, length 19 mm, thickness (of the single valve) 5 mm.

Distribution. North-East Greenland: in a boulder on the south side of Vesterdalen at Danmarks Havn (1 spec.).

Franz Josephs Land: in Middle Callovian.

Russia: in Lower Volga deposits in Central Russia.

36. **Macrodon Mylii** n. sp.

Pl. XXXIV, fig. 1.

The shell little arched, very oblique, elongated in a diagonal direction. Anterior end narrow, posterior end very broad; the wings not sharply marked off from the rest of the shell; the diagonal ridge very much rounded and but little prominent. The beaks but little projecting, almost touching one another. The anterior margin rounded, forming a rounded corner with the cardinal margin. The posterior margin likewise somewhat curved, without concavity, forming a blunt angle with the ventral margin; the size of this angle increasing with age. The ventral margin with quite a slight concavity in its front part. The surface covered with concentric, regular folds, overlapping like tiles. Here and there — especially on the most strongly arched region of the shell — faint radial furrows. Area little evident, quite unusually low. The hinge not accessible for examination.

Height 14 mm, length 23 mm, thickness (2 connected valves) 7 mm.

This species is very nearly related to *M. Rouillieri* Lah., but is distinct from it by being much less arched and less elongated. In connection with the former characteristic, the ridge is much less prominent and the area considerably lower.

I have named the species after the leader of the Danmark Expedition, the author Mylius-Erichsen, who met his death on the icefields of Greenland.

Distribution. North-East Greenland: lying loose in the middle sandstone region of Store Koldewey Island (1 entire specimen).

37. **Macrodon Hagenii** n. sp.

Pl. XXXIV, figs. 3 and 4.

One or two, somewhat incomplete shells of a *Macrodon* greatly resemble *M. Keyserlingii*, but are so different, that I think it best to

describe them as a new species, which I have called after First-Lieut. N. P. HOEGH-HAGEN, the companion and fellow-sufferer of MYLIUS-ERICHSEN. The material, as mentioned, is somewhat imperfect. The best preserved specimen is a left valve, of which only the posterior half is preserved and the following description applies to it.

The valve not much arched; the umbo far in front of the middle of the shell; the posterior margin with a deep concavity; the ventral margin (on the preserved portion of the valve) almost parallel with the cardinal margin. Area fairly low. The surface covered with the usual concentric folds and radial ribs. From the umbo down to the front part of the ventral margin a characteristic, narrow depression, bounded posteriorly by a greatly raised edge and likewise well-defined in front; the middle part of the depression slightly raised and characterized by a narrow, but relatively deep concavity on the concentric lines.

From the same locality there is a right valve, which should rather be described as a cast with a portion of the valve preserved. It has an extremely irregular form, which is perhaps however due to pressure in part. The valve is strikingly high and its middle part is fairly strongly arched. The posterior wing has a distinct incision and the anterior margin forms almost a right angle with the cardinal margin. It is somewhat uncertain whether this valve belongs to the above species, but it is probable, as *inter alia* it also has the characteristic radial furrow from the beak to the ventral margin; on the ventral margin a narrow, but relatively deep concavity corresponds to this furrow. The height of the valve is 15 mm, its length 22 mm.

In form the species has some resemblance to *M. parallelum* ILOVAÏSKY, but is much higher.

Distribution. North-East Greenland: lying loose with the previous species in the middle sandstone region of Store Koldewey Island (1—2 spec.).

38. **Astarte striato-costata** MÜNSTER.

Pl. XXXIII, fig. 11.

1837. *Astarte striato-costata* MÜ.; GOLDFUSS, Petref. Germ., II, p. 192; Pl. 134, fig. 18.
1883. — — GOLDF.; LAHUSEN, Jurass. Bild. des Rjasanschen Gouv., p. 31; Pl. 2, fig. 26.

Very numerous specimens of one or several *Astarte* species were found in a coarse-grained sandstone from "Kløft II" on Store Koldewey Island. They are all badly preserved, almost without exception; some of them can perhaps be referred to *A. minima* PHILL., whilst a few larger specimens are sufficiently well-preserved, that they can be determined as *A. striato-costata* MÜ.

The shell fairly flat, ovoid to circular with small, pointed, median umbo. The anterior margin somewhat concave; the posterior margin straight, passing evenly over into the rather strongly curved ventral margin. The older parts of the shell covered with dense, concentric folds and with finer concentric striae; the younger parts smoother, with fainter concentric folds and striae.

Height and length 9 mm.

The available specimens show such great resemblance to some of the figures given by Ilovaïsky (especially with fig. 19) of *A. depressoides* Lahus.[1], that one might be tempted to refer them to this species, or perhaps more correctly to *A. levilimbata* Ilovaïsky, which is only distinguished from the former by having a smooth margin and can thus probably not be separated from it. On the other hand, they differ considerably in form from Lahusen's figures of this species[2], to which therefore I have not ventured to refer them.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (3 spec.).

Russia: in the zone with *Aspidoceras biarmatum* (Oxfordian).

Germany: Upper Dogger.

39. **Astarte minima** Phillips.

(1829) 1835. *Astarte minima* Phillips, Geology of Yorkshire, I; Pl. 9, fig. 23.
1853. *Astarte minima* Phillips; Morris and Lycett, Mollusca from the Great Oolite, II, p. 82; Pl. 9, fig. 10.
1858. — — — ; Quenstedt, Der Jura, p. 444; Pl. 61, fig. 4.
1861. — — — ; Trautschold, Recherches géologiques etc., p. 82; Pl. 7, fig. 6.

The shell strongly rounded-triangular, almost circular, fairly flat. The beak but little prominent. The surface covered with 10—12 rather coarse, concentric folds; the folds nearest the umbo the strongest; the younger part of the shell almost perfectly smooth.

Height ca. 3 mm; length a little more.

The available specimens from "Kløft I" agree well in form with the specimen figured by Trautschold from the black sand at Mniowniki, but seem to differ therefrom in the fact, that the folds are lost down towards the ventral margin. From English and German specimens they are distinguished by their less triangular form. Possibly they should rather be regarded as young specimens of *A. depressa* Quenst. (Der Jura, p. 505; Pl. 67, figs. 29—34) from "Brauner Jura ε"; in this species, namely, the younger parts of the shell may also be smooth as in the Greenland specimens.

[1] Ilovaïsky: L'Oxfordien et le Séquanien etc., p. 256; Pl. 9, figs. 12—22.
[2] Lahusen: Jurass. Bild. des Rjasanschen Gouv., Pl. 2, fig. 27.

Loose-lying stones from "4. Sænkning" contain a number of specimens, up to 9 mm high, of an *Astarte* with crenulated margin; these may also be referred probably to the present species.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (5 spec.); "4. Sænkning" on the same Island (many spec.).

Russia: black sand at Mniowniki.

Germany: Brauner Jura ε in Wurthemberg.

England: Great Oolite.

40. **Astarte alta** n. sp.

Pl. XXXIV, fig. 2.

The shell comparatively high and short, moderately arched, triangular-ovoid. The umbo median, pointed and very projecting, and bent somewhat forwards. The posterior margin slightly convex, passing rather abruptly into the strongly curved ventral margin; the anterior margin slightly concave. From the umbo down to the posterior part of the ventral margin a slightly concave depression. Lunula distinctly marked off. The surface covered with numerous, somewhat irregular, rather sharp, concentric ribs. The margin of the shell crenulated.

Height 13·5 mm, lenght 12 mm and thickness (of a single valve) 5 mm.

This species is distinguished from *A. striato-costata* Mč. by its high form and stronger ribs on the younger parts of the shell.

Distribution. North-East Greenland. "Kløft I" on Store Koldewey Island (1 spec.).

41. **"Astarte" retrotracta** Rouillier.

1847 48. *Astarte retrotracta* Rouillier, Études progr. Géol. Moscou; II étude, p. 414; Pl. G. fig. 29.

The valve small, oval, strongly arched. The umbo behind the middle of the valve, inclined somewhat forward; in front of it a distinct, oval lunula.

The shell itself is only in part preserved in the single available specimen; it seems to have been thin; its surface has only had finer and coarser concentric striae. The hinge cannot be seen for examination.

Height 9 mm, length 11·5 mm and thickness (of the cast of a left valve) ca. 3·5 mm.

Although the hinge is not known in the only specimen and the margin of the shell seems to be smooth, the resemblance otherwise

is so great — among other things in the characteristic position of the umbo — that I venture to refer the specimen to *A. retrotracta*.

Distribution. North-East Greenland: at "4. Sænkning" on Store Koldewey Island (1 left valve).

Russia: in "3. Etage" at Moscow.

42. **Tancredia curtansata** Phillips sp.

(1829) 1835. *Corbula curtansata* Phillips, Geology of Yorkshire. I. Pl. 3, fig. 27.
1854. *Tancredia* — — ; Morris and Lycett, Mollusca from the Great Oolite. III. p. 93; Pl. 13, fig. 7.

The shell rounded, obliquely triangular. The umbo somewhat behind the middle, little projecting. The anterior part of the shell compressed, pointed; the posterior part moderately arched. The margin in front of the umbo concave; the posterior margin convex, somewhat blunt, the ventral margin evenly curved. The hinge with a cardinal tooth and a long, posterior, lateral tooth in each valve. The surface of the shell with fine and coarse lines of growth.

A cast of a right shell: height 22 mm, length ca. 33 mm and thickness ca. 5·5 mm.

Distribution. North-East Greenland: in loose-lying stones at "4. Sænkning" on Store Koldewey Island (2 valves).

England: in Great Oolite and Coralline Oolite.

43. **Tancredia planata** Morris & Lycett.

Pl. XXXIII, fig. 10.

