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Carlsbergfondets Expedition

til

Øst-Grønland,

udført i Aarene 1898—1900

under Ledelse af

G. Amdrup.

Tredie Del.

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VI.

On Jurassic Fossils from East-Greenland.

By

Victor Madsen.

Works which are quoted in abbreviation in the following pages: —

- FOX-STRANGWAYS, C. 1892. *The Jurassic Rocks of Britain. Vol. II. Yorkshire. Tables of Fossils. Mem. Geol. Survey United Kingdom. London.*
- LUNDGREN, B. 1895. *Anmärkningar om några Jurafossil från Kap Stewart i Ost-Grönland. Medd. om Grönland. Hefte 19, 1896.*
- POMPECKJ, J. F. 1899. *The Jurassic Fauna of Cape Flora, Franz Josef Land with a geological Sketch of Cape Flora and its neighbourhood by FRIDTJOF NANSEN. The Norwegian North Polar Expedition 1893—1896. Scientific Results edited by FRIDTJOF NANSEN. II. London. Christiania. New York. Bombay. Leipzig.*
- SCHLOSSER, M. 1901. *Die Fauna des Lias und Dogger in Franken und der Oberpfalz. Zeitschr. d. deutsch. geol. Ges. Jahrg. 1901, p. 549.*
- WOODWARD, H. B. 1894. *The Jurassic Rocks of Britain. Vol. IV. The Lower Oolitic Rocks of England (Yorkshire excepted). Mem. Geol. Survey United Kingdom. London.*
- WOODWARD, H. B. 1895. *The Jurassic Rocks of Britain. Vol. V. The Middle and Upper Oolitic Rocks of England (Yorkshire excepted). Mem. Geol. Survey United Kingdom. London.*

Introduction.

The Jurassic deposits in East-Greenland were discovered in 1822 by SCORESBY jun. From SCORESBY'S description of Jameson's Land¹⁾ and from JAMESON'S Appendix to the same²⁾, it is seen that SCORESBY examined the Jurassic beds of Cape Stewart in Neill's Cliffs and brought away specimens of the rocks. SCORESBY brings out, with great distinctness, the striking difference between the structure of Jameson's Land and that of the rest of Greenland: "The western coast of this land [Jameson's Land], that borders Hurry's Inlet" says SCORESBY "is more regular than any thing I have seen in Greenland. From the shore, where it is low and almost even with the water's edge, it rises, with an easy slope, to the height of perhaps 1500 or 2000 feet perpendicular; and it is so uniform in its ascent and termination, that it constitutes a level ridge, regularly diminishing, to appearance, by the effect of perspective, until it sinks down to the level of the sea, in the extreme distance . . .

¹⁾ SCORESBY, WILLIAM (junior). 1823. Journal of a voyage to the Northern Whale-Fishery; including Researches and Discoveries on the Eastern Coast of West Greenland, made in the summer of 1822 in the Ship Baffin of Liverpool. Edinburgh 1823. p. 191, 193, 202, 204—7.

²⁾ JAMESON. 1823. List of specimens of the Rocks brought from the Eastern Coast of Greenland. with Geognostical Memoranda. Appendix No. 1 to the above-named work. p. 399—409 of the same

«Jameson's Land, it has been observed, is of a totally different appearance and character, from any other polar lands that I have seen. At a distance, it appears low, and undulating, and of a light-brown colour: while all the surrounding coasts, with the exception of Perspective Ridge, are rugged, mountainous, and of a blackish-brown colour. And what rendered it still more striking at this time, was the remarkable freedom of the southern part from the least vestige of snow».

SCORESBY'S description of the Jurassic deposits which occur in Neill's Cliffs near Cape Stewart, is in all essentials correct: «Neill's Cliffs were found to be about 300 feet in height, full two—thirds of which were concealed by the debris of the higher strata: on this I ascended to the rock in situ; and found it to consist of a thick bed of bituminous slate, — coarse conglomerate, with a base of sandstone, — sandstone flag, or slaty sandstone, — calcareous sandstone, — fine granular limestone, full of organic remains, — and a coarse grained limestone of a grey colour, containing numerous large specimens of pectinites and other bivalve shells. These were the principal rocks; but scattered specimens were also found of clay ironstone, slate-clay, common slate-coal, jet, splintery limestone, arenaceous limestone, &c. Most of these rocks were of a friable texture, and the general colour was light-brown. This tint gives the peculiar appearance to the cliffs of Jameson's Land which first excited my attention».

SCORESBY (l. c. p. 207) and JAMESON (l. c. p. 402 and 408) referred these deposits to the Carboniferous system. Later it was proved that the lower bituminous slate belongs to the Rhætic, and the overlying beds to the Jurassic.

Many years later, the German North Polar Expedition of 1869—70¹⁾, discovered Jurassic beds somewhat further north, on

¹⁾ Die zweite deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitäns KARL KOLDEWEG. Herausgegeben von dem Ver-

Kuhn Island off the east coast of Greenland (see the map). The material collected by JULIUS PAYER and RALPH COPELAND was examined by FRANZ TOULA in Vienna. TOULA'S researches demonstrate clearly that the development of the Jurassic beds in Kuhn Island is of a two-fold nature. On the east coast are light-grey, calcareous marls and fine-grained micaceous quartz-sandstones of a yellow or grey colour; the petrological nature of these rocks recalls somewhat that of the «Quadersandstein», but their fossils, on the other hand, show the strongest affinities with those of the Jurassic rocks of Russia. On the south side are fine-grained, calcareous sandstones of a dark greyish-brown colour, containing flakes of mica; also coarse-grained sandstones filled with shells, and regular shell-breccias, in both of which coal-seams occur. All these rocks belong probably to the middle «Dogger». The Jurassic deposits of Kuhn Island rest directly upon crystalline rocks, which stand out between the two types of deposits, forming a lofty mountain ridge covered with glaciers.

The following fossils are quoted as occurring on the east coast: —

Perisphinctes Payeri, nov. sp.

Ammonites sp. ind.

Belemnites Panderianus, D'ORB.

— *absolutus*, FISCH.

— *Volgensis*, D'ORB.?

— sp. ind.

Cyprina sp. cf. *Syssolæ*, KEYS.

Aucella concentrica, KEYS. non FISCH.

— — *var. rugosa*, KEYS.

— — *var. crassicollis*, KEYS.

— — *var. sublævis*, KEYS.

ein für die deutsche Nordpolarfahrt in Bremen. Zweiter Band. Wissenschaftliche Ergebnisse. Leipzig 1874. p. 477—479, 491—492, 497—507.

Some other *Aucella*-forms were also found; two left valves bear some resemblance to *Aucella Pallasii*, KEYS. The *Aucella*-shells are abundant in a light-grey calcareous marl. Casts and impressions of *Aucella concentrica*, FISCH. var. *rugosa*, KEYS. occur in various sizes in the quartz-sandstone.

On the south coast have been found (in the fine-grained sandstone): —

Ostrea sp. ind. in great abundance.

Goniomya V-scripta, SOW. sp.

Myacites sp. ind.

Modiola sp. cf. Strajeskianus, D'ORB. sp.

Avicula Münsteri, GOLDF. sp.

Belemnites cf. fusiformis, QU.

(in the coarse-grained shelly sandstone): —

Trichites, LYCETT?

Patella cf. Aubentonensis, ARCH.

Patella sp. ind.

Nerita cf. hemisphærica, RÖM.

Trochus sp. ind.

Spines of *Echinodermata*.

The Jurassic deposits of Jameson's Land were examined later by N. HARTZ and EDV. BAY during the Danish expedition to East-Greenland, undertaken in the years 1891—2 under the leadership of C. RYDER¹). BAY reports that Rhætic and Jurassic beds have been found along Hurry's Inlet in Jameson's Land and that similar beds may possibly crop out also on the west side of Jameson's Land. The western shores of Hurry's Inlet consist of high, steep cliffs, the so-called Neill's Cliffs, which have their beginning southward at Cape Stewart and rise gradually to a greater elevation towards the north. BAY is of

¹) BAY, EDV. 1896. Geologi. Meddelelser om Grönland. Hefte 19, p. 163.

opinion that no essential difference occurs in the strata for the whole of this long distance and therefore that a description of the relationships between the various beds at Cape Stewart is fairly applicable throughout their extent.

The lowest part of Cape Stewart consists of a foreshore, made up almost entirely of fragments from the formations above it, all of which weather very easily. From this foreshore a narrow ravine leads up to the plateau above the cliffs and in this ravine the various beds can be easily examined.

The lowest bed is described as a green sandstone, which has been observed on the shore at the most northerly part of the Cape, but has not been found in Neill's Cliffs north of Cape Stewart.

Above the sandstone, a grey, somewhat sandy clay-shale was seen to occur, this containing many fossil-plants. In the ravine, it attains to a height of 160—180 feet (50—56 metres) above sea-level and also crops out almost immediately below on the shore.

Above the shale is a belt covered with weathered fragments and above this again a stratum rich in fossils, which varies very much in different parts but can be best described as a very impure, reddish-coloured limestone. In some places the limestone is free from foreign fragments of any appreciable size, but contains very much sand; in such places it hardly ever contains fossils. In other parts it is full of small pebbles, which are sometimes rolled and sometimes fairly angular, so that the limestone has the appearance either of a conglomerate or a breccia. In other places, again, the limestone becomes a regular shell-breccia, in consequence of the number of fossils contained in it, these being of Jurassic age. These variations of the same rock occur near one another and pass over into one another. In addition to the fossil fauna, a few stems and branches have been found here and there. This bed is 7 feet

(2 metres) thick and occurs at a height of 186 feet (58 metres) above sea-level.

Above this is a very sandy grey shale, which probably continues up to a height of at least 270 feet (85 metres). This deposit yielded no fossils.

At a height of 300 feet (94 metres), a sheet of basalt, 10 feet (3 metres) thick, occurs which, at the end of the ravine, is overlain by a yellow sandstone, 6 feet (2 metres) in thickness. The latter appears in some places as a typical sandstone and in others it approaches in nature rather an impure clay-shale. As regards fossils, it contains only a few carbonised plant-remains. This sandstone is the uppermost deposit at Cape Stewart. Further inland, sedimentary beds could be seen cropping out in various places.

All the beds of Cape Stewart and, generally speaking, those of Neill's Cliffs as well, are dipping at an angle of 6° , in a direction 50° west of south.

Continuing along Hurry's Inlet in a northerly direction, Neill's Cliffs rise higher and higher, this being due partly to the position of the beds, but also probably to the fact that several other beds appear, both above and below those already described.

The expedition landed about south-west of the Fame Islands (see p. 169). Here, the lowest bed exposed is a kind of shale, which frequently assumes the nature and appearance of a sandstone. Above this, and at a height of about 1000 feet (314 metres) above sea-level, appears once more the fossiliferous limestone, which here becomes conglomeratic or brecciated both upwards and downwards, the middle part being a fairly pure limestone. Above this is a shale, then a yellowish-grey sandstone, then basalt, at a height of about 1300 feet (408 metres), and above this come alternating layers of sandstone and dolerite. It is evident that several beds occur here, which

belong to a higher horizon than those of Cape Stewart, and further inland are yet newer deposits.