1854. *Tancredia planata* Morris & Lycett; Mollusca from the Great Oolite. III. p. 94; Pl. 13, fig. 10.

Some casts, one of which is almost perfect, seem to agree well with Morris and Lycett's above-cited description and figures (especially with fig. 10 b).

The shell triangular-oval, fairly flat. The umbo small, almost in the middle. The cardinal margin in front of the umbo slightly concave, behind the umbo slightly convex. The anterior margin rounded; the posterior margin likewise rounded, slightly truncate; the ventral margin evenly curved. The hinge not visible for examination.

The cast of a left valve: height 17 mm, length 25 mm.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (1 spec.). In free-lying stones at "4. Sænkning" on the same island (2 spec.).

England: Great Oolite.

44. **Tancredia axiniformis** Phillips sp.

Pl. XXXV, fig. 1.

(1829) 1835. *Nucula axiniformis* Phillips, Geology of Yorkshire. I. Pl. 11, fig. 13.
1850. *Tancredia extensa* Lycett, Fossil Shells from the Inf. Oolite. p. 407; Pl. 11, fig. 9.
1854. — *axiniformis* Phill.; Morris and Lycett, Mollusca from the Great Oolite. III. p. 93; Pl. 12, fig. 7 and Pl. 13, fig. 6.

The shell rather flat, triangular-oval, elongated. The umbo almost in the middle, pointed. The anterior and posterior margins almost straight, passing very abruptly into the slightly curved ventral margin. The front part of the shell less arched than the posterior part. In the neighbourhood of the posterior margin a somewhat rounded, but very distinct radial ridge; the region behind this somewhat concave. The surface of the shell with fine lines of growth.

Height ca. 13 mm, length ca. 24 mm, thickness (of a single valve) ca. 2·5 mm.

All the available specimens are badly preserved; they seem to agree very well with Morris and Lycett's fig. 7, Pl. 12. — Along with this a portion of the cast of a right shell was found, which possibly belongs to the same species. This seems to show, that each valve has had a blunt cardinal tooth and an elongated, posterior, lateral tooth.

For the sake of comparison I have had specimens from Langrune and Ranville (Calvados); the only difference between these and the Greenland specimens seems to be, that the ventral margin in the latter is a little more curved, thus causing the whole form to be a trifle higher.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (5 spec., 1 with both valves). In free-lying stones at "4. Sænkning" on the same island (3 valves). — On the south-east slope of Muschelberg (Hochstetter's Foreland) at a height of 370 m above the sea (1 valve?).

England: Inferior Oolite and Great Oolite.

France: in Grand Oolite.

45. **Tancredia Jarneri** n. sp.

Pl. XXXV, fig. 3.

A number of characteristic casts seem referable to all appearance to a new species of the genus *Tancredia*.

Description of the cast: strongly arched; the form somewhat variable, oblong, triangular-oval. The anterior end rounded, sometimes rather pointed; the posterior end blunter; the ventral margin rather slightly curved. The umbo almost median, little prominent.

In the neighbourhood of the cardinal margin and in front of the umbo a somewhat excavated region; between this and the cardinal margin an oblong, small but strong prominence, and in front of this a larger projection (imprint of the anterior adductor), which is lost below. Behind the umbo a depression which runs in an oblique direction towards the posterior part of the ventral margin, though not reaching quite to the latter; it is bounded posteriorly by a projecting part (imprint of the posterior adductor). Along the posterior part of the cardinal margin a broad furrow, which vanishes after passing a small, marked depression lying above the impression of the posterior adductor. The impressions of the adductors not distinctly marked off; the pallial line without sinus. Of teeth only 1 cardinal tooth apparent in each valve, that of the left valve lying in front of that of the right.

As mentioned, the form varies considerably, as is shown by the following measurements of two casts:

Height	Length	Thickness
32 mm	68 mm	20 mm
37 —	54 —	17 —

All transitions seem to occur between the extreme forms, so that all the available specimens probably belong to one and the same species. — A few fragments preserved of the shell itself show, that the surface of the shell has been covered with the usual, concentric lines of growth.

During the Danish Expedition to the east coast of Greenland in 1891—92 a single cast of a left valve of the same or a very nearly related species was found at Cape Stewart. The incompleteness of the material does not permit of a certain determination. Lundgren, who worked up the Jurassic fossils brought by the Expedition from Cape Stewart, does not mention this specimen.

Distribution. North-East Greenland: "Kløft II" on Store Koldewey Island (22 casts). In a loose-lying stone at "4. Sænkning" on the same island (cast of a left valve). — In loose-lying stones from the river-bed through Muschelberg on Hochstetter's Foreland (3 casts). Top of Muschelberg (cast of two connected valves).

East Greenland: ? Cape Stewart (cast of a left valve).

46. **Lucina substriata** Roemer?

1835. *Lucina substriata* Roemer, Verst. des norddeutsch. Oolithen-Geb. p. 118; Pl. 7, fig. 18.

1874. — — — ; Brauns, Der obere Jura. p. 285.

I have not been able to refer some rather badly preserved specimens of a *Lucina* with full certainty to any earlier described species. They seem to come nearest to *L. substriata*, to which they

should possibly be referred. They are more or less complete casts, with here and there the inner layer of the shell preserved.

The shell to some extent circular, somewhat elongated in front. The umbo almost median, somewhat projecting. The posterior part of the circumference of the shell semicircular, but with a pair of faint concavities. The margin in front of the umbo strongly concave. On the hindmost portion of the shell a deepened part, extending from the umbo down along the posterior margin; this depression well-marked on the cast. The surface probably with fine, concentric striae and with fine radial lines; the latter also apparent on the cast. — The hinge and muscular impressions not apparent.

Height ca. 47 mm, length ca. 51 mm and thickness (cast of a double-valved spec.) 19 mm. The largest specimen is ca. 60 mm high.

A small, badly preserved specimen from "4. Sænkning" perhaps belongs to the same species, but seems to be more strongly arched than the other Greenland specimens.

Distribution. North-East Greenland: "Kløft II" on Store Koldewey Island (3 spec., 2 of them double-valved). ? At "4. Sænkning" in loose-lying stone (1 spec.).

Germany: in Kimmeridgian at numerous localities in North Germany.

France: in Kimmeridgian-Portland.

47. **Protocardia** sp.

I have not been able with certainty to refer some specimens of a *Protocardia* to any species known to me.

The shell rather strongly inflated, rounded-trapezoidal, with unequal sides; the umbo inclined somewhat forwards. The anterior margin rounded and passing evenly into the rather slightly rounded ventral margin. The posterior margin somewhat elongated downwards and grading fairly evenly into the ventral margin. The whole of the surface, with exception of the hindmost part, smooth, showing only fine, concentric lines of growth. In the neighbourhood of the posterior margin a strongly rounded radial ridge; the shell behind this sloping very steeply down towards the posterior and cardinal margins. Behind the ridge ca. 8 rather faint radial ribs, and in front of the ridge a few still fainter. The part of the margin touched by the ribs crenulated, the remainder smooth.

A single valve is 19 mm high, 18 mm broad and ca. 6 mm thick.

Possibly the specimens described (3 in number), which were found in "Kløft I" on Store Koldewey Island, may be referred to

Pr. eduliformis Roem. sp. They seem to agree to a certain extent with Roemer's description of his *"Venus trapeziformis"*, which is said to be identical with the species mentioned, but nevertheless seem to be somewhat more strongly inflated. Owing to the lack of material for comparison I am not able to settle this question.

At "4. Sænkning" on Store Koldewey Island 4 specimens of a *Protocardia* were found, which may belong to the same species as the above-described from "Kløft I".

48. **Cyprina cfr. mosquensis** d'Orbigny.

Pl. XXXV, fig. 2.

Some casts of a *Cyprina* greatly resemble casts which are preserved in the collections of the Mineralogical Museum under the name *Cyprina mosquensis* d'Orb. and which are stated to have been found at Kharoschowo at Moscow. Unfortunately, I cannot find, where this form is described.

The cast evenly and comparatively slightly arched, rather oblique, with pointed, projecting umbo, which inclines strongly forwards. The angle at the umbo ca. 110°; the anterior margin grading evenly into the ventral margin and this again into the posterior margin. The hinge as usual in *Cyprina* with 3 cardinal teeth and 1 lateral tooth in the ventral valve posteriorly. Muscular impressions and pallial line not observed.

Height 14 mm, breadth 18 mm and thickness 7 mm.

The casts described differ from *C. mosquensis* especially in that they are somewhat less arched; further, the umbo is more pointed and inclined somewhat more forwards. But in the former character, especially, the Russian species seems to vary considerably.

Another cast from the same locality as the above greatly resembles these, but has a somewhat longer anterior end and in consequence a more median umbo and the ventral margin in a flatter curve. It is doubtful, therefore, whether it can be referred to the same species.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (3—4 specimens).

Russia: the above-mentioned specimens of *C. mosquensis* are stated to have been found at Kharoschowo in deposits belonging to Malm *β*.

49. **Cyprina kharoschovensis** Rouillier.

Pl. XXXV, fig. 4.

1847—48. *Cyprina kharoschovensis* Rouillier, Études progr. Géol. Moscou. II. p. 421; Pl. H, fig. 32.

The shell rounded, triangular, rather flat. The umbo far in front of the middle, bent strongly forwards. The anterior margin and the

front part of the ventral margin forming a semicircle; the posterior part of the circumference very like the half part of an ellipse. The shell strongly arched in the neighbourhood of the posterior margin, otherwise rather flat. No sinus on the pallial line. The hinge not observed.

Height of the cast 28 mm, its length 36 mm and thickness (of a single valve) ca. 7 mm.

To judge from the right valves the available casts agree very well with ROUILLIER's above-cited figure.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (1 spec.). At "4. Sænkning" also on Store Koldewey Island (1 spec.). — On the top of Muschelberg, Hochstetter's Foreland (2 spec.).

Russia: at Kharoschowo.

50. **Cyprina Syssollae** KEYSERLING.

Pl. XXXV, fig. 6.

1846. *Cyprina Syssollae* KEYSERLING, Petschora-Land, p. 309; Pl. 17, figs. 17—22.

The shell rounded-triangular, relatively higher and shorter than in the previous species, fairly flat. The umbo somewhat in front of the middle, rather prominent. — The front part of the cardinal margin more concave than in the previous species. Lunula not sharply marked off. The surface covered with coarse and fine, concentric striae.

All the available specimens (casts and imprints) are more or less defective; their form has been partly somewhat altered by pressure. The following measurements can be given of an imprint of a right valve somewhat deformed in this way:

Height 25 mm, length 29 mm and thickness ca. 9 mm.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (many spec.). At "4. Sænkning" on the same island (5 spec.). — Top of Muschelberg on Hochstetter's Foreland (1 spec.).

Russia: in deposits with *Belemnites Panderianus*.

51. **Cyprina cfr. inconspicua** LINDSTRÖM.

1865. *Cyprina inconspicua* LINDSTRÖM, Trias- och Juraförsteningar från Spetsbergen. p. 11; Pl. 3, figs. 7—8.

A cast of a left valve and a second specimen with the greater part of the shell preserved have a great resemblance to this species, but yet differ so much from it, that they must perhaps be referred to another species.

Oblong-oval, comparatively little oblique and rather strongly arched. The umbo a little in front of the middle. The circumference evenly rounded. The surface with fine, concentric lines of growth, otherwise smooth.

Height 18 mm, length 23 mm, thickness ca. 5 mm.

The available specimens differ from Lindström's original examples especially in that they are higher and more strongly arched. It is possible, however, that these original examples were somewhat deformed by pressure.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (1 spec.). In a loose-lying stone at "4. Sænkning" on the same island (1 spec.).

52. **Cyprina Panderi** Rouillier sp.?

1847—48. *Astarte Panderi* Rouillier, Études progr. Géol. Moscou. II. p. 413; Pl. G, fig. 28.

I am inclined to refer some few, incomplete shells to this species, especially from the nature of the surface.

The shell rather strongly arched, slightly triangular-circular, comparatively little oblique. The umbo a little in front of the middle. The surface with characteristic, sharp, canaliculated, concentric furrows at regular distances from one another; further with very fine, concentric lines.

Rouillier states, that this species forms a connecting link with the genera *Astarte, Lucina* and *Cyprina,* and that it is very nearly related to *C. Syssollae.* To judge from the hinge, which he figures, it seems most natural to refer it to the genus *Cyprina,* also because it lacks the distinct, anterior pedal scar which is characteristic for the genus *Astarte.*

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (3 spec.).

Russia: in the 2. Etage of the Moscow Jurassic.

53. **Pleuromya peregrina** d'Orbigny sp.

1845. *Panopaea peregrina* d'Orbigny; Murchison, de Verneuil et Keyserling, Géologie de la Russie d'Europe. II. p. 468; Pl. 40. figs. 10—12.

1847. *Panopaea peregrina* d'Orb.: Rouillier, Études progr. Géol. Moscou. II. p. 406.

1881—85. *Pleuromya peregrina* d'Orb.; Zittel, Handbuch der Palāontologie. II. fig. 179.

The shell thin, rather strongly arched, rounded triangular; the anterior margin truncated, the posterior margin more curved, the ventral margin slightly curved. The umbo somewhat in front of the middle, but little prominent, bent strongly inward and somewhat forward.

Height 15 mm, length 24 mm.

Of this species we have only a couple of valves, which agree well with some casts from the Moscow Jurassic; they seem only to be a little less arched. The characteristic nature of the surface cannot be observed, which is probably due however to the fact, that the surface of the valves is somewhat weathered.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey (1 spec.). In a loose-lying stone at "4. Sænkning" on the same island (1 spec.).

? Spitzbergen: at Advent Bay.

Nova Zembla: at Besimannaja.

Russia: at Kharoschowo.

54. **Goniomya** sp.

A single, very imperfect cast from the sandstone on the top of Muschelberg, Hochstetter's Foreland, must be referred to the genus *Goniomya* from its whole form and characteristic sculpture; to determine the species is impossible.

55. **Dentalium nodulosum** Lundgren.

1883. *Dentalium nodulosum* Lundgren, Jura- und Trias-Fossilien. p. 10; Pl. 2, figs. 7–9.

At several localities the *Dentalium* tubes belong to the fossils of most frequent occurrence in the sandstone. In any case a number of them seem referable to *D. nodulosum* Ldgrn.

Thick-walled, slightly bent tubes of up to 3 mm in diameter, frequently more or less uneven in thickness. The surface with coarse transverse lines and irregular constrictions and folds.

One might be inclined to think from their whole appearance, that these were *Serpula* tubes, but the structure of the shell agrees with that of the *Dentalium* tube.

Distribution. North-East Greenland: in boulders at Vesterdalen at Danmarks Havn (many spec.); "Kløft I" on Store Koldewey (numerous spec.). — In loose-lying stones at "4. Sænkning" on Store Koldewey Island (numerous spec.).

Spitzbergen: in the Jurassic.

In one of the black concretions occurring as boulders in Vesterdalen at Danmarks Havn 3 specimens were found of a small *Dentalium*. The shell is thin, smooth and shiny; but some irregular cross-wrinkles can be seen under the lens. The specimens are too imperfect to permit of a closer determination.

56. **Amberleya groenlandica** n. sp.

Pl. XXXV, fig. 5.

The shell turbinate with slightly arched whorls. Almost on the middle of the whorls a strong spiral ridge beset with a series of fairly large nodes; under this ridge and a little above the lower suture a similar spiral ridge with more numerous and smaller nodes; the interval between these ridges slightly excavated. The region between the upper suture and the upper ridge greatly excavated. Almost in the middle of this region, but a little nearer the suture a series of scattered nodes almost of the same size as those on the lower spiral ridge. The whole of the surface, further, covered with fine transverse ribs, at fairly regular distances from one another. The under-surface of the last whorl preserved rounded and with a number of raised spirals. Form of the mouth not observed.

Height 11 mm, thickness 10 mm.

I have not been able to refer the species described to any species known to me. In the Munich Museum I have seen some shells from Vaches noires (Calvados), which are labelled *Eucyclus (Littorina) Meriani* Goldf., a number of which have a considerable resemblance to the Greenland specimen, but the region above the upper ridge is flat and not excavated; further, the underside of the whorls is more strongly arched and there are also 2 rows of nodes over the upper ridge.

Distribution. North-East Greenland: in a loose-lying stone, found 50 m above the sea down from "Trækpasset" on Store Koldewey Island (1 spec.).

57. **Amberleya Jasicofiana** d'Orbigny sp.?

1845. *Turbo Jasicofianus* d'Orbigny in Murchison, Verneuil et Keyserling, Géologie de la Russie d'Europe. II. p. 451; Pl. 37, figs. 19—20.

A single cast of an *Amberleya* seems to agree perfectly with casts of this species which I have seen in Munich Museum, and which are stated to have come from Mniowniki at Moscow. For a certain determination, however, the material is too imperfect.

The last of the whorls preserved has borne 3 or 4 spiral ridges. The cross-section of the whorl is rounded, its height a little greater than the breadth.

Distribution. North-East Greenland: in a loose-lying stone from "4. Sænkning" on Store Koldewey Island (1 spec.).

58. **Natica** sp.

Some imperfect *Natica* shells (6 spec. from "4. Sænkning" and 2 spec. from "Kløft I" on Store Koldewey Island) cannot be deter-

mined to their species. In form most of them show a considerable resemblance to *N. plicata* MÜ. (GOLDFUSS: Petrefacta Germaniae. III. p. 119; Pl. 109, fig. 15) from Lindner Berg in Hanover, but the transverse folds of the last whorl seem to be wanting. — One of the two specimens from "Kløft I" is considerably smaller than the others and probably belongs to a different, more slender species.

59. **Turritella** sp.

Pl. XXXV, fig. 7.

From "Kløft II" on Store Koldewey Island there is a fragment of a *Turritella*, consisting of ca. 5, extremely well-preserved whorls. It probably belongs to a hitherto underscribed species.

Very elongate-turreted with numerous, flat whorls, separated by little obvious sutures. Uppermost on the younger whorls present a very narrow and quite faint excavated band, on which there is a pair of quite fine, raised spirals. The rest of the shell covered with numerous, rounded spirals of variable breadth and with somewhat variable interspaces; the last usually less than, sometimes equal to the breadth of the spirals. Lines of growth fine, in an even curve.

On the second-last whorl present, with a diameter of 8 mm, the number of spirals is 9.

The whole appearance greatly resembles that of a *Nerinea*, but there is no trace of the internal folds characteristic of this genus.

A second, less well-preserved specimen from "Kløft I" on Store Koldewey Island probably belongs to this species.

In the boulder containing *Aucella mosquensis* from Harefjæld at Danmarks Havn a stump was found of a quite indeterminable *Turritella* species.

60. **Chemnitzia undulata** TULLBERG sp.

1881. *Eulima undulata* TULLBERG, Aucella-Schichten Novaja Semljas. p. 10; Pl. 2, figs. 26—27.

Short turreted with slightly arched whorls. These separated by deep sutures and — in the case of the older ones — covered with fairly coarse, curving, rounded transverse ribs; the younger whorls on the other hand smoother, without regular transverse ribs, but with coarse and fine, curving lines of growth. Further, numerous very fine spirals. The aperture probably oviform, with a pointed angle above.