The plant-remains of the lowest shales found at Cape Stewart were examined by N. HARTZ¹⁾ who referred them to the Rhætic or to the Rhætic-Lias formation.

The animal-remains were examined by B. LUNDGREN²⁾. LUNDGREN states that the rocks in which the fossils occurred may be relegated to two main types, the gap between them being bridged over by other rocks of intermediate structure and composition. The two main types are: —

- 1) a somewhat calcareous, grey sandstone, rich in mica; this is usually fine-grained, sometimes so compact as almost to be designated a quartzite, at others containing rounded quartz-grains and quite fresh fragments of felspar as large as peas, the rock thus assuming rather the character of a conglomerate.
- 2) a dark-coloured, almost black, very calcareous rock, also containing mica.

In the grey sandstone, the following fossils were found: —

Rhynchonella sp., three species.

Waldheimia sp., two species.

Ostrea grønlandica n. sp., one of the most characteristic forms, and fairly common.

Ostrea sandalina (cf. *sandalina*, GOLDF.).

Placunopsis minuta n. sp.

Plicatula cf. *spinosa*, Sow.

Limea duplicata, Sow.

Lima sp.

1) HARTZ, N. 1896. Planteforsteninger fra Cap Stewart i Östgrönland, med en historisk Oversigt. Meddelelser om Grönland. Hefte 19, p. 217—247.

2) LUNDGREN, B. 1895. Anmärkningar om några Jura-fossil från Kap Stewart i Ost-Grönland. Meddelelser om Grönland. Hefte 19, 1896, p. 191—214.

Pecten Stewartianus n. sp., fairly abundant.

— *Johnstrupi* n. sp., one of the commonest species.

— *Rinki* n. sp.

Pecten callosus n. sp.

Avicula Münsteri, BRONN, one of the commonest and most characteristic species.

Perna sp.

Modiola Ravni n. sp.

Pinna sp.

Leda lacryma, SOW.

Panopœa Toulai n. sp.

— sp.

Pholadomya grönlandica sp.

Ammonites sp.

Belemnites sp.

In the black limestone the following fossils were found: —

Lingula sp.

Rhynchonella sp.

Placunopsis minuta n. sp.

Limea duplicata, SOW.

Modiola sp.

Astarte Bayi n. sp.

— *Wandeli* n. sp., sometimes in large numbers.

— ? *amygdaloides* n. sp.

Cardium concinnum, v. БУСН.

Lyonsia subæquilateralis n. sp.

In rocks of composition intermediate between 1) and 2) the following fossils were found: —

Myoconcha borealis n. sp.

Astarte Hartzi n. sp.

Tancredia elongata n. sp.

Cyprina cf. *Cancriniana*, D'ORB.

LUNDGREN considers that the Cape Stewart beds should be identified with the Middle Jurassic («Dogger») deposits of Kuhn Island. «The four European species found at Cape Stewart all occur in the Callovian deposits of Europe and the general character of the fauna is in close agreement with that of the Callovian. *Plicatula cf. spinosa*, alone, seems to point rather to the Lias, but too much importance should not be attached to this fact. The Jurassic deposits of Cape Stewart should then, in my [LUNDGREN'S] opinion, be referred to the Callovian and they certainly have a Middle-European character, as far as the Lamellibranchs and Brachiopods are concerned. As regards the Cephalopods, these are not well enough preserved for any conclusions as to the age of the beds to be definitely based upon them».

The observations upon the Jurassic deposits of Jameson's Land were further supplemented in 1899, by the Swedish expedition under the leadership of A. G. NATHORST¹⁾.

On this expedition NATHORST discovered a sandstone cropping out on the western shore of Hurry's Inlet, near Point Constable. This sandstone is mottled red and white and rather coarse-grained; but higher up, at a height of 71 metres, it is white, shaly and contains kaolin; higher still, it is of a brownish colour. At a height of 120 metres a basalt-sheet protrudes. Above this, blocks of a greenish sandstone were found, which is probably in place there, the same blocks occurring up to a height of 231 metres. Still higher up, a rock was seen, similar to the plant-bearing Rhætic beds of Cape Stewart; and

¹⁾ NATHORST, A. G. 1900. Två somrar i Norra Ishafvet. Kung Karls Land, Spetsbergens kringsegling, spanande efter ANDRÉE i nordöstra Grönland. Bd. II, p. 214 and 305.

NATHORST, A. G. 1900. Den svenska expeditionen till nordöstra Grönland. Ymer. Årg. 20, p. 115—156.

NATHORST, A. G. 1901. Bidrag till nordöstra Grönlands geologi. Geol. Fören. i Stockholm Förh. Bd. 23, p. 283, 298 and 303.

at 514 metres is a yellow sandstone, containing *Ostreas*, *Bellerophontes* etc. *Ostreas* are present in great numbers and the shells were seen to be partly weathered out, so as to be quite whole.

On the map, accompanying his paper in *Geol. Fören. Förh.*, NATHORST has further indicated a certain region on the south-west side of Davy's Sound at Antarctic's Harbour as doubtfully of Jurassic age. Here, the rocks on the shore have more gentle outlines than the Silurian and Devonian rocks further north in King Oscar's Fjord. The mountains east of Antarctic's Harbour consist partly of soft, coloured sandstones with obscure plant-remains. A block of impure, arenaceous limestone with obscure animal-remains, recalls, in some measure, the Cape Stewart rock. Possibly we are here dealing with the Keuper and Jurassic deposits of Hurry's Inlet, which may extend to this point.

With regard to the geological structure of the district, NATHORST infers that the whole of Greenland must be regarded as a «Horst», which must in earlier times have been more or less covered by sedimentary deposits. These are only preserved in areas of depression and in small «Grabensenkungen», along the coast, or beneath the eruptive masses, which have been brought to the surface in consequence of these depressions. As regards the Jurassic deposits, it must be supposed that the small exposures on Kuhn Island occur in «Grabensenkungen» which have a north and south direction. The Jurassic rocks of Jameson's Land also are depressed in relation to the crystalline rocks.

The Jurassic deposits of Jameson's Land were once more examined in 1900 on the occasion of the Danish expedition to the East coast of Greenland under the direction of N. HARTZ¹⁾, while G. AMDRUP, who had the chief command of this expedi-

¹⁾ HARTZ, N. 1902. Beretning om Skibsexpeditionen til Grönlands Östkyst for Tidsrummet fra d. 18. Juli til d. 12. September 1900. Meddelelser om Grönland. Hefte 27, p. 155—181.

tion, accomplished his perilous journey along the East coast of Greenland to Angmagsalik.

HARTZ'S detachment landed on the 31st of July near Dinosaurus River, about one and a quarter Danish miles (9,4 kilometres) north of Cape Stewart. Here, at a height of about 110 feet (35 metres) above sea-level, HARTZ found a block of sandstone bearing the footprint of a Saurian, which according to FRAAS was that of a Dinosaur. HARTZ believes the sandstone to have been derived from the Jurassic beds there exposed. HARTZ also found in the same locality some good fossils, mainly Lamellibranchs and Belemnites, in loose blocks derived from a sandstone bed, which was exposed at a height of about 600 feet (188 metres) above sea-level; and, on the shore below, in loose pebbles, were a large number of beautiful Pectens (*Pecten Stewartianus*, LUNDGR.).

DEICHMANN and O. NORDENSKJÖLD, members of the expedition, spent from the 2nd to the 7th of August in making a journey into the interior of the northern part of Jameson's Land. On their return, they reported amongst other things, that innumerable Ammonites lay scattered about on the plateaux inland; they brought specimens of the Ammonites back with them.

On the 9th of August, KOCH and HARTZ sailed for Point Constable. In Mount Nathorst at a height of about 1625 feet (510 metres) above sea-level, they observed a huge oyster-bank (probably identical with that mentioned by NATHORST, see p. 167) containing innumerable oyster-shells, beautifully preserved, besides many other Lamellibranchs and Belemnites. Somewhat higher up, a crinoid-sandstone with many stems and arms of Crinoids (*Pentacrinus*) occurred.

On the 11th of August, HARTZ found some richly fossiliferous beds containing plant-remains in the lower part of Vardeklöft¹⁾

¹⁾ According to information kindly given by HARTZ, Vardeklöft is the place on the coast where RYDER'S expedition landed in 1891 and which was described as approximately south-west of the Fame Islands, see p. 164. — Meddelelser om Grönland. Hefte 19, 1896. p. 165.

about 600 feet (188 metres) above sea-level. According to the fossils, the beds were of Rhætic-Lias age. From the 16th to the 19th of August was spent in collecting fossil-plants. In the north side of Vardekløft, at a height of 1750—1850 feet (550—580 metres), HARTZ also found many fine Ammonites, Belemnites, a Gastropod, vertebræ of *Ichthyosaurus* (according to FRAAS) and fossil wood. These fossils were contained in concretions in a very micaceous clay-shale, which weathered easily.

From the 15th to the 21st of August KRUISE, O. NORDENSKJÖLD and KOCH undertook an expedition in a boat along the coast of Jameson's Land, from North-east Bay to Cape Stewart. On this expedition a light-coloured, *Aucella*-bearing sandstone was found cropping out in Aucella River near the camping-place of August 18th—19th in the south-west of Jameson's Land, about two and a half Danish miles (18,8 kilometres) south-east of the «Erratic Boulder» (see the map).

A very exact topographical description of the regions visited by the Danish expedition has been given by J. P. KOCH¹⁾.

The Board of directors of the «Carlsbergfondet» did me the honour of requesting me to undertake the examination and determination of the Jurassic fossils collected during the expedition of 1900. A casual glance through the material at once convinced me of the importance of comparing these fossils with those of the same age which had been derived from Central Europe. I, therefore, represented to the Board of directors that it would be advisable for me to make the final determination of the species at Munich, where the most magnificent material for comparison would be available. To this the Board of directors readily agreed and placed the necessary means at my disposal; for which generosity on their part, I desire here to express the deepest grati-

¹⁾ KOCH, J. P. 1902. Bemærkninger vedrørende de paa Skibsexpeditionen til Grönlands Östkyst opmaalte Kyststrækninger mellem 69° 20' N. Br. og 72° 20' N. Br. Meddelelser om Grönland. Hefte 27, p. 275—303.

tude. At Munich, Herr Geheimrath K. A. v. ZITTEL received me, as on former occasions with every possible expression of kindness and goodwill. He placed a seat in the Palæontological Institute at my disposal and permitted me to make use of the very valuable palæontological collection for purposes of comparison. I tender to him now my heartfelt thanks for all the assistance he, in many ways, afforded to me. Even then my labours would hardly have been crowned with such satisfactory results, had not Herr Professor Dr. J. F. POMPECKJ proffered me such ready assistance in my researches. His very wide experience of the fossils belonging to the Jurassic formations of Arctic regions has been of the greatest assistance to me, in helping to determine the more obscure fragments, and I beg here to express my gratitude to him for his kindly help.

The conclusions I arrived at and the descriptions of the various species that could be identified, are contained in the following pages.

Description of the fossils.

Echinodermata.

Crinoidea.

Pentacrinus. MILLER.

Pentacrinus sp. cf. *Andreæ*. DE LORIOI.

Plate VI, figs. 1—6.

1878. DE LORIOI, P. Monographie des Crinoïdes fossiles de la Suisse, Deuxième partie. Abh. Schweiz. paläont. Ges. Basel und Genf. vol. V. p. 112, tab. XIV, fig. 31—38.

The remains of Crinoids are found in great quantities in a very coarse-grained brown crinoid-sandstone from Mount Nathorst. The fragments consist of stalks, cirrhi and arms, but are, unfortunately, weathered and so badly preserved that the species could not be determined with any certainty. A few of the better-preserved stalks, however, are pentagonal, sharply angular, perfectly smooth without any sculpture, and resemble very closely that of *Pentacrinus Andreæ*, DE LORIOI. Very rarely fragments of stalks occur, in which the suture-line bears centrally a small round depression as in *Pentacrinus crista-galli*, QUENSTEDT¹⁾ (pl. VI, fig. 6), but the tubercle in the middle of the side of the stem-joints, described by DE LORIOI as characteristic of this species, has not been observed.

¹⁾ DE LORIOI, P. 1884—9. Paléontologie Française. Sér. 1. Animaux invertébrés. Terrain jurassique. Tome XI. Deuxième partie. Crinoïdes. Paris. p. 152, tab. 152, fig. 1—10.

The largest stem-joints have a diameter of 5^{mm}, but the majority have a diameter of only 3—4^{mm}. Upon one slab is an impression of a stalk, which is 170^{mm} long. No sculpturing is discernible upon the faces of joint. The cirrhi resemble those of the above-mentioned species.

A few of the arms are fairly well-preserved and appear to branch infrequently. They also resemble those of the species already mentioned.

Calyx-fragments are rarely present and are unfortunately so weathered that it has not been possible to identify the various ossicles.

The Swiss specimens of *Pentacrinus Andreae* quoted by DE LORIOI belong to the «Hauptrogenstein» (étage bathonien). *Pentacrinus crista-galli* occurs in the Humphriesianum-zone of the Inferior Oolite (étage bajocien, the «brown Jura δ » of QUENSTEDT).

Vermes.

Serpula. LINNÉ.

Serpula sp.

A brown sandstone block, brought by O. NORDENSKJÖLD from the vicinity of Aucella River in the south-west of Jameson's Land on August 18th, contains a mass of thick, irregularly twisted, calcareous tubes representing probably some species of *Serpula*. A nearer determination is not possible.

Molluscoidea.

Brachiopoda.

Rhynchonella. FISCHER.

Rhynchonella sp. sp.

Fragments of two species of *Rhynchonella*, not determinable, were found by HARTZ in Vardekløft on August 11th in a block of dark-coloured calcareous sandstone.

Waldheimia. KING.*Waldheimia sp.*

A badly-preserved shell of a species of *Waldheimia* occurs in the brown sandstone from Mount Nathorst. This shell resembles rather closely the one figured by Lundgren¹⁾, but is so weathered that it cannot be determined with absolute certainty.

Mollusca.**Lamellibranchiata.****Pseudomonotis. BEYRICH.***Pseudomonotis sp. (an Jacksoni. POMPECKJ).*

The left valve of a large Aviculid has been obtained from the plateau immediately west of Neill's Cliffs. This shell was found by DEICHMANN on August 12th. It is embedded in brown sandstone so that only the weathered inner surface is visible. As both hinge and the greater part of the wing are wanting, the shell cannot be determined with certainty, but the large size and coarse radial sculpture recall *Pseudomonotis Jacksoni*, POMPECKJ²⁾.

Pseudomonotis Jacksoni, POMPECKJ was found by NANSEN at Cape Flora in Franz Josef's Land in a hard grey sandy marl. POMPECKJ considers that in all probability the horizon is Lower Bajocian, almost corresponding to the Opalinum- and Murchisonæ-zones.

Pecten. KLEIN.*Pecten sp. (an Stewartianus. LUNDGREN).*

A fragment of a large smooth *Pecten* occurs in a block of coarse-grained sandstone found in Vardekløft. It resembles

¹⁾ LUNDGREN, B. 1895, p. 195, pl. III, fig. 4.

²⁾ POMPECKJ, J. F. 1899, p. 60 and 125—127.

Pecten Stewartianus, LUNDGREN¹⁾, but a more exact determination cannot be made.

According to LUNDGREN, *Pecten Stewartianus* occurs fairly abundantly in the grey sandstone of Cape Stewart in Jameson's Land which is reckoned by him to be of Callovian age.

Pecten sp. cf. Johnstrupi. LUNDGREN.

1895. LUNDGREN, B. Anmärkningar om några Jurafossil från Kap Stewart i Ost-Grönland. Medd. om Grönland. Hefte 19, 1896, p. 199, tab. III, fig. 13.

Part of a ribbed *Pecten* was found by HARTZ on Aug. 11th in a block of dark-coloured calcareous sandstone from Vardeklöft. The ears of the shell are wanting, otherwise it is in every other respect identical with *Pecten Johnstrupi* but is too incomplete to be determined with any certainty.

Pecten Johnstrupi is, according to LUNDGREN, one of the very commonest species occurring in the grey sandstone of Cape Stewart in Jameson's Land, which rock is by him referred to the Callovian.

Pecten sp. cf. Rinki. LUNDGREN.

1895. LUNDGREN, B. Anmärkningar om några Jurafossil från Kap Stewart i Ost-Grönland. Medd. om Grönland. Hefte 19, 1896. p. 200, tab. III, fig. 14.

A smooth cast of a *Pecten* has been found in a block of coarse-grained sandstone from Vardeklöft. The specimen is about 46^{mm} long and 45^{mm} wide. It resembles *Pecten Rinki* but cannot be determined with any certainty.

Pecten Rinki, as described by LUNDGREN, occurs in the grey sandstone of Cape Stewart in Jameson's Land, which is referred to the Callovian by LUNDGREN.

Pecten sp.

Pl. VI, fig. 10.

A cast of a rather finely striated *Pecten*, which cannot be identified, occurs in the *Aucella*-sandstone. The sandstone

¹⁾ LUNDGREN, B. 1895, p. 198, pl. III, fig. 12.

crops out in Aucella River in the south-west of Jameson's Land. The cast is 25^{mm} in length.

Lima. BRUGUIÈRE.

Lima sp.

An impression in the crinoid-sandstone of Mount Nathorst seems to belong to a species of *Lima*, but cannot be determined.

Limea. BRONN.

Limea duplicata. SOWERBY.

1829. *Plagiostoma duplicata.* SOWERBY. Mineral Conchology of Great Britain. London. vol. 6, p. 114, tab. 559, fig. 3.
 1834—40. *Lima duplicata.* GOLDFUSS. A. Petrefacta Germaniæ. Düsseldorf. Theil 2, p. 103, tab. 107, fig. 9.
 1863. *Lima duplicata.* TRAUTSCHOLD. Bull. Moscou. 1863, p. 10, tab. 7, fig. 6.

This cast is entirely similar to those identified by LUNDGREN¹⁾ as *Limea duplicata*, Sow. It occurs in a dark-coloured calcareous sandstone pebble found on the sea-shore near Dinosaurus River, about one and a quarter Danish miles (9,4 kilometres) north of Cape Stewart, on July 31st. The material of which the pebble consists resembles the rock of LUNDGREN'S specimens exactly and has evidently been derived from the same bed.

Limea duplicata has been found by LUNDGREN in the grey sandstone, as well as in the black limestone of Cape Stewart in Jameson's Land, which is referred by him to the Callovian. ? *Limea cf. duplicata*, GOLDF. is quoted by POMPECKJ²⁾ from the grey clayey sandstone north of Elmwood at Cape Flora, Franz Josef's Land, which is reckoned by him to belong to the Middle Callovian. According to POMPECKJ, *Limea duplicata* has been obtained from the Upper Bajocian to the Oxfordian in Western Europe, in the localities of Balin and Koscielec near Krakow, Popielany in Lithuania, the island of Andö in Norway, Central Russia, Nova Zembla and Cape Stewart in East-Greenland.

¹⁾ LUNDGREN, B. 1895, p. 198. pl. III, fig. 6.

²⁾ POMPECKJ, J. F. 1899, p. 65 and 113—115.

Ostrea. LINNÉ.*Ostrea eduliformis.* SCHLOTHEIM.

Pl. VII, figs. 1—3.

1820. SCHLOTHEIM, E. F. Die Petrefactenkunde etc. Gotha. p. 233.

1834—40. *Ostrea explanata.* GOLDFUSS, A. Petrefacta Germaniæ. Düsseldorf. Theil 2, p. 22, tab. 80, fig. 5.

A large number of oyster-shells have been collected from Mount Nathorst. These occur mainly in an oyster-bank, i. e. a bed which consists almost exclusively of oyster-shells, held together by a brown sandy cementing material. A few shells occur in the brown sandstone and in the crinoid-sandstone. Most of the better preserved shells resemble very closely *Ostrea eduliformis* SCHLOTH. They have the same broad hinge-line, drawn out into a point above, the same rounded anterior border and the same concave posterior border with a wing-like prolongation below. The position of the muscular impression is also identical. The shell figured on pl. VII, fig. 3, except that it is smaller, is very like a specimen from the Knorrii-beds of the canal near Hildesheim, which is to be seen in the Palæontological Collection at Munich. Other specimens in the Munich Collection are also very similar to the Greenland ones.

The largest of the specimens from East-Greenland is 104^{mm} in length.

Ostrea eduliformis (*typ.* and *var. trigona* SCHLIPPE) occurs, according to SCHLIPPE¹⁾, in the Subfurcatum-beds, in the «Hauptrogenstein (Great Oolite) and Cornbrash of Baden, in the «Hauptrogenstein» and Cornbrash of Alsace, in the «Hauptrogenstein» and the Varians-beds of Western Argau, in the «brown Jura δ » of Swabia and in the Parkinsoni-zone of North-west Germany. SCHLOSSER²⁾ quotes it from the «brown Jura δ » (Humphriesianum-zone) of Franken and of Oberpfalz.

¹⁾ SCHLIPPE, O. 1888. Die Fauna des Bathonien im oberrheinischen Tieflande. Abh. zur geol. Specialkarte von Elsass-Lothringen. Strassburg. Band IV, Heft IV, p. 21, 34, 54, 67, 110.

²⁾ SCHLOSSER, M. 1901, p. 552.

Ostrea sp. cf. eduliformis. SCHLOTHEIM.

Pl. VII, figs. 4 and 5.

1820. SCHLOTHEIM, E. F. Die Petrefactenkunde etc. Gotha. p. 233.

A few of the *Ostrea*-shells from Mount Nathorst are more convex than the typical *Ostrea eduliformis*. Unfortunately the largest of these are in a very fragmentary condition so that it is not possible to identify them with certainty. A small, fairly complete specimen with both valves (pl. VII, fig. 5) resembles very closely an "*Ostrea cf. explanata*, GOLDF." from the Bathonian beds of Boulogne, which is preserved in the Munich Collection.

Ostrea sp. cf. sandalina. GOLDFUSS.1834—40. *Ostrea sandalina.* GOLDFUSS, A. Petrefacta Germaniæ. Düsseldorf. Theil 2, p. 21, tab. 79, fig. 9.1849. *Ostrea sandalina.* ROUILLER. Bulletin de Moscou. t. N., fig. 111.