Length ca. 8 mm, thickness ca. 4 mm.

Although numerous specimens of the species are present, I have not seen a single complete shell. According to TULLBERG's description there should be transverse ribs on all the whorls; his figures

seem to show, however, that the younger whorls may lack the transverse ribs.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (many specimens). In loose-lying stones at "4. Sænkning" on the same island (many spec.).

Nova Zembla: in bituminous limestone at Skodde Bay.

61. **Chemnitzia hamptonensis** Morris & Lycett.

Pl. XXXV, fig. 8.

1854. *Chemnitzia Hamptonensis* Morris & Lycett. Mollusca from the Great Oolite. p. 50; Pl. 7, fig. 1.

The shell more slender than in the previous species; otherwise resembling this greatly. The whorls flat or slightly arched, separated by deep sutures. The older whorls with numerous, fairly strongly curved, rounded transverse ribs; the younger whorls with faint, irregular transverse folds and distinct, curving and obliquely placed lines of growth.

Length ca. 9 mm, thickness ca. 3·5 mm.

This species occurs in considerable abundance along with the preceding, from which it is so little different, that better material will probably prove it to be the same species.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (several spec.). In loose-lying stones at "4. Sænkning" on the same island (several spec.).

England: in Great Oolite.

62. **Aporrhais** sp. (I).

In two of the black concretions (with *Garnieria*) occurring as boulders at Danmarks Havn, there are numerous species of an *Aporrhais*. Unfortunately it has not been possible to separate an even approximately complete specimen.

The older whorls are strongly arched; the younger have a strong ridge along the middle. Under this ridge on the last whorl there is a second, somewhat fainter ridge. The outer lip forms a short wing, on which the two ridges of the last whorl run out and continue further as two long (?), diverging fingers. Behind, as usual in the genus, there is a canal up along the lowermost part of the spire. Otherwise the shell is covered with fine, raised spirals, at variable, but as a rule comparatively great distances from one another.

It has not been possible for me to refer these specimens to any hitherto known species; probably the species is new.

63. **Aporrhais** sp. (II).

In the same concretions, which contained the previous species, are a number of other specimens, which in all probability belong to a different species of the genus *Aporrhais*.

All the whorls are strongly arched. No true ridge occurs, but on the other hand a very strong spiral, which lies somewhat above the middle of the whorls; it is bounded on both sides — especially below — by a depression. The outer lip forms a large, broad wing, the outer boundary of which cannot be seen on the available specimens. Otherwise the sculpture consists of a large number of fine spirals, which seem however to be somewhat coarser and denser than in the preceding species, just as the lines of growth are much more distinct. I have not succeeded in referring these specimens either to any known species.

64. **Lytoceras polare** n. sp.

Pl. XXXV, fig. 9.

I have been unable to refer a fairly well-preserved specimen of a *Lytoceras* to any species known to me.

The whorls slightly overlapping, almost circular in section (to a breadth of 15 mm corresponds a height of 12·5 mm, measured in the middle line); its greatest breadth lying a little nearer the umbilicus than the external side. The greatest diameter of the specimen 42 mm with a corresponding width of umbilicus of 16 mm. On the surface somewhat distant, slightly curved, raised transverse lines at fairly equal distances from one another; between them indications of other dense, fine lines, somewhat variable in size. — The suture-line in part distinct, strongly toothed, with a very narrow siphonal saddle, and the characteristic, cross-shaped, antisiphonal lobe; auxiliary lobes wanting. The external lobe and 1st lateral lobe almost equally deep (probably the specimen is not fully developed).

It will be seen from the above, that this species is one of the typical Fimbriates. In form it greatly resembles *L. Sacya* Forb., but the suture-line and sculpture of the latter are very different, as it belongs to the subgenus *Gaudryceras* Gross. (*emend.* Kossmat). A more nearly related form is *L. ezoense* Yabe, but this species also has a different sculpture.

Distribution. North-East Greenland: in a limestone concretion found as boulder on the north side of Vesterdalen at Danmarks Havn (1 spec.).

65. **Cardioceras alternans** v. Buch sp.

Pl. XXXVI, figs. 1, 2 and 3.

(1831) 1885. *Ammonites alternans* v. Buch, Pétrifications remarquables. p. 145; Pl. 18, fig. 4.

1845. *Ammonites subcordatus* d'Orbigny, in Murchison, Verneuil et Keyserling, Géologie de la Russie d'Europe. II. p. 434; Pl. 34, figs. 6—7.

1846. — *alternans* v. Buch; Keyserling, Petschora-Land. p. 323, Pl. 22, fig. 2.

1849. — — — , Quenstedt, Die Cephalopoden. p. 96; Pl. 5, figs. 7—8.

— — — — , Rouillier, Études progr. Géologie de Moscou. V. p. 362; Pl. L, fig. 88; Pl. M, fig. 109.

1878. *Amaltheus alternans* Buch; Nikitin, Group of *Amaltheus funiferus* Phill. p. 148; Pl. 2, fig. 18.

1881. — — — ; Nikitin, Jura-Ablagerungen an der oberen Wolga. p. 59.

1904. *Cardioceras* — — ; Ilovaïsky, L'Oxfordien et le Séquanien etc. p. 272; Pl. 11, figs. 6—7.

Some specimens of this extremely variable species were found in "Kløft I" on Store Koldewey Island in the blue-gray, calcareous and micaceous sandstone. They are all more or less imperfect and in part much compressed. A well-preserved and practically complete imprint shows short, but well-marked ribs only in the neighbourhood of the external side on the beginning of the last of the whorls preserved, but the sides are smooth; later, ribs also appear on the edge of the umbilicus; these ribs become stronger and stronger, continuing over the side and in the end joining on to the first-mentioned ribs, which at the end curve strongly forwards and disappear before reaching the ridge, so that the latter is bounded on each side by a smooth band. The number of ribs externally is almost double that on the umbilical margin, as a short rib is as a rule inserted on the outside towards the periphery between each two of the ribs, which start from the umbilical edge. The latter ribs show more or less distinctly a thickening, which lies almost midway on the side, though a little nearer the external side. The ridge is very finely dentated. The greatest diameter of this specimen is 31 mm and the greatest height of the whorl 14 mm. In the whole of its sculpture it shows a considerable resemblance to the specimens of *C. Volgae* Pavl., described by P. G. Krause and found in the Kimmeridgian in East Prussia;[1] but it is distinct from this in that especially the insertion of the secondary ribs is more regular and the dentation of the ridge much finer.

In addition to this specimen we have a couple of compressed

[1] P. G. Krause: Ueber Diluvium, Tertiär, Kreide und Jura in der Heilsberger Tiefbohrung. p. 241; Pl. 3, figs. 1—4. — Jahrb. Preuss. geolog. Landesanst. Bd. 29. Berlin 1908.

specimens of similar dimensions, which seem to be nearly related to it. This is also the case with a small cast, which shows the suture-line very distinctly. This line is simple on the whole and forms a broad external lobe, which is divided by a short, but broad siphonal saddle. After the external lobe comes the broad, slightly bilobed external saddle. The first lateral lobe is deep, rather narrow and ends in 3 points, the middle one being comparatively long. The first lateral saddle is fairly broad and quite slightly bilobed. The second lateral lobe is very short and small and has but few, faint teeth. The second lateral saddle is likewise very small and only slightly indented. The remaining part of the suture-line is somewhat indistinct.

Fig. 2. The suture-line of *Cardioceras alternans* v. Buch sp. Height of the whorl 9 mm.

Three other specimens from the same locality have ribs, which are unusually strong, especially in the middle of the sides and in the neighbourhood of the external side; they agree well with specimens from Skodde Bay in Nova Zembla, which I have seen in the Stockholm Riksmuseum. This is also the case with 2 specimens, found in loose-lying sandstones at "4. Sænkning" on Store Koldewey Island.

A couple of imprints in the yellowish, fine-grained sandstone from Muschelberg on Hochstetter's Foreland likewise belong to this species. One of the imprints is to some extent complete and is very similar to the first-mentioned imprint from "Kløft I" on Store Koldewey; the ribs however are on the whole more distinct on the sides, especially on the older parts of the shells.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey (8 spec.). In loose-lying sandstones at "4. Sænkning" on the same island (2 spec.). — Hochstetter's Foreland (2 spec.).

Europe: this species has a wide distribution on the boundary between the Oxford and Kimmeridgian deposits.

66. **Cardioceras Nathorsti** Lundgren sp.

Pl. XXXV, fig. 10.

1883. *Ammonites* (*Amaltheus*) *Nathorsti* Lundgren, Jura- und Trias-Fossilien. p. 6; Pl. 1, figs. 1—2.

Some incomplete, more or less compressed casts from the "Kløft II" agree quite well with Lundgren's description and figures of this species. — Thus, the shell has also originally been greatly compressed. The ribs are frequently unbranched, fairly strong and sharp; on the sides they are only slightly bent; on the external side they curve somewhat abruptly forwards and disappear before they reach

the keel, so that this is bounded on both sides by a smooth band. The keel is well-developed and very finely dentated; the number of teeth is far in excess of that of the ribs. The suture-line is fairly strongly dentated; the first lateral lobe is deep and ends in 3 points, the middle one being much longer than the others; the second lateral lobe is very short.

Fig. 3. The suture-line of *Cardioceras Nathorsti* Lbgrn. sp. Height of the whorl 21 mm.

A single fragment from "Kløft I" agrees with the above specimens in regard to the sculpture; on the other hand, the suture-line is perhaps somewhat different.