In the pebble which was found by HARTZ on July 31st on the seashore near Dinosaurus River and which has already been mentioned as containing a cast of *Limea duplicata*, Sow., fragments of a species of *Ostrea* also occur. These resemble very closely the specimens from Cape Stewart in the Copenhagen Collection, which have been determined by LUNDGREN¹⁾ as *Ostrea sandalina* (*cf. sandalina* GOLDF.). LUNDGREN'S specimens of *Ostrea sandalina* were found in the grey sandstone of Cape Stewart in Jameson's Land, which has been referred by Lundgren to the Callovian.

Aucella. KEYSERLING.*Aucella Pallasii.* KEYSERLING.

Pl. VI, fig. 7.

1846. KEYSERLING, A. und KRUSENSTERN, P. Wissenschaftliche Beobachtungen auf einer Reise in das Petschora-Land im Jahre 1843. St. Petersburg. p. 299, tab. XVI, fig. 1—6.

1888. LAHUSEN, J. Ueber die russischen Aucellen. St. Pétersbourg. Mém. Com. Géol. vol. III, no. 1, p. 34, tab. I, fig. 12—27.

¹⁾ LUNDGREN, B. 1895, p. 197.

Casts of *Aucella Pallasii* are fairly abundant in a light-coloured sandstone which crops out in Aucella River in the south-west of Jameson's Land. The fossils agree exactly with LAHUSEN's description and also with the figures. The largest specimen (a cast) is 43^{mm} in length.

According to LAHUSEN, *Aucella Pallasii* is an excellent guide-fossil for the lowest Virgatus-beds in the lower Volga-stage, which A. P. PAVLOW places in the Middle Portlandian¹⁾.

Aucella Pallasii is quoted from the Kimeridge Clay of Lincolnshire²⁾. It has also been found by NATHORST³⁾ in the dark-grey, marly, bituminous limestone of Nordenskiölds Berg in the Svenska Förlandet and in boulders of a black carbonaceous shale from Tordenskjolds Berg in Kung Karls Ö (King Karl's Land).

Myoconcha SOWERBY.

Myoconcha grönlandica. nov. sp.

Pl. VI, figs. 8 and 9.

Two fairly well-preserved casts in coarse brown sandstone of a species of *Myoconcha* have been obtained from Mount Nathorst. The larger one, the posterior end of which is wanting, must have been about 103^{mm} in length; the breadth is 29^{mm} and the thickness 23^{mm}. The smaller specimen, in which the posterior end is also lacking, must have been about 85^{mm} long; the breadth is 26^{mm} and the thickness 15^{mm}. The shape of these casts, and especially the fact that they have a deep depression corresponding to the position of the ridge on the posterior border of the muscular impression, show clearly that

¹⁾ PAVLOW, A. P. 1901. Comparaison du Portlandien de Russie avec celui de Boulonnais. Compte-rendu du VIII. Congrès géologique international 1900. Paris.

²⁾ WOODWARD, H. B. 1895, p. 371.

³⁾ POMPECKJ, J. F. 1899. Marines Mesozoicum von König-Karls-Land. Öfvers. Vetenskaps-Akademiens Förh. Stockholm. No. 5, p. 457—8.

they belong to the genus *Myoconcha*; on the other hand the specimens cannot be identified with any species hitherto described. The species *Myoconcha elongata*, MORRIS and LYCETT¹⁾ approaches them most nearly; they are, however, considerably larger and narrower in proportion.

In the collection of Cape Stewart fossils examined by LUNDGREN, there is a badly preserved impression in coarse brown sandstone of the inner side of a Lamellibranch shell, which LUNDGREN was unable to determine with certainty. This impression is about 95^{mm} long and 26^{mm} wide. It resembles the casts of *Myoconcha grönlandica* and is probably to be identified with this species.

Trigonia. BRUGUIÈRE.

Trigonia undulata. FROMHERZ.

Pl. VI, fig. 11.

1872—79. LYCETT, J. A monograph of the British fossil *Trigoniæ*. Printed for the Palæontographical Society. London. p. 77, tab. XVI, fig. 9, 10, 11; tab. XVII, fig. 5, 6.

Six specimens of a species of *Trigonia* occur in a fine or fairly coarse-grained sandstone from Mount Nathorst. These agree exactly with LYCETT's description of *Trigonia undulata* and with figure 5 on pl. 17 of his work, except that they are slightly more convex and consequently the border between the surface of the shell and the area is bent more in an S-figure. The Greenland specimens are also more convex than a specimen of the same shell from the Bathonian of Boulogne-sur-mer in the Munich Collection, although in other respects they resemble it exactly.

Trigonia undulata is quoted from the Great Oolite and Stonesfield slate, from the Forest Marble and Bradford Clay

¹⁾ MORRIS, J., and LYCETT, J. 1853. A monograph of the mollusca from the Great Oolite. Part II. Bivalves. London. p. 77, pl. III, fig. 18.

and also from the *Macrocephalus*-zone in the Cornbrash of England, from Dorsetshire to Lincolnshire¹⁾).

Astarte. SOWERBY.

Astarte Bayi. LUNDGREN.

Pl. VI, fig. 13.

1895. LUNDGREN, B. Anmärkningar om några Jurafossil från Kap Stewart i Ost-Grönland. Medd. om Grönland. Köbenhavn. 1896. Hefte 19, p. 204, tab. IV, fig. 22.

A small, well-preserved specimen of *Astarte Bayi* was found by HARTZ in a block of dark-coloured calcareous sandstone in Vardekløft on August 11th. The specimen agrees perfectly with LUNDGREN'S description and figure. Its length is 5^{mm}.

According to LUNDGREN, *Astarte Bayi* occurs rarely in the black limestone of Cape Stewart in Jameson's Land, which is reckoned by him as Callovian.

Astarte Hartzi. LUNDGREN.

Pl. VI, fig. 12.

1895. LUNDGREN, B. Anmärkningar om några Jurafossil från Kap Stewart i Ost-Grönland. Medd. om Grönland. Köbenhavn 1896. Hefte 19, p. 205, tab. IV, fig. 24.

Two dark-coloured calcareous sandstone casts, with fragments of shell attached, are identical with LUNDGREN'S description and figures of this species. These specimens were collected in blocks in Vardekløft on August 11th. The shell-fragments show that the shell was covered with tolerably fine, close, concentric lines.

Astarte Hartzi occurs in the Callovian beds of Cape Stewart in Jameson's Land.

¹⁾ WOODWARD, H. B. 1894, p. 573.

Astarte sp. cf. elegans. SOWERBY.

Pl. VI, figs. 14 and 15.

1818. SOWERBY, J. Mineral Conchology of Great Britain. London. vol. 2, p. 86, tab. 137, fig. 3.
- 1834—40. GOLDFUSS, A. Petrefacta Germaniæ. Düsseldorf. Theil II, p. 191, tab. 134, fig. 12.
1853. MORRIS, J., and LYCETT, J. A monograph of the Mollusca from the Great Oolite. Printed for the Palæontographical Society. London. Part II, p. 86, pl. XIV, fig. 14.

In a fine-grained, brown sandstone from Mount Nathorst, seventeen shells and casts are found belonging to a species of *Astarte* closely allied to *Astarte elegans*. The shells are broad (the best preserved specimen has a breadth of 30^{mm} and a length of 29^{mm}), they are also thick and are covered by rather coarse, close lines of growth. The Greenland specimens do not agree particularly well with the above-quoted figures of this very variable species, seeing that they are both broader and more convex. The specimens resemble much more closely two in the Munich Collection from the Bajocian or Inferior Oolite of the Cotswold Hills, Gloucestershire, but the latter are more drawn out posteriorly and have a narrower lunule.

Astarte elegans, Sow. is quoted by FOX-STRANGWAYS¹⁾ and WOODWARD²⁾ from the Dogger, Millepore Bed, Grey Limestone and Cornbrash of Yorkshire; also from the Inferior Oolite, Murchisonæ-, Humphriesianum- and Parkinsoni-zones, and from the Cornbrash (Macrocephalus-zone) from Dorsetshire to Yorkshire.

SCHLOSSER³⁾ quotes *Astarte elegans* as occurring in the «brown Jura γ » or Sowerbyi-zone of Franconia.

¹⁾ FOX-STRANGWAYS, C. 1892, p. 157.

²⁾ WOODWARD, H. B. 1894, p. 555.

³⁾ SCHLOSSER, M. 1901, p. 549.

Astarte sp. cf. *Sæmanni*. DE LORIOI.

Pl VI, fig. 16.

1867. DE LORIOI. et PELLAT. Mon. pal. et géol. de l'étage portlandien de Boulogne-sur-mer. p. 68, tab. VI, fig. 9.

Fragments of an *Astarte* have been obtained from a light-coloured sandstone block, which was found by O. NORDENSKJÖLD in Aucella River in the south-west of Jameson's Land. The sandstone-block was found below the place where the Aucella-sandstone crops out. The best-preserved specimens show a close resemblance to those of *Astarte Sæmanni* in a Kimeridge-Portland boulder from Hirshals in Denmark, in the Copenhagen Collection¹). The sculpture of the shells is somewhat coarser and the edges do not seem to have been crenulated. Specimens of *Astarte Sæmanni* from the Portlandian of Boulogne, in the Munich Collection, are also very similar to these.

The sculpture of the valves recalls at once that of *Astarte ovooides* v. БУЧ²), specimens of which, from Khorochovo near Moscow, are in the Copenhagen Collection. The shape of the latter is, however, very much more oval than that of the Greenland *Astarte*, which certainly stands nearer to *Astarte Sæmanni* than to *Astarte ovooides*.

Astarte Sæmanni occurs in the «Marnes à *Perna Bouchardi*» or «zone à *Virgatites typiques*» (*sosia*, *apertus* etc.) of the «Portlandien» of Boulogne-sur-mer, and in the Lower Portlandian (Portland Sand) of Wiltshire and Buckinghamshire in England.

¹) SKEAT, E. G., and MADSEN V. 1898. On Jurassic, Neocomian and Gault boulders found in Denmark. Kjöbenhavn. Danmarks geologiske Undersøgelse R. 2, Nr. 8, p. 123, tab. III, fig. 2.

²) v. BUCH, L. 1845. Mittheilungen an H. G. BRONN. Cistideen; *Trigonia Whateleyæ*; Unteroolith-Versteinerungen bei Moskau. Neues Jahrbuch für Mineralogie etc. Jahrg. 1845, p. 180.

Tancredia. LYCETT.*Tancredia sp. cf. angulata.* LYCETT.

Pl. VI, fig. 18.

1853. LYCETT, J. Description of some new species of Mollusca from the Lincolnshire Oolites, see: MORRIS, J. On some sections in the oolitic district of Lincolnshire. Quart. Journ. Geol. Soc. vol. 9, p. 341, tab. 14, fig. 5.
1853. MORRIS, J., and LYCETT, J. A monograph of the Mollusca from the Great Oolite. Printed for the Palæontographical Society. London. Part II, Bivalves. p. 94, tab. XIII, fig. 9 a and b.

Three specimens consisting of casts and shells, but with the outer side embedded in brown sandstone, were found in Mount Nathorst. These resemble *Tancredia angulata*, LYCETT, but are larger than the figures quoted above.

The specimen much resemble the casts of *Tancredia donuciformis*, Lyc. an *angulata*, Lyc. in the Munich Collection, which came from the «brown Jura β » (Murchisonæ-zone) of Heiningen Wald near Boll; the largest Greenland specimen is, however, more convex and shows but faint indications of the broad groove on the surface of the cast, which passes diagonally from the umbo towards the posterior end. A second Greenland specimen is also more convex and narrower and either does not show the groove at all, or gives but the faintest possible indication of it.

The largest specimen from Greenland is 46^{mm} long and 22^{mm} wide; the second is 35^{mm} long and 18^{mm} wide.

Tancredia angulata is quoted by WOODWARD¹⁾ from the Passage Beds (Opalinum-zone) and from the Fuller's Earth, Clay and Rock; also from the Great Oolite and Stonesfield Slate of Somersetshire, Gloucestershire and Lincolnshire in England.

¹⁾ WOODWARD, H. B. 1894, p. 571.

Tancredia sp.

Pl. VI, fig. 19.

A cast which, in all probability, is derived from a species of *Tancredia*, occurs in a light-coloured sandstone block. This block was found by O. NORDENSKJÖLD in Aucella River, below the spot where the Aucella-sandstone crops out. This locality is in the south-west of Jameson's Land.

The specimen is, unfortunately, too incomplete to be determined with any certainty.

Gresslya. AGASSIZ.*Gresslya gregaria.* (ZIETEN) GOLDFUSS. sp.

Pl. VIII, figs. 1 and 2.

1830. *Lutraria gregaria*, ZIETEN, C. H. Die Versteinerungen Württembergs. Stuttgart. p. 85, tab. 64, fig. 1 a—c.
 1834—40. *Lutraria gregaria*, GOLDFUSS, A. Petrefacta Germaniæ. Düsseldorf. Theil 2, tab. 61, fig. 8—10.
 1858. *Myacites gregarius*, QUENSTEDT, F. A. Der Jura. Tübingen. p. 447.

Sixteen casts and the greater part of a shell, found embedded in a fine-grained brown sandstone from Mount Nathorst, are identical with casts of *Gresslya gregaria*, GOLDF. in the Munich Collection, from the «brown Jura δ » of Auerbach, in Oberpfalz.

The largest specimen, a cast, is 53^{mm} long, 36^{mm} broad and 26^{mm} thick.

Gresslya gregaria occurs, according to QUENSTEDT in the «brown Jura δ »; SCHLOSSER¹⁾ quotes it from the «brown Jura δ » (Humphriesianum-zone) and «brown Jura ε » (Parkinsoni-zone). In England, WOODWARD²⁾ gives it as occurring in the Inferior Oolite (Murchisonæ-zone) of Dorsetshire.

1) SCHLOSSER, M. 1901, p. 552, 559.

2) WOODWARD, H. B. 1894, p. 561.

Gresslya abducta. PHILLIPS. *sp.*

Pl. VIII, fig. 3.

1829. *Unio abductus*. PHILLIPS, J. Illustrations of the Geology of Yorkshire. York. p. 156, tab. VI, fig. 4.
 1858. *Myacites abductus*. QUENSTEDT, F. A. Der Jura. Tübingen. p. 325, tab. 44, fig. 17.

Eight casts of fine-grained brown sandstone from Mount Nathorst resemble exactly the Munich specimens of «*Gresslya gregaria*, ZIET. *abducta*, PHILL. *sp.*», which came from the «brown Jura δ » of Laufen near Balingen.

The largest specimen, a cast, is 54^{mm} long, 41^{mm} wide and 32^{mm} thick.

Gresslya abducta is quoted by QUENSTEDT from the «brown Jura α ». In the Munich Collection there are fragments of the same species from the «brown Jura δ ».

FOX-STRANGWAYS¹⁾ gives them as occurring in the Jurense-zone, Millepore Bed and Cornbrash of Yorkshire, and WOODWARD²⁾ quotes them from the Passage Beds, (Jurense- and Opalinum-zones), the Inferior Oolite (Murchisonæ-, Humphriesianum- and Parkinsoni-zones) and questionably from the Great Oolite and Stonesfield Slate from Dorsetshire to Yorkshire.

Gresslya peregrina. PHILLIPS. *sp.*

Pl. VIII, fig. 4.

1829. *Unio peregrinus*. PHILLIPS, J. Illustrations of the Geology of Yorkshire. York, p. 144, tab. VII, fig. 12.

A few casts in a fine-grained brown sandstone from Mount Nathorst resemble very closely the Munich specimens of *Gresslya peregrina*, which are also casts and were obtained from the «brown Jura δ » of Laufen near Balingen.

The largest cast is 60^{mm} long, 38^{mm} wide and 24^{mm} thick.

¹⁾ FOX-STRANGWAYS, C. 1892, p. 61.

²⁾ WOODWARD, H. B. 1894, p. 560.

Gresslya peregrina occurs, according to FOX-STRANGWAYS¹⁾, in the Blea Wyke beds, the Grey Limestone (Humphriesianum-zone) and the Cornbrash of the Lower Oolite, in the Kellaways Rock, the Lower Calcareous Grit and Lower Limestone, the Middle Calcareous Grit and Upper Limestone of the Middle Oolite of Yorkshire. WOODWARD²⁾ quotes it from the Inferior Oolite (Muchisonæ-zone), the Fuller's Earth, Clay and Rock, questionably from the Great Oolite, the Stonesfield Slate, the Cornbrash (Macrocephalus-zone), the Kellaways Rock (Calloviense-zone) and the Corallian (Plicatilis-zone) from Dorsetshire to Yorkshire.

Pleuromya. AGASSIZ.

? *Pleuromya* sp.

Pl. VI, fig. 17.

A cast in light-coloured sandstone, which may possibly have been derived from a species of *Pleuromya*, was found by O. NORDENSKJÖLD in a block. This block was found in Aucella River in the south-west of Jameson's Land, below the spot where the Aucella-sandstone crops out.

Unfortunately the state of preservation of the cast does not allow of accurate determination.

Pholadomya SOWERBY.

Pholadomya angustata. SOWERBY. sp.

Pl. VI, fig. 20.

1823. *Lutraria angustata.* SOWERBY, J. Mineral Conchology of Great Britain. vol. 4, p. 29, tab. 327.

1874. MOESCH, C. Monographie der Pholadomyen. Abh. schweiz. palæont. Ges. Basel und Genf. vol. I, p. 33, tab. X, fig. 2, 3, 4.

A fairly well-preserved cast of a *Pholadomya*, in fine-grained brown sandstone has been obtained from Mount Nathorst. This corresponds fairly well with MOESCH's description of *Pholadomya angustata*, yet an appreciable distinction is seen in the fact

¹⁾ FOX-STRANGWAYS, C. 1892, p. 162 and 217.

²⁾ WOODWARD, H. B. 1894, p. 561, and 1895, p. 375.

that the anterior border of the shell is somewhat drawn upwards in the direction of the hinge-line and is not «nach der Bauchseite vorspringend» as MOESCH indicates. In this respect the Greenland specimen agrees better with SOWERBY'S figure quoted above. The pallial border is somewhat curved, but the hinge-line is almost straight. The area is not preserved. The number of ribs is 13.

Pholadomya angustata occurs, according to MOESCH, in the Sowerbyi-zone, through the Cornbrash up to the Callovian. FOX-STANGWAYS¹⁾ gives it as occurring doubtfully in the Grey Limestone, also in the Cornbrash, Lower Calcareous Grit and Lower Limestone of Yorkshire. WOODWARD²⁾ quotes it from the Oxford Clay of Dorsetshire.

In addition to the specimens described above, a number of shell-fragments and casts of Lamellibranchs have been found in various localities. Unfortunately it has been impossible to determine any of these. They are mentioned on pages 198—203.

Gastropoda.

A few fragments of Gastropod-casts, partially covered with the shell, have been found in the brown calcareous sandstone of Mount Nathorst and in the very micaceous clay-shale of Vardekløft, 550—880 metres above sea-level. These specimens are, unfortunately, so badly preserved that they cannot be determined.

¹⁾ FOX-STANGWAYS, C. 1892, p. 168 and 223.

²⁾ WOODWARD, H. B. 1895, p. 381.

Cephalopoda.

Ammonoidea.

Macrocephalites. V. SUTNER.

Group of Macrocephalites Ishmæ. KEYSERLING. sp.

Macrocephalites Pompeckji. nov. sp.

Pl. VIII, figs. 5 and 6.

Five more or less perfect clay-ironstone casts of Ammonites have been collected by O. NORDENSKJÖLD on Ammonite Mountain on the west side of the innermost part of Hurry's Inlet, from a height of 500 metres above sea-level. These belong to the genus *Macrocephalites* and to the group of *Macrocephalites Ishmæ* KEYS. sp.

The largest fragment has a diameter of 81^{mm}; the best-preserved has a diameter of 75^{mm} in the widest part that can be measured.

In this same specimen the actual measurements and proportions, taken where the diameter measures 70^{mm}, are the following: —

Diameter	=	70 ^{mm}	=	1	
Width of umbilicus	=	9 "	=	0.13	
Height	} of last whorl {	=	33 "	=	0.47
Thickness		=	32 "	=	0.46.

Measurements of the same specimen taken at right angles to the above, gave the following results and proportions: —

Diameter	=	62 ^{mm}	=	1	
Width of umbilicus	=	7 "	=	0.11	
Height	} of last whorl {	=	31 "	=	0.50
Thickness		=	30 "	=	0.48.

The whorls are broadly convex on the sides and on the external margin, but curve down steeply and abruptly towards the umbilicus. The greatest thickness of the whorls occurs at a little below half their height. The whorls are approximately

horseshoe-shaped or elliptical in cross-section. The penultimate whorl is embraced by a little more than half the height of the last whorl. The umbilicus is deep and narrow so that little more than the inner margin of the first whorls is visible. In the region of the body-chamber the umbilicus widens somewhat more rapidly and forms a more open spiral than before. The length of the body-chamber and the shape of the shell-aperture are not known.

The whorls are covered with strong ribs, which traverse their sides in slight curves, having their convex side backwards. At a distance of somewhat less than half the height of the whorl, these ribs divide into two or three branches or, more rarely, shorter ribs coming from the external margin are interposed between the longer primary ribs. The ribs cross the external margin in gentle curves, which have their convex side forwards. Upon the last whorl or body-chamber the ribs become gradually broader, less prominent and further apart than they are on the preceding whorls. In some specimens, the sculpture of the last whorl has almost disappeared.

The suture-lines cannot be traced with certainty; they appear indistinctly in a few places on the surface of the weathered casts. It can, however, be observed that the lobes and saddles were strongly and deeply divided.

The Greenland specimens differ from *Macrocephalites Ishmæ*, KEYS. *typ.*¹⁾ and from *var. arctica*, NEWTON²⁾ by their more flat-

¹⁾ KEYSERLING, A. und KRUSENSTERN, P. 1846. Wissenschaftliche Beobachtungen auf einer Reise in das Petschora-Land im Jahre 1843. St. Petersburg. p. 331, tab. XX, fig. 8—10, tab. XII, fig. 15.