A small, less well-preserved specimen of a *Cardioceras* from "4. Sænkning" may perhaps be referred to this species, owing to the densely placed ribs and the fine dentation of the keel.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey (1 spec.?). "Kløft II" on the same island (3 spec.). In loose-lying boulder at "4. Sænkning" likewise on Store Koldewey Island (1 spec.?).

Spitzbergen: Séquanian-Kimmeridgian.

67. **Cardioceras** sp.

Pl. XXXV, fig. 11.

A fairly complete, but not quite well-preserved imprint of an Ammonite must be referred to one or other species of the genus *Cardioceras*. It was found at "Kløft I" on Store Koldewey Island along with *C. alternans*. From this it is distinguished especially by the fact, that the ribs on the youngest part of the shell are very much raised on the middle of the side and form here a marked row of nodes; a similar row, but with smaller nodes, occurs on the umbilical edge; uppermost on the side the ribs are likewise strongly developed and inclined forwards. There seems to be a considerable resemblance with the form, which Ilovaïsky (l. c., p. 272, Pl. 11, fig. 6) describes and figures under the name of *C. cf. alternans* Buch and considers as a transition form between a variety of *C. cordatum* Sow. and *C. alternans*. But in this form the ribs are somewhat denser and their uppermost part (nearest the keel) not so sharply bent. The dentation of the keel, on the other hand, seems to be quite similar.

68. **Quenstedtoceras** (?) sp.

Pl. XXXVI, fig. 4.

A small fragment of an Ammonite belongs perhaps to a species of this genus. It was found in the free-lying brownish sandstone

down from "Trækpasset" on Store Koldewey Island at a height of 50 m above the sea.

The shell has been somewhat involute with inflated whorls. The breadth of the whorl far exceeds its height; the external outline from edge to edge of the umbilicus is very approximately a semicircle; the older whorls have been relatively higher. Edge of the umbilicus not sharply marked. The ribs strong, especially in the neighbourhood of the edge of the umbilicus; a few divide into two a little below the middle of the side; at other places a new rib is inserted. In the cases of dichotomy the two ribs do not unite again on the other side, but join on to the rib respectively before and behind. From the umbilicus to the umbilical edge the ribs are bent somewhat backwards; then they bend forwards and on the external part form a distinct arch bent forwards; they course over the external part without interruption.

Height of the whorl 20 mm, breadth 29 mm.

The available fragment has a no slight resemblance to an Ammonite, which LAHUSEN (l. c., Pl. 4, fig. 11) figures under the name of *Cardioceras carinatum* EICHW., but the material is too incomplete for a certain determination.

69. **Cosmoceras boreale** n. sp.

Pl. XXXVI, figs. 5 and 6.

The shell with rather small umbilicus and with inflated whorls; the older whorls lower and thicker than the younger. The slope down towards the umbilicus short, but steep. The thickness of the whorl increasing from the edge of the umbilicus; its greatest thickness at about 1/3rd of the distance from the umbilical edge to the external side; here a spiral row of small, pointed nodes. The region from this up to the external side convex. The external side itself with a distinct furrow. The sides covered with rather fine, sharp ribs, beginning right down at the umbilicus and directed somewhat forwards. No marked nodes on the umbilical edge, but here the ribs are specially strong. Dichotomy of all the ribs at the lowermost row of nodes; at the same height sometimes insertion of new ribs. Never junction of ribs at the external edges; on the other hand, the ribs here as a rule somewhat swollen, but without any true formation of nodes. No appreciable weakening of the ribs in the external furrow. — The suture-line dentated comparatively coarsely; the external lobe rather narrow; the first lateral lobe with one point, of the same length as the external lobe.

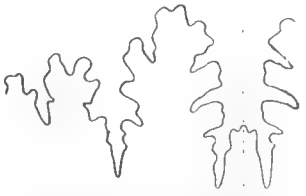

Fig 4. Suture-line of *Cosmoceras boreale* n. sp. Height of the whorl 8 mm.

The most complete specimen has the following dimensions: diameter 21 mm; greatest height of the whorl 9 mm, thickness 8·5 mm; width of the umbilicus 6 mm; distance between the external edges 2 mm.

In sculpture the species described resembles *C. Jason* Rein., but the whorls are lower and thicker; further, nodes at the umbilical edge are practically wanting. It resembles more a shell from Swistowo (Gouv. Rjasan), which Lahusen (l. c., Pl. 6, fig. 8) has figured under the name of *C. Gowerianum* Sow. To judge from the figure, however, this shell has a considerably wider umbilicus and the transverse section of the whorl is more hexagonal; further, the row of nodes on the sides lies here more to the middle of the flanks. On the other hand, there is fairly good agreement between the suture-line in the Greenland species and in *C. Gowerianum*, which Lahusen (l. c., Pl. 7, fig. 1) figures; but this latter is somewhat more finely dentated, which is perhaps due however to its belonging to an older specimen. Agreement is also shown in the fact, among others, that the first lateral lobe is not deeper than the external lobe, as is usually the case in the genus *Cosmoceras*.

Distribution. North-East Greenland: in the loose-lying, brownish sandstone, found at 50 m above the sea on Store Koldewey Island down from "Trækpasset" (8 spec.).

70. **Kepplerites Tychonis** n. sp.

Pl. XXXVII, fig. 1.

Large, discoidal shell with fairly wide umbilicus. The whorls growing very slowly, greatly overlapping; but the last whorl becoming gradually less and less so. Height of the inner whorls almost the same as their thickness; the height of the outer on the other hand greater. Edge of the umbilicus specially well-marked, rounded. The flanks but slightly arched. The external side evenly rounded, but distinctly flattened on the innermost whorls, without external furrow. The sculpture on the outer whorls in the form of very numerous, very sharp ribs, originally directed strongly backwards, but already over the edge of the umbilicus inclining slightly forwards, dividing into several branches a little above this and forming flat arches directed forwards over the external portion. — The suture-line unusually strongly dentated with broad saddles and narrow lobes. The external lobe deep and narrow, divided by a very projecting median saddle. The external saddle extremely broad and very deeply incised. The first lateral lobe a little deeper than the external lobe, trilobed. The two lateral saddles broad, but much smaller than the external saddle. The second lateral lobe much shorter than the first lateral lobe. Auxiliary lobes and saddles small and indistinct.

Greatest diameter 104 mm; width of the umbilicus 32 mm; height of the last whorl 39 mm, its thickness ca. 32 mm.

How far a greatly weathered fragment of an Ammonite, found along with the above-described, can be referred to the same species, is somewhat doubtful. The sculpture and suture-line seem to agree, but the whorls are comparatively higher. Further, the external part is flattened even on a whorl with a height of 19 mm, whilst it is uncertain, if this is the case at the same stage in the first-mentioned specimen.

I have been in some doubt, as to whether the species described here should be referred to *Macrocephalites* or to *Kepplerites*. In referring it to the latter genus my reason is, that on breaking it in two I succeeded in laying open one of the innermost whorls, and it

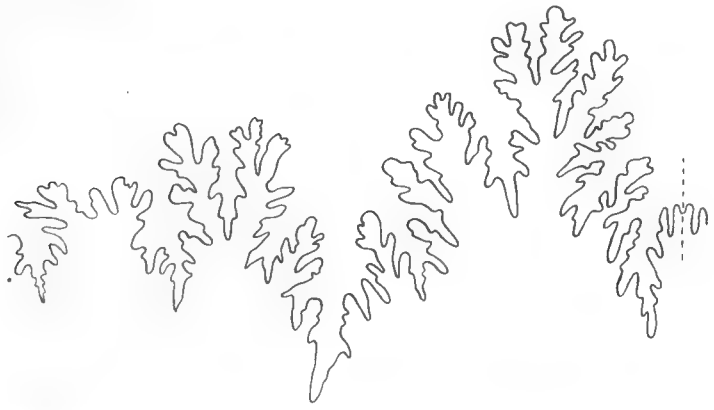

Fig. 5. The suture-line of *Kepplerites Tychonis* n. sp. Height of the whorl 29 mm.

shows a distinct flattening on the external side. Unfortunately, I did not succeed in getting the whole flank prepared free, so that I do not know, whether nodes occur here on the points of division of the ribs. This whorl is only 8 mm in diameter. How early this flattening begins and how long it continues, I have not been able to see, nor has it been possible to observe a "Parkinsonia-stage" preceding this "Runcinate-stage"[1]. This flattening of the external side of the inner whorls along with the striking resemblance between the suture-line and the suture-line of *K. Galilaei* Opp. sp., as figured in Neumayr and Uhlig (l. c., Pl. 3, fig. 4 c), seems to me to show, that the species must be referred to the genus *Kepplerites*.

I have called this species after the famous Danish astronomer Tycho Brahe.

[1] Regarding the genus *Kepplerites* see M. Neumayr und V. Uhlig: Ueber die von H. Abich im Kaukasus gesammelten Jurafossilien. p. 53. — Denkschr. der k. Akad. d. Wissensch. Math.-naturw. Classe. Bd. 59. Wien 1892.

Distribution. North-East Greenland: in the loose-lying, brownish sandstone, occurring 50 m above the sea, down from "Trækpasset" on Store Koldewey Island (1—2 spec.).

71. **Aulacostephanus (?) groenlandicus** n. sp.

Pl. XXXVII, fig. 3.

About one-quarter of a whorl of an Ammonite may perhaps, as new species, be referred to the genus *Aulacostephanus*.

The whorl is somewhat deformed by pressure; its sides seem to have been somewhat flattened and its height is a little greater than its breadth. The external side is also somewhat flattened. The whorl thus assumes an oval, slightly square-shaped section. The slope towards the umbilicus is even. The ribs disappear before they reach quite down to the umbilicus; on the edge of the umbilicus and somewhat above this they are very prominent with an indication of a sharp spine or node; at the same time they now bend somewhat forwards, decrease suddenly in size a little below the middle of the flank and course almost in a straight line over the external side. Most of these ribs dichotomize immediately above their strongest part and further, a new rib is inserted almost at the same place, so that for each rib on the umbilical edge there are about 3 ribs on the external side. In the middle of this the ribs become weaker somewhat, and an indication of a furrow is thus formed. Constrictions present. — The suture-line is not quite distinct; it seems to be somewhat strongly dentated and there is a well-marked "Suspensivlobus".

Height of the whorl 20 mm, its breadth 18 mm.

Distribution. North-East Greenland: in free-lying sandstone at the bottom of "Kløft II" on Store Koldewey Island (1 spec.).

72. **Garnieria pusilla** n. sp.

Pl. XXXVI, figs. 7, 8 and 9.

The shell compressed with slightly arched sides and a fairly narrow umbilicus. The slope towards the umbilicus short and steep. The inner whorls low and smooth with rounded external side. When the shell has reached a diameter of ca. 2·5 mm, a keel begins to appear on the external side, and at the same time the whorl becomes more and more compressed and increases greatly in height. The keel, which is finely dentated, is bounded later by a distinct spiral depression on each side. A number of fairly weak, falciform ribs now appear also, but no nodes. Further, the shell is here covered with numerous, very fine radial striae, inclined forwards very strongly on the outside; these striae reach right up to the keel. —

The suture-line slightly incised. The external lobe broad, not deep. The external saddle low, divided into two, somewhat unequal parts by a small adventitious lobe. The first lateral lobe narrow, but fairly deep, bifid or trifid. The first lateral saddle more strongly developed than the external saddle both in breadth and length, almost symmetrical. The second lateral lobe narrow with three points. The second lateral saddle low, irregularly lobed. Further, 2—3 faintly developed auxiliary lobes.

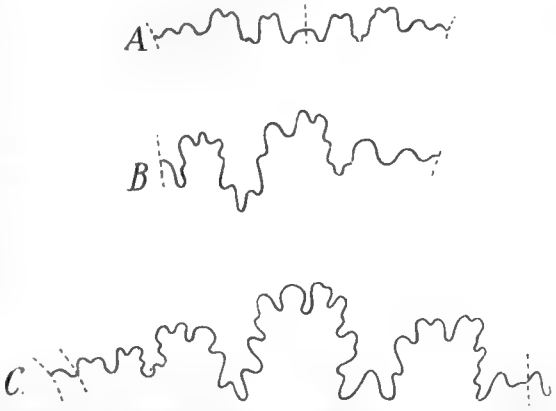

Fig. 6. The suture-line of *Garnieria pusilla* n. sp. Height of the whorl: in *A* 1·7 mm; in *B* 3 mm; in *C* 8 mm.

One of the most complete specimens has a diameter of 8·5 mm; the width of the umbilicus is 1·2 mm, height of the last whorl above the edge of the umbilicus 4·5 mm; its height above the preceding whorl 3·3 mm. The thickness could only be measured approximately; it is a little over 1·5 mm. Different fragments show, that other specimens have been not a little larger.

Distribution. North-East Greenland: in 3 black calcareous concretions found as boulders at Danmarks Havn, two from Vesterdalen, the third from a place not given (many specimens).

Indeterminable fragments or imprints of Ammonites, belonging in part at least to other species than those mentioned, were found at the following localities.

"Kløft I" on Store Koldewey Island in the calciferous and micaceous sandstone.

"4. Sænkning" on Store Koldewey Island in the loose-lying, blue-gray, calciferous sandstone.

Down from "Trækpasset" on Store Koldewey Island in a gray, calciferous and micaceous nodule of sandstone, found at a height of 50 m above the sea. — At the same locality, but above the plateau in gray cone-in-cone marl.

River-bed just to the north of Cape Oswald Heer on Hochstetter's Foreland in a light-gray, fine-grained, calcareous and very micaceous sandstone.

73. **Belemnites Panderianus** d'Orbigny.

Pl. XXXVII, fig. 2.

1842. *Belemnites excentricus* Blainv.; d'Orbigny (*pars*), Paléont. Franç. Terr. jur. I. p. 120; Pl. 17, figs. 3 and 7—8.
1845. — *Panderianus* d'Orbigny in Murchison, Verneuil et Keyserling, Géologie de la Russie d'Europe. II. p. 423; Pl. 30, figs. 1—5 and 7—11.
1881. — — d'Orb.; Nikitin, Jura von Elatma. p. 48.
1892. — *Panderi* d'Orb.; Pavlow et Lamplugh, Argiles de Speeton etc. p. 246.

Some well-preserved fragments of 3 different rostra belong with certainty to this species. — On the underside of the apex there is a well-marked furrow, which however soon becomes feebler and disappears 1·5—2 cm before the point of the rostrum, merging here gradually into the flattened underside of the rostrum; in the alveolar region the flattening disappears. Further, the hindmost part of the rostrum is greatly compressed, so that the section here is rounded-rectangular; in the alveolar region the section is more rounded-trapezoidal. The apical line lies very excentrically, especially in the posterior part of the rostrum.

The largest fragment (posterior part of rostrum) is 55 mm long and shows at its front end no trace as yet of the alveolus; the dorsoventral diameter is here 15·5 mm, the transversal 15 mm; at a distance of 29 mm from the point of the rostrum the same dimensions are respectively 13·5 and 13 mm. In a second specimen the measurements at a distance of 38 mm from the point of the rostrum are respectively 16 and 14·5 mm.

A loose-lying cast of an alveolus is present from the same locality as the above fragments of rostra; its dorsoventral angle is ca. 24°, the transversal ca. 22°. This perhaps also belongs to *B. Panderianus*.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (3—4 spec.).

Russia: from the zone with *Quenstedtoceras Lamberti* to the zone with *Cardioceras alternans*.

74. **Belemnites breviaxis** A. Pavlow.

1842. *Belemnites excentricus* Blainv.; d'Orbigny (*pars*), Paléont. Franç. Terr. jur. I. p. 120: Pl. 17, figs. 1—2.
1849. — — — ; Quenstedt, Die Cephalopoden. p. 426; Pl. 27, fig. 5.
1865. — *abbreviatus* Phillips, British Belemnitidae. V. p. 124; Pl. 34, figs. 84—85.
1892. — *breviaxis* Pavlow et Lamplugh, Argiles de Speeton etc. p. 247; Pl. 8, fig. 7.

A fairly complete rostrum seems to belong to this species, as it agrees quite well with Pavlow's description. The extreme point with a part of the alveolar region is wanting.

The posterior part of the rostrum is distinctly compressed and the underside is flattened, so that a section here is somewhat rounded-quadrilateral with the greatest breadth down towards the underside; this section still has the rostrum in the posterior part of the alveolar region, whilst the section further forward is very nearly circular. The apical line lies very excentrically. The alveolus is very deep, as it has certainly occupied more than half of the whole length of the rostrum; its angle is ca. 22°.

The portion of the rostrum preserved is 98 mm long; at the point about 5 mm are wanting and at the alveolar end ca. 30 mm, so that the whole length has been ca. 133 mm, of which the alveolus has taken up at least 70 mm. At the point of the alveolus the dorso-ventral diameter is 22·5 mm, the transversal 22 mm. The apical line lies here 7 mm from the underside and 15·5 mm from the upper side. At a distance of 35 mm in front of the point of the alveolus both the dorsoventral and transversal diameters are 23·5 mm. The width of the alveolus is here 12 mm.

Distribution. North-East Greenland: "Kløft I" on Store Koldewey Island (1 spec.).

Russia: in the zone with *Cardioceras cordatum* and *C. alternans*.

From the tenting-ground 3/V 1907 on Store Koldewey Island there are two disconnected fragments of a Belemnite, which in form and position of the axis seem to agree well with *B. magnificus* d'Orb., but the material is too incomplete for a certain determination. The fragments were found in a fine-grained, light-gray, very micaceous sandstone. The one fragment shows the posterior part of the alveolus, the angle of which is ca. 23° (measured dorsoventrally)[1]. On the surface of the same fragment there is a quantity of oblong, comparatively deep, small pits, which greatly resemble those produced by *Polydora* in Mollusc shells of the present day. These pits are filled with sandstone and must therefore have been formed before this rostrum has been deposited in the sand. — From another locality on Store Koldewey Island, the tenting-ground 8/VI 1907, there is a couple of fragments of two different Belemnite species, certainly different from those mentioned above. In the one species the rostrum is very strongly compressed and the apical line very excentric, whilst the rostrum in the other is almost circular in section with a slight flattening on the ventral side, and the apical line is considerably

[1] Zinc-blende occurs in the innermost part of the alveolus.

less excentric. — Further, from "Kløft I" on Store Koldewey Island there is the outermost end of a blunt-ended rostrum, which unfortunately is indeterminable. It lies in the usual sandstone of this locality, in which *B. breviaxis* was also found. — Lastly, at the tenting-ground 22/V 1908 (a little south of Haystack) the Expedition found a free-lying, brownish sandstone containing a very badly preserved and thus indeterminable, alveolar end of a Belemnite.

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(The treatises, marked with *, have not been accessible to me.)

INDEX.

Erratum.

Page 458, 7th line, for "Kløft II" read "Kløft I".

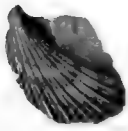
Plate XXXII.

PLATE XXXII.