POMPECKJ, J. F. 1899. The Jurassic Fauna of Cape Flora, Franz Josef Land. The Norwegian North Polar Expedition 1893—1896. Scientific results edited by FRIDTJOF NANSEN. II. London &c. p. 72.

²⁾ NEWTON, E. T., and TEALL, J. J. H. 1897. Notes on a collection of rocks and fossils from Franz Josef Land, made by the JACKSON HARMSWORTH expedition during 1894—1896. Quart. Journ. Geol. Soc. London. vol. 53, p. 500, tab. 40, fig. 1.

tened whorls, their wider umbilicus and by the inner whorls being less embraced by the outer.

Macrocephalites Ishmæ. KEYSERLING. *sp.*

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

1846. KEYSERLING, A., und KRUSENSTERN, P. Wissenschaftliche Beobachtungen auf einer Reise in das Petschora-Land im Jahre 1843. St. Petersburg. p. 331, tab. XX, fig. 8 - 10, tab. XII, fig. 15.
1899. POMPECKJ, J. F. The Jurassic Fauna of Cape Flora, Franz Josef Land. The Norwegian North Polar Expedition. 1893-6. Scientific Results edited by FRIDTJOF NANSEN. II. London &c. p. 72.

Eight more or less complete specimens of this Ammonite have been found at Vardekløft. Most of the specimens occurred in concretions in a very micaceous clay-shale, 550—580 metres above sea-level. Many of the specimens have unfortunately been much compressed and crushed, but the width of the umbilicus, the extent to which the penultimate whorl is embraced by the outer whorl and also the sculpture of the whorls are in every way identical with those of KEYSERLING's specimens from Petchora-Land. In some of the specimens, parts of the suture-lines can be made out. These resemble those of *Macrocephalites Kættlitzii*, POMPECKJ, which, according to POMPECKJ, are — at any rate as far as the second lateral lobe — identical with those of *Macrocephalites Ishmæ*. POMPECKJ explains that KEYSERLING's original drawing of the suture-lines of this species was not correct.

The diameter of the largest Greenland specimen of *Macrocephalites Ishmæ* is about 100^{mm}.

According to information given by Professor TH. TSCHERNYSCHEW to Professor POMPECKJ, *Macrocephalites Ishmæ* occurs in the Lower Callovian or Macrocephalus-zone of the Petchora-basin.

Group of *Macrocephalites macrocephalus*, SCHLOTHEIM sp.

Macrocephalites sp. cf. *compressus*. QUENSTEDT.

1849. QUENSTEDT, F. A. Cephalopoden. p. 182, tab. 15, fig. 1.

?1868. *Stephanoceras Canizarroi*. GEMELLARO, G. G. Studj paleontologici s. Fauna d. Calc. a Ter. Janitor. p. 45, tab. 9, fig. 9—11.

1886—7. QUENSTEDT, F. A. Die Ammoniten des Schwäbischen Jura. vol. II. Der braune Jura. p. 651, tab. 76, fig. 14, 15.

A fragment of an ammonite-cast, consisting of red-brown limestone, found in a concretion in a very micaceous clay-shale at Vardekløft, seems to bear a strong resemblance to the species *Macrocephalites compressus*, QUENSTEDT.

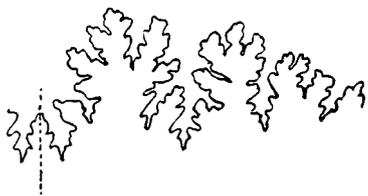


Fig. 1. Suture-line of *Macrocephalites* sp. cf. *compressus*, QUENST.

It has, however, a wider umbilicus and the ribs are further apart at the umbilicus. On the other hand, the ribs divide more than do those in QUENSTEDT'S figures, consequently, on the external margin, they are quite as near together as in those figures; also the ribs curve forward more in the neighbourhood of the umbilicus, than do those in the above-mentioned figures of QUENSTEDT. In the Palæontological Collection at Munich, there is, however, a specimen of *Macrocephalites compressus* from Ützing in Franconia; in this the ribs are closer together and seem to curve in the same way as those of the Greenland specimen. The latter has, however, a wider umbilicus than is seen in the Ützing specimen.

Macrocephalites compressus is quoted by QUENSTEDT from the «brown Jura ε» (Lower Callovian) of Swabia and by SCHLOSSER¹⁾ and POMPECKJ as occurring in the Macrocephalus-zone at Regensburg (Keilberg). Perhaps the same form is intended by GEMELLARO in his description of *Stephanoceras Canizzaroi* from Sicily and by BONARELLI²⁾ from Chanaz (Savoy).

¹⁾ SCHLOSSER, M. 1901, p. 560.

²⁾ PARONA, C. F. et BONARELLI, G. 1895. Sur la Faune du Callovien inférieur de Savoi. p. 118.

Cadoceras. FISCHER.

Group of *Cadoceras modiolare*, d'ORBIGNY, and *Elatmæ*, NIKITIN.*Cadoceras crassum. nov. sp.*

Pl. IX, figs. 1, 2, 3, and X, fig. 1.

Six more or less complete casts of this Ammonite have been found in Vardekløft and on some of these the shell is partly preserved. The casts occurred in concretions in a very micaceous clay-shale 550—580 metres above sea-level.

The largest specimen has a diameter of 140^{mm} and its dimensions and their proportions to one another are as follows: —

	of about	of about	of about	of about
Diameter	140 ^{mm} (= 1)	124 ^{mm} (= 1)	57 ^{mm} (= 1)	
Width of umbilicus	34 " (= 0.24)	27 " (= 0.22)	17 " (= 0.30)	
Height } of the whorl {	60 " (= 0.43)	52 " (= 0.43)	25 " (= 0.44)	15 ^{mm}
Thickness } of the whorl {	100 " (= 0.71)	84 " (= 0.68)	40 " (= 0.70)	20 "
Proportion of the height of the whorl to the thickness	0,61	0,62	0,62	0,75

The very involute outer whorls are broadly convex on the sides, but bend down steeply and suddenly towards the umbilicus. The greatest thickness of these whorls occurs at about a third of their height. In cross-section they are broadly horse-shoe shaped. The penultimate whorl is embraced by the outer whorl to half its height. The inner whorls are higher and narrower than the outer. The umbilicus of the adult shell is deep and somewhat narrow. Little more than the umbilical border of the inner whorls is visible. The length of the body chamber and the shape of the aperture is unknown. The whorls are covered with strong ribs which cross the sides either in a quite straight line or in shallow, backward-bending curves. At about the thickest part of the whorl, the ribs divide into two — or very rarely into three — branches. No tubercles are present at the points of bifurcation. The ribs usually pass straight across the external area or occasionally form very slight curves which are convex forwards. On the last whorl, or body-chamber, the

ribs become gradually broader and less elevated; they are also further apart than on the preceding whorls.



Fig. 2. Suture-line of *Cadoceras crassum* nov. sp.

and somewhat lower than the external saddle. The inferior lateral saddle is situated at the angle formed by the side and the inner margin; it also is comparatively broad and lower than the superior lateral. The nature of the suture-line proves that this Ammonite belongs to the genus *Cadoceras*.

Of all the Ammonites that have been hitherto described, these Greenland ones are related most nearly to *Cadoceras sublaeve*, DESL.¹⁾ and *Cadoceras Elatmæ*, NIKITIN²⁾.

They differ from the first in that the whorls are proportionately higher and narrower, the umbilicus is wider and the ribs are smaller and closer together.

The chief difference between the Greenland specimens and *Cadoceras Elatmæ* is seen in the wider umbilicus of the former; further, the umbilical border is much more rounded, the ribs are finer and do not curve forward so much, also they remain distinct further forward in the Greenland specimens than is the case in the species *Cadoceras Elatmæ*.

Another large Ammonite-fragment was found also in Vardekløft, which differs from the six specimens mentioned above in

¹⁾ EUDES-DESLONGCHAMPS, E. 1889. Rapport sur les fossiles oxfordien de la collection JARRY. Bull. Soc. Linnéenne de Normandie. sér. 3, vol. X, separat p. 26, tab. 1, fig. 1—4.

²⁾ NIKITIN, S. 1881. Der Jura der Umgegend von Elatma. Lieferung I, p. 34, tab. IV, fig. 20, 21, 23, 18? Lieferung 2, p. 14, tab. X, fig. 47.

having a wider umbilicus. This may perhaps be a variety of *Cadoceras crassum*.

Perisphinctes. WAAGEN.

Perisphinctes sp. cf. *Panderi*. d'ORBIGNY.

Pl. X, fig. 3.

1890. *Perisphinctes Panderi*. MICHALSKI, A. Die Ammoniten der unteren Wolga-Stufe. St. Pétersbourg. Mém. Com. Géol. vol. VIII, no. 2, p. 211, 453, tab. XII, fig. 1—3.

A large Ammonite-fragment occurs in a block from Aucella River in the south-west of Jameson's Land. This fragment consists of a cast of the inner whorls of some species of *Perisphinctes*. The block was found below the place where the Aucella-sandstone crops out and is of very similar material. The specimen is unfortunately crushed and in a poor state of preservation. There is no trace of the suture-lines and the species cannot possibly be determined with any certainty. It resembles the specimen figured by MICHALSKI on pl. XII, fig. 1 not only in the width of the umbilicus and in the sculpturing of the surface, but also in the manner in which the inner whorls are embraced by the outer. The somewhat coarse ribs divide usually into two branches, very rarely into three. The points of bifurcation, in the case of the outer whorls, lie somewhat below the line of contact with the next whorl and are consequently visible on these whorls.

Perisphinctes Panderi is quoted by MICHALSKI as occurring very frequently in the deposits referred to the Virgatus-zone in the immediate neighbourhood of Moscow.

Olcostephanus. NEUMAYR.

Olcostephanus (? *Simbirskites*, PAVLOW and LAMPLUGH.) *nov. sp.*

Pl. X, fig. 2.

Some Ammonite-fragments were collected by O. NORDENSKJÖLD on the 5th and 6th of August 1900, from fossil-locality 2 on

Fossil Mountain in the northern part of Jameson's Land at a height of about 600—700 metres above sea-level. The specimens are five in number and consist of casts, four in light-coloured and one in dark-coloured sandstone.

Although the specimens are tolerably complete, they are too badly preserved for determination to be possible. Prof. POMPECKJ is of opinion that they may be a new species of *Simbirskites*.

In addition to the specimens described above, a number of Ammonite fragments and casts have been found in various localities. Unfortunately it is impossible to determine any of these. They are mentioned on p. 197—203.

Belemnnoidea.

Large and small fragments of several species of Belemnites have been obtained in considerable numbers from the localities given below. All of these unfortunately are either much weathered or incomplete and cannot therefore be determined: —

- I) Mount Nathorst — from the crinoid-sandstone, the coarse sandstone, the fine sandstone and the oyster-bank.
 - II) Vardeklöft — in blocks.
 - III) Fossil-locality 1 on Fossil Mountain in the northern part of Jameson's Land, — in light-coloured sandstone blocks collected by O. NORDENSKJÖLD August 3rd and 4th 1900.
 - IV) Fossil-locality 2 on Fossil Mountain in the northern part of Jameson's Land, — in light coloured sandstone blocks collected by O. NORDENSKJÖLD August 5th and 6th 1900.
 - V) Aucella River in the south-west of Jameson's Land, — in light coloured sandstone blocks collected by O. NORDENSKJÖLD.
-

General remarks.