Fig. 1. *Oxytoma inaequivalvis* Sow., var. *macroptera* Roem. × 2. "4. Sænkning".
— 2 a—c. *Aucella kirghisensis* Sok. "Kløft I".
— 3 a—c. — *Sinzovi* Pavl. "Kløft I",
— 4 a—b. — cfr. *reticulata* Ldgrn. Vesterdalen.
— 5. — *Bronni* Lah. "Kløft I".
— 6 a—b. *mosquensis* v. Buch. Harefjæld.
— 7. — *tenuistriata* Lah. Vesterdalen.
— 8 a—b. — *crassicollis* Keys. Aucellabjerget.
— 9 a—b & 10. *Aucella concentrica* Fisch. Fig. 9, a left valve; Fig. 10, a right valve. Aucellabjerget.
— 11 a—b & 12 a—b. *Aucella piriformis* Lah. Fig. 11, a right valve; Fig. 12, a left valve. Aucellabjerget.

The figures are of the natural size, except where otherwise stated.

All the specimens figured are preserved in the Mineralogical Museum of the University, Copenhagen.



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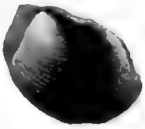

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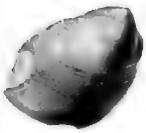

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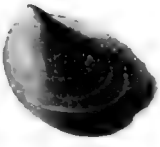

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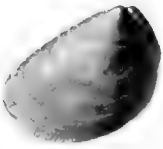

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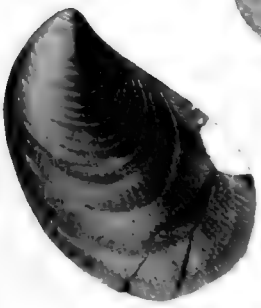

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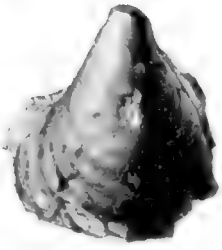

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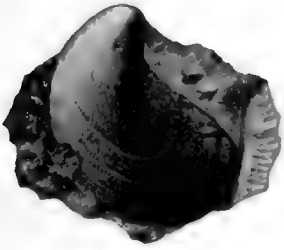

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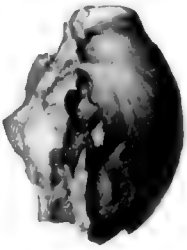

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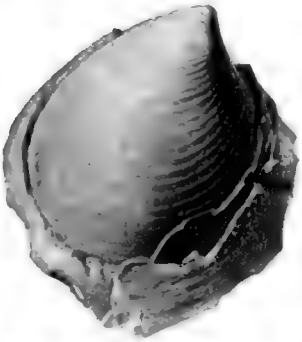

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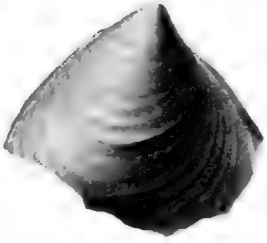

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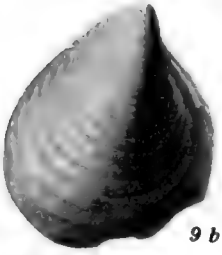

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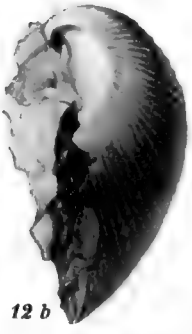


12 b

H. V. Westergaard del.

Pacht & Crone phototyp.

Plate XXXIII.

PLATE XXXIII.

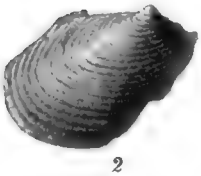
Figs. 1 a—b. *Aucella sp.*; a left valve. Aucellabjerget.
— 2—3. *Posidonomya ornati* QUENST. sp. × 2. Down from "Trækpasset".
— 4 & 5 a -c. *Perna groenlandica* n. sp. "Kløft I".
— 6. *Tancredia curtansata* PHILL. sp. "4. Sænkning".
— 7. *Pecten (Entolium) cingulatus* PHILL. Down from "Trækpasset".
— 8. — — *demissus* PHILL. Harefjæld.
— 9 a—b. *Modiola Strajeskiana* D'ORB. sp. "Kløft I".
— 10. *Tancredia planata* MORR. & LYC. "4. Sænkning".
— 11. *Astarte striato-costata* MÜ. "Kløft I".

The figures are of the natural size, except where otherwise stated.

All the specimens figured are preserved in the Mineralogical Museum of the University, Copenhagen.

1 a

1 b



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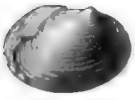

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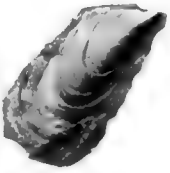

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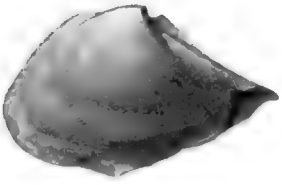

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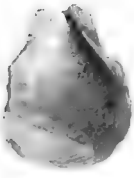

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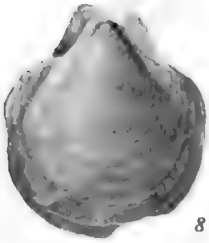

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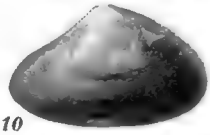

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H. V. Westergaard del.

Pacht & Crone phototyp.

Plate XXXIV.

PLATE XXXIV.

Figs. 1 a—c. *Macrodon Mylii* n. sp. Middle sandstone region on Store Koldewey.

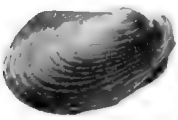
— 2 a—b. *Astarte alta* n. sp. "Kløft I".

— 3 a—b & 4. *Macrodon Hagenii* n. sp. Fig. 3 a, × 3. Middle sandstone region on Store Koldewey.

— 5 a -b & 6. *Pecten (Camptonectes) Broenlundi* n. sp. Fig. 5, a left valve; Fig. 6, a right valve. "Kløft I".

The figures are of the natural size, except where otherwise stated.

All the specimens figured are preserved in the Mineralogical Museum of the University, Copenhagen.



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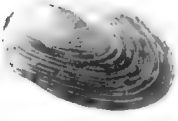

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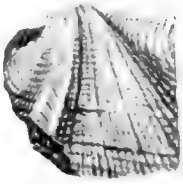

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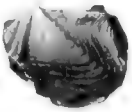

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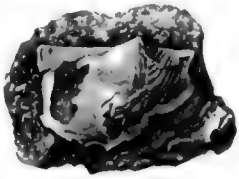


4

5 b

H. V. Westergaard del.

Pacht & Crone phototyp.

Plate XXXV.

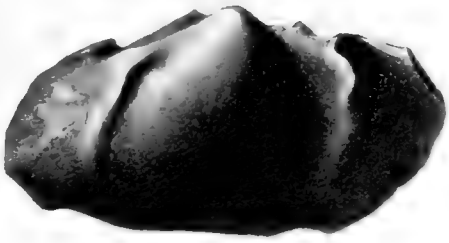
Plate XXXV.

Fig. 1. *Tancredia axiniformis* PHILL. sp. "Kløft I".
— 2 a—c. *Cyprina* cfr. *mosquensis* D'ORB. "Kløft I".
— 3 a—b. *Tancredia Jarneri* n. sp. "Kløft II".
— 4. *Cyprina kharoschovensis* ROUILL. Top of Muschelberg.
— 5 a—b. *Amberleya groenlandica* n. sp. × 2. Down from "Træk-passet".
— 6. *Cyprina Syssollae* KEYS. "Kløft I".
— 7. *Turritella* sp. "Kløft II".
— 8. *Chemnitzia hamptonensis* MORR. & LYC. × 2. "4. Sænkning".
— 9 a—b. *Lytoceras polare* n. sp. Vesterdalen.
— 10. *Cardioceras Nathorsti* LDGRN. sp. ? "4. Sænkning".
— 11. — sp. "Kløft I".

The figures are of the natural size, except where otherwise stated.

All the specimens figured are preserved in the Mineralogical Museum of the University, Copenhagen.

1



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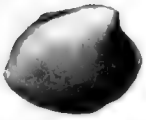

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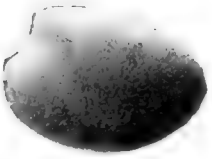

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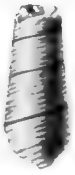

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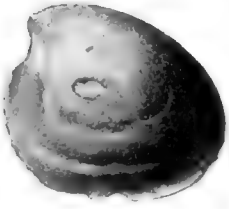

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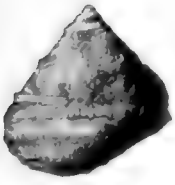

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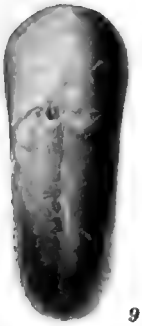

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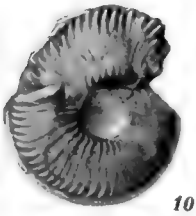

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11

H. V. Westergaard del. Pacht & Crone phototyp.

Plate XXXVI.

Plate XXXVI.

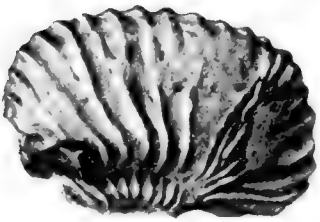
Figs. 1—3. *Cardioceras alternans* v. Buch sp. "Kløft I".
— 4 a—c. *Quenstedtoceras* (?) sp. Down from "Trækpasset".
— 5 a—b & 6 a—b. *Cosmoceras boreale* n. sp. Down from "Trækpasset".
— 7, 8 & 9 a—c. *Garnieria pusilla* n. sp. Figs. 7 & 8, × 3; Fig. 9, × ca. 25. Vesterdalen.