The fossils that have been examined were collected from various localities and from different beds. The following lists of fossils have been compiled, arranged in the order of the days on which the collections were made.

1. From a pebble of dark-coloured calcareous sandstone, found by HARTZ on the sea-coast near Dinosaurus River about one and a quarter Danish miles (9,4 kilometres) north of Cape Stewart, on July 31st, the following were obtained: —

Limea duplicata, Sow., one cast.

Ostrea sp. cf. sandalina, GOLDF., fragments.

Both these forms were identified by LUNDGREN in the Jurassic deposits of Cape Stewart. This pebble may easily have been derived from a continuation of the same beds, or may perhaps have been conveyed to this place by coast-ice from Cape Stewart.

2. A brown sandstone was found on August 4th by CHRISTENSEN. This occurred on a mountain south of Fossil Mountain, WSW of the innermost part of Carlsberg Fjord, at a height of 950 metres above sea-level. In this occurred: —

Ammonites sp. ind., one fragment.

The age of this fragment cannot be determined, but, according to CHRISTENSEN many Ammonites could be found here.

3. Fossils collected by O. NORDENSKJÖLD from «Fossil-locality 1» on Fossil Mountain in the northern part of Jameson's Land, on the 3rd and 4th of August: —

Ammonites sp. ind., one fragment.

Belemnnoidea-fragments.

The rock, in which these fossils are contained, is a coarse-grained brown sandstone.

No conjecture can be made as to the age of these fossils.

4. Fossils collected by O. NORDENSKJÖLD on August 5th and 6th from «Fossil-locality 2» on Fossil Mountain in the northern part of Jameson's Land, at a height of about 600 to 700 metres above sea-level: —

Lamellibranchiata gen. et sp. ind., two specimens.

Olcostephanus (? *Simbirskites*) *nov. sp.*, five fragments of casts in light or dark-coloured sandstone.

Ammonites sp. ind., two fragments in a brown sandstone.

Belemnnoidea-fragments.

If these specimens are really a kind of *Simbirskites*, the beds must be of Upper Jurassic or Lower Cretaceous age.

5. Fossils, undated, collected by O. NORDENSKJÖLD from Fossil Mountain in the northern part of Jameson's Land: —

Ammonites sp. ind., two fragments in a brown sandstone.

The age of these fragments is quite uncertain.

6. Fossils collected by O. NORDENSKJÖLD on August 7th from Ammonite Mountain, on the west side of the innermost part of Hurry's Inlet, at about 500 metres above sea-level: —

Macrocephalites Pompeckji nov. sp., five casts in a brown clay-ironstone.

Ammonites sp. ind., two fragments.

Although the specimens of *Macrocephalites* belong to a new species, it may be assumed that they are of Callovian age and consequently that we are here dealing with Callovian beds.

7. The following were collected by HARTZ on August 9th on Mount Nathorst near Point Constable: —

a) An oyster-bank occurring at about 1625 feet (510 metres) above sea-level, a local development of b), contained: —

Ostrea eduliformis, SCHLOT., many specimens.

Ostrea cf. eduliformis, SCHLOT., a few specimens.

Lamellibranchiata gen. et sp. ind., three specimens.

Belemnoidea-fragments.

As far as I have been able to discover, *Ostrea eduliformis* first occurs in the Humphriesianum-zone of the Bajocian, extends through this stage and the Bathonian and dies out in the Macrocephalus-zone of the Lower Callovian.

b) A brown calcareous sandstone, sometimes fine-grained, at others of medium-grain or coarse-grained, occurring at about 1675 feet (525 metres) above sea-level, contained: —

Waldheimia sp., one specimen.

Ostrea eduliformis, SCHLOTH., a few specimens.

Myoconcha grönlandica nov. sp., two casts.

Trigonia undulata, FROMHERZ, six specimens.

Astarte sp. cf. elegans, SOW., a few specimens.

Tancredia cf. angulata, LYCETT, three specimens of shells and casts.

Gresslya gregaria, (ZIET.) GOLDF. *sp.*, sixteen casts.

Gresslya abducta, PHILL. *sp.*, eight casts.

Gresslya peregrina, SOW. *sp.*, a few casts.

Pholadomya angustata, SOW. *sp.*, one cast.

Lamellibranchiata gen. et sp. ind., various impressions and casts.

Gastropoda gen. et sp. ind., one specimen.

Ammonites sp. ind., five fragments.

Belemnoidea-fragments.

So far as I have been able to discover, the species which, of all these, extends the furthest downwards is *Gresslya abducta*, which appears in the Jurensis-zone of the Upper Lias. In the Opalinum-zone of the lowest «Dogger» (Bajocian), *Gresslya peregrina* and *Tancredia angulata* appear; in the Murchisonæ-zone, *Astarte elegans* and *Gresslya gregaria*; in the Sowerbyi-zone, *Pholadomya angustata*; in the Humphriesianum-zone, *Ostrea eduliformis*; while in the Great Oolite (Bathonian) *Trigonia undulata* appears for the first time.

In the Parkinsoni-zone of the Upper Bajocian the following species die out: *Astarte elegans*, *Gresslya gregaria* and *Gresslya abducta*, although the last of these may possibly pass up into the Bathonian. In the Bathonian, *Tancredia angulata* dies out. *Ostrea eduliformis* and *Trigonia undulata* die out in the Macrocephalus-zone of the Callovian, *Pholadomya angustata* in the Perarmatum-zone of the Corallian and *Gresslya peregrina* in the Plicatilis-zone of the same.

If then we may venture to correlate the Middle-European distribution of fossils with that of East-Greenland, it would seem that the fossils in question must have been derived from strata of an age intermediate between the Upper Bajocian and Lower Bathonian.

- c) A very coarse-grained brown crinoid-sandstone, occurring at about 1675 feet (525 metres) above sea-level, a local development of b), contained: —

Pentacrinus sp. cf. *Andreae*, de Lor., many pieces of stems and cirrhi, a few arm-fragments and some portions of the calices.

Lima sp., one impression.

Ostrea eduliformis, SCHLOTH., a few specimens.

Belemnnoidea-fragments.

Pentacrinus Andreae occurs in the Bathonian.

The age of the Jurassic strata of Mount Nathorst seems to be intermediate between the Upper Bajocian and Lower Bathonian.

8. The following were collected by HARTZ in Vardekløft between August 11th and 19th: —

a) A block of coarse-grained sandstone, found 450 feet (140 metres) above sea-level, contained: —

Pecten sp. (an. *Stewartianus*, LUNDGR.), one fragment.

Pecten sp. cf. Rinki, LUNDGR., one cast.

Pecten Stewartianus and *Rinki* occur in the Callovian of Cape Stewart. This piece of sandstone is probably derived from a continuation of these beds.

b) Blocks of dark-coloured calcareous sandstone, found 480—640 feet (150—200 metres) above sea-level, contained: —

Rhynchonella sp., one fragment.

Rhynchonella sp., one fragment.

Pecten sp. cf. Johnstrupi, LUNDGR., one fragment.

Astarte Bayi, LUNDGR., one specimen.

Astarte Hartzii, LUNDGR., two casts.

Lamellibranchiata gen. et sp. ind., two specimens.

The fossils that are suitable for purposes of determination all occur in the Callovian beds of Cape Stewart. The dark-coloured calcareous sandstone blocks are apparently derived from a continuation of these beds.

c) Concretions in a very micaceous clay-shale, the so-called «Ammonite-bed», found 1750—1850 feet (550—580 metres) above sea-level, yielded:

Ichthyosaurus (Ophthalmosaurus) sp. one vertebra.

Gastropoda gen. et sp. ind., one specimen.

Macrocephalites Ishmæ, KEYS. *sp.*; eight specimens.

Macrocephalites sp. cf. compressus, QUENST., one fragment of a cast.

Cadoceras crassum nov. sp., six casts partly covered with shell.

Ammonites sp. ind., five specimens.

Macrocephalites Ishmæ (see p. 191) and *Macrocephalites compressus* belong to the *Macrocephalus*-zone (Lower Callovian).

All the Jurassic strata of Vardeklöft seem to be of Callovian age.

9. A brown sandstone found on August 12th, by DEICHMANN on the plateau immediately west of Neill's Cliffs, contained: —

Pseudomonotis sp. (an Jacksoni, POMPECKJ), one shell.

Lamellibranchiata gen. et sp. ind., one cast.

Pseudomonotis Jacksoni occurs in a deposit in Franz Josef's Land, which should probably be referred to the Lower Bajocian; no definite statement can, however, be made with regard to the age of this rock-fragment.

10. Brown sandstone; a loose block found by O. NORDENSKJÖLD in the vicinity of Aucella River in the south-west of Jameson's Land on August 18th and containing: —

Serpula sp., a collection of tubes.

Lamellibranchiata gen. et sp. ind., one specimen.

The age of this block cannot be determined.

11. In Aucella River near the camping-place of August 18th and 19th in the south-west of Jameson's Land, O. NORDENSKJÖLD collected: —

- a) A yellowish-white sandstone with: —

Pecten sp., one cast.

Aucella Pallasii KEYS., several casts.

Lamellibranchiata gen. et sp. ind., several specimens.

Aucella Pallasii is the typical fossil of the lowest *Virgatus*-beds of the Lower Volga-stage. This is classed as Middle Portlandian.

b) The same rock, but loose blocks only, containing: —
Astarte sp. cf. *Sæmanni*, de Lor., fragments of
 several shells.

Tancredia sp., one cast.

?*Pleuromya* sp., one cast.

Lamellibranchiata gen. et sp. ind. a few specimens.

Perisphinctes sp. cf. *Panderi*, d'ORB, a fragment
 of a cast.

Ammonites sp. ind., three fragments.

Belemnoidea-fragments.

Astarte Sæmanni characterises the Middle and Lower
 Portlandian; *Perisphinctes Panderi* belongs to the
 Virgatus-beds of the Portland stage.

The light-coloured sandstone of Aucella River is therefore
 of Middle Portlandian age and can be correlated with the
 Virgatus-beds of the Lower Volgian.

12. A light-coloured sandstone was obtained by O.
 NORDENSKJÖLD August 19th from the vicinity of Aucella River
 in the south-west of Jameson's Land. This contained: —
Ammonites sp. ind., two fragments.

No conjecture can be made as to the age of these specimens.

Of the above-mentioned twelve collections only nos. 1, 4,
 6, 7, 8 and 11 are of any real interest.

Nos. 1 and 8 a and b indicate that near Dinosaurus River
 about one and a quarter Danish miles (9,4 kilometres) north of
 Cape Stewart, in all probability, and in Vardekløft certainly,
Callovian-beds are exposed; that these are petrologically and
 faunistically identical with the Cape Stewart beds and probably
 represent a direct continuation of these.