The figures are of the natural size, except where otherwise stated.

All the specimens figured are preserved in the Mineralogical Museum of the University, Copenhagen.

1

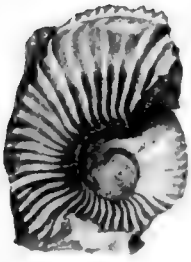
2



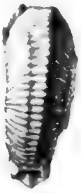
4 b

4 a

4 c



3



5 b

5 a

6 a

6 b

7

8

9 a

9 b

9 c

H. V. Westergaard del.

Pacht & Crone phototyp.

Plate XXXVII.

PLATE XXXVII.

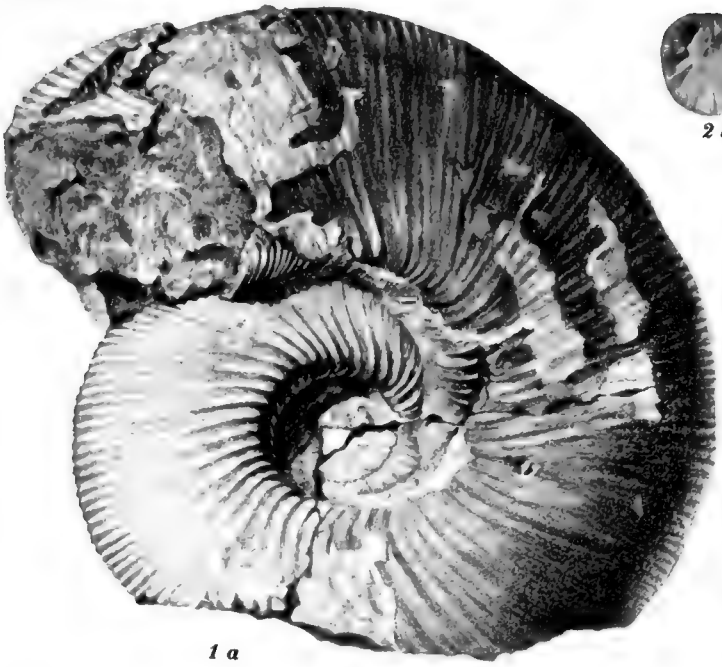
Figs. 1 a—e. *Kepplerites Tychonis* n. sp. Figs. d & e, one of the innermost whorls, × ca. 2½. Down from "Trækpasset".

— 2 a—c. *Belemnites Panderianus* D'ORB. Fig. b, ventral view; Fig. c, lateral view. "Kløft I".

— 3 a—c. *Aulacostephanus* (?) *groenlandicus* n. sp. "Kløft II".

The figures are of the natural size, except where otherwise stated.

All the specimens figured are preserved in the Mineralogical Museum of the University, Copenhagen.



1 a

2 a

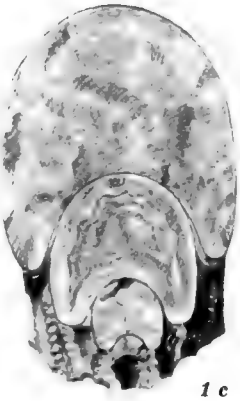
2 b

2 c

1 b

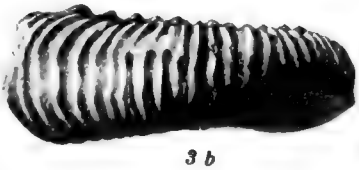
1 d

1 e



1 c

3 a



3 b

3 c

H. V. Westergaard del.

Pacht & Crone phototyp.

Plate XXXVIII.

PLATE XXXVIII.

Map-sketch over a part of North-East Greenland, drawn from the map made by Capt. J. P. Koch, on which are indicated those localities, where Jurassic and Cretaceous fossils were found by the Danmark Expedition.

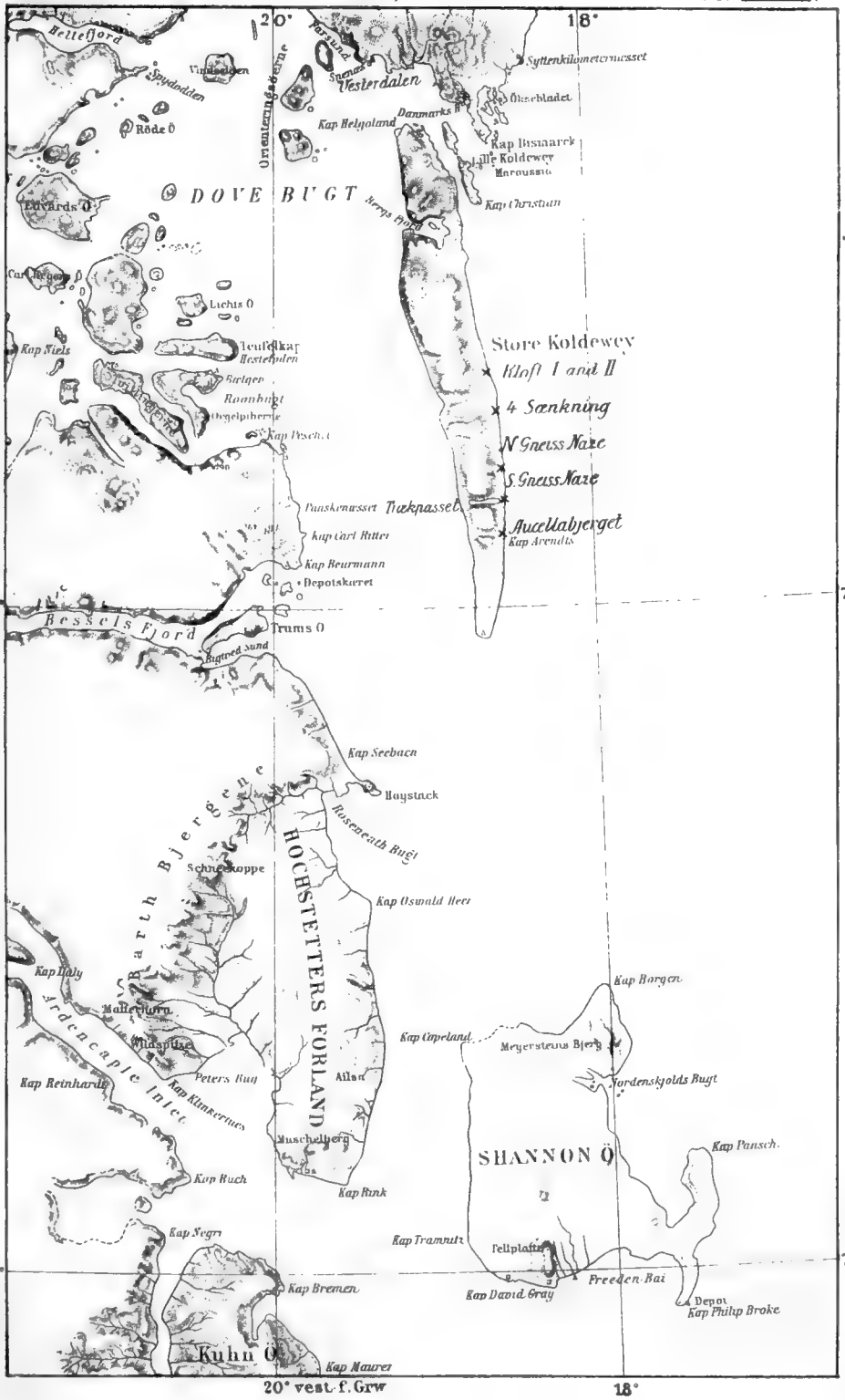
These localities are (from N. to S.) the following:

Germania Land: Vesterdalen.
Harefjæld, between Vesterdalen and Danmarks Havn.
Danmarks Havn.

Store Koldewey Island: Kløft I.
Kløft II.
4. Sænkning.
} The northern sandstone region.

The middle sandstone region between the N. Gneiss Naze and the S. Gneiss Naze.
Down from Trækpasset. This locality belongs to the southern sandstone region.
Aucellabjerget.

Hochstetters Foreland: Muschelberg.


20°
18°
76°
75°
Hellefford
Vinteroen
Spydnoddan
Röde Ö
Orienteringsøerne
Snenæs
Vesterdalen
Kap Helgoland
Dannmarks
Kap Bismarck
Lille Koldewey
Marcussen
Kap Christian
DOVE BUGT
Herys Bugt
Edwards Ö
Carl Jørgens Ö
Lichus Ö
Kap Niels
Teufelkap
Bestehuden
Seligen
Roenbiget
Vogelpiberge
Kap Pesch.
Store Koldewey
Kloft I and II
4 Sænkning
N Gneiss Naze
S Gneiss Naze
Pauskenæsset
Trækpasset
Kap Carl Ritter
Kap Beurmann
Depotskarret
Kap Arendts
Bessels Fjord
Trums Ö
Sigtred Sund
Kap Seebach
Haystack
Rosenbeath Bugt
Barth Bjergene
HOCHSTETTERS FORLAND
Schneekoppe
Kap Oswald Heer
Kap Haly
Malteshorn
Wildspitze
Ardencaple Inlet
Peters Bay
Kap Reinhardt
Kap Klinkerfues
Muschelberg
Ailsa
Kap Rink
Kap Ruch
Kap Negri
Kap Bremen
Kuhn Ö
Kap Maurer
Kap Borgen
Kap Copeland
Meyersteens Bjerg
Nordenskjolds Bugt
SHANNON Ö
Kap Pansch
Kap Tramnitz
Fellplatte
Freeden Bai
Kap David Gray
Depot
Kap Philip Broke
20° vest f. Grw
18°