No. 6 shows that **Callovian-beds** may also be present on
 Ammonite Mountain on the west side of the innermost part of
 Hurry's Inlet.

No. 8 c and also no. 6 help to extend very considerably our knowledge of the East-Greenland Callovian rocks, seeing that here, for the first time in that country, Callovian-beds have been found to contain Ammonites suitable for determination. The following Ammonites have been found in these beds: —

Macrocephalites Ishmæ, KEYS.

Macrocephalites sp. cf. *compressus*, QUENST.

Macrocephalites Pompeckji nov. sp.

Cadoceras crassum nov. sp.

Macrocephalites Ishmæ indicates (see p. 191) that the **Macrocephalus-zone (Lower Callovian)** is represented in the Callovian-beds of Vardekløft.

No. 7 is also of great interest as proving that on Mount Nathorst, throughout a number of brown sandstone deposits of coarser or finer texture, a Lamellibranch fauna occurs. This fauna is undoubtedly more ancient than the Callovian and should, in all probability, be referred to the **Upper Bajocian or Lower Bathonian**, or possibly to passage beds between these two stages.

No. 11 is also very interesting for the yellowish-white sandstone found in Aucella River near the camping-place of August 18th and 19th in the south-west of Jameson's Land contains a fauna which can with certainty be referred to the **Virgatus-beds of the Lower Volgian**.

No. 4 proves that the «white Jura» probably exists also on Fossil Mountain in the northern part of Jameson's Land.

As in the case of the Jurassic deposits of East-Greenland described already, the facies of the material brought back in 1900 is that of shallow-water and coast-deposits.

That the Jurassic rocks of East-Greenland show certain faunistic peculiarities has already been demonstrated by TOULA and LUNDGREN, and is now more clearly seen on examination

of the material brought back by HARTZ in 1900. The most striking feature is that the Lamellibranch-fauna of the «brown Jura» and also to some extent that of the «white Jura» show a Middle-European character, whereas the Ammonites distinctly have affinities with those of Russia¹⁾. Nor should the scarcity of the Gastropods in the Jurassic beds of East-Greenland pass unnoticed. It appears that, throughout the Arctic Jurassic, the number of Gastropod species is remarkably small and this is the case also in East-Greenland.

The researches of TOULA and LUNDGREN have already proved that the East-Greenland Jurassic deposits are developed in a similar manner to those of King Karl's Land and Franz Josef's Land. The present work supplies further evidence in support of this fact.

Deposits occur in East-Greenland which must be referred to the Bajocian or the Bathonian, to the Lower Callovian and to the Lower Volgian (Middle-Portlandian) stages respectively. In King Karl's Land²⁾, beds occur, which have been referred to the Bathonian, the Lower, Middle and Upper Callovian, to the Upper Oxfordian, to the Kimeridgian and to the Lower and Upper Volgian. In Franz Josef's Land³⁾ are deposits, which have been referred to the Bajocian, to the Lower, Middle and Upper

¹⁾ The plant-remains of the Rhætic-Liassic deposits of the west-side of Hurry's Inlet (see p. 164—5) have the closest affinity with the Rhætic-Liassic plant-remains of Scania and with the Rhætic ones of Franconia. — Medd. om Grönland. Hefte 19, 1896, p. 244.

²⁾ POMPECKJ, J. F. 1899. *Marines Mesozoicum von König-Karls-Land*. Öfvers. Vetenskaps.-Akad. Förh. Stockholm. No. 5, p. 464.
NATHORST, A. G. 1901. *Bidrag till Kung Karls lands geologi*. Geol. Fören. i Stockholm Förh. Bd. 23, p. 349.

³⁾ POMPECKJ, J. F. 1899, p. 108.
POMPECKJ, J. F. 1899. *Jura auf Franz Josef-Land*. Zeitsch. d. deutsch. geol. Ges. Bd. 51, Heft 1:
NATHORST, A. G. 1899. *Fossil plants from Franz Josef Land*. p. 22—28.

Callovian and to the «white Jura». The identical character of the beds will probably be revealed in a yet more striking manner, when, at some future time, more fossiliferous material from East-Greenland is available, so that the determination of the zones can be worked out completely in this country.

The various conclusions arrived at with regard to the Jurassic deposits of East-Greenland are of the greatest palæogeographical significance. As POMPECKJ³⁾ has pointed out, a Bajocian sea was situated to the north of the Jurassic continent of Eurasia. We now know that this sea, at the close of Bajocian or at the beginning of Bathonian times, extended as far as East-Greenland, and its shore in that direction was in the vicinity of the present coast-line. The Bajocian Polar Sea must have been in direct connection with the Central- and West-European sea, by means of a strait which passed between the Scandinavian part of the Eurasia of that period and the then existing Nearctic continent (NEUMAYR). Similar relations existed in Callovian and Portlandian times, but Scandinavia must then have been an island, with the Polar Sea extending across the greater part of Russia and Siberia. Whether or not the sea receded from East-Greenland during the intervening periods, it is impossible to determine on the ground of existing evidence as, up to the present time, no deposits belonging to these periods have been found there.

¹⁾ POMPECKJ, J. F. 1899, p. 40.

Explanation of the plates.

Plate VI.

Pentacrinus sp. cf. *Andraeæ*, de LORIOI.

Fig. 1. Fragment of a stem with cirrhi.

Figs. 2 and 3. Fragments of arms, with a few pinnules attached.

Fig. 4, a, b. Fragment of a stem: a) as seen from the side, b) as seen in cross-section.

Fig. 5. Fragment of a stem to show the sutures (enlarged $\frac{2}{1}$).

Fig. 6. Stem-fragment with little round depressions in the middle of the suture-line of each side, as in *Pentacrinus crista-galli*, QUENSTEDT (enlarged $\frac{2}{1}$).

All these specimens were obtained from the coarse-grained brown crinoid-sandstone of Mount Nathorst.

Aucella Pallasii, KEYSERLING.

Fig. 7. Cast of left valve: a) as seen from the side, b) from above, c) from below. Light-coloured sandstone from Aucella River in the south-west of Jameson's Land.

Myoconcha grönlandica sp. nov.

Figs. 8 and 9. Casts of two specimens: a) as seen from the side, b) from above, c) from the front. Coarse brown sandstone of Mount Nathorst.

Pecten sp.

Fig. 10. A cast in light-coloured sandstone from Aucella River in the south-west of Jameson's Land.

Trigonia undulata, FROMHERZ.

Fig. 11. Left valve. Brown sandstone of Mount Nathorst.

Astarte Hartzi, LUNDGREN.

Fig. 12. A cast: a) as seen from left side, with part of shell attached, b) from right side, c) from above. Block of dark-coloured calcareous sandstone from Vardeklöft.

Astarte Bayi, LUNDGREN.

Fig. 13. Right valve enlarged $\frac{2}{1}$. Block of dark-coloured calcareous sandstone from Vardeklöft.

Astarte sp. cf. elegans, SOWERBY.

Fig. 14. Both valves of the same specimen: a) view of exterior of right valve, b) view of reverse side of same valve showing internal cast of left valve with the border of right valve, c) the same valve (with the cast) from anterior end, d) interior of left valve. Brown sandstone of Mount Nathorst.

Fig. 15. Fragment of a right valve to show the sculpture of the surface. Brown sandstone of Mount Nathorst.

Astarte sp. cf. Sæmanni, de LORIOU.

Fig. 16. Fragment of a right valve: a) from the side, b) from the front. From a loose block of light-coloured sandstone, found in Aucella River in the south-west of Jameson's Land.

? Pleuromya sp.

Fig. 17. A cast partly covered with shell-substance: a) from the side, b) from above. From a loose block of light-coloured sandstone, found in Aucella River in the south-west of Jameson's Land.

Tancredia sp. cf. angulata, LYCETT.

Fig. 18. A cast in brown sandstone from Mount Nathorst.

Tancredia sp.

Fig. 19. A cast in a loose block of light-coloured sandstone, found in Aucella River in the south-west of Jameson's Land.

Pholadomya angustata SOWERBY *sp.*

Fig. 20. A cast: a) seen from the side, b) from the front. Brown sandstone of Mount Nathorst.

Plate VII.

Ostrea eduliformis, SCHLOTHEIM.

Fig. 1. Left valve, interior.

Fig. 2. Right valve, interior.

Fig. 3. Left valve: a) interior, b) exterior, c) posterior view.

Ostrea sp. cf. eduliformis, SCHLOTHEIM.

Fig. 4. Left valve: a) interior, b) posterior view.

Fig. 5. A small specimen with both valves: a) seen from the right side, b) seen from the left, c) anterior view.

All these specimens were obtained from the "oyster-bank" on Mount Nathorst.



1



7a



8c



8a



7b



9c



9a



9b



8b



2



7c



10



12c



12a



11



12b



3



4a



4b



5



6



14a



14b



14c



14d



13



18



19



15



16b



16a



17a



17b



20a



20b



1



2



4a



4b



5c



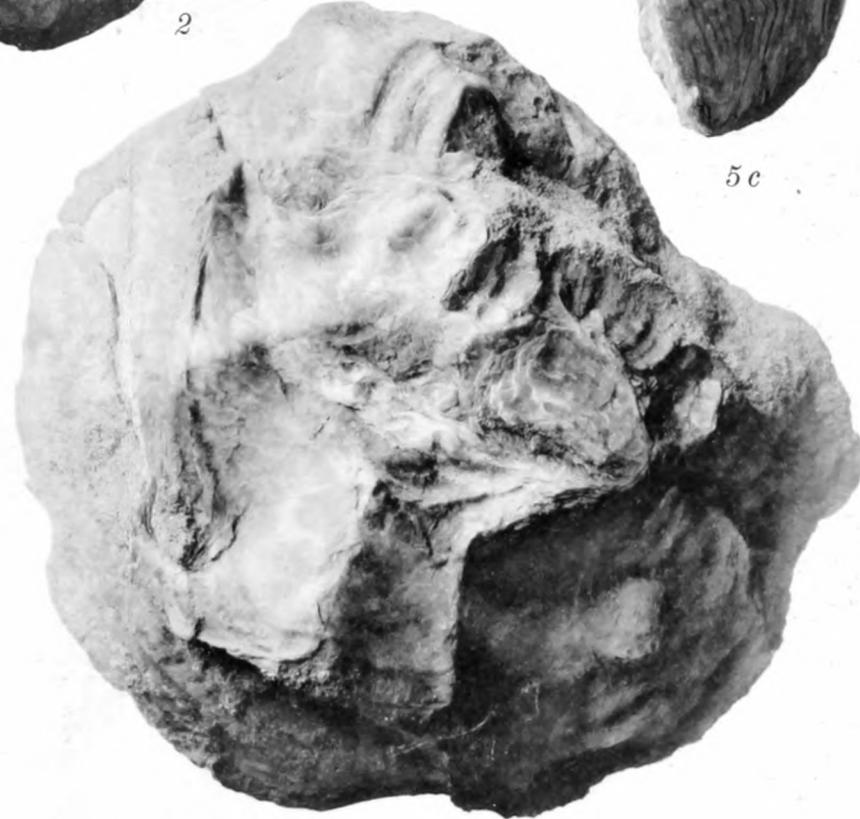
5a



3c



3a



3b



5b



1a



1b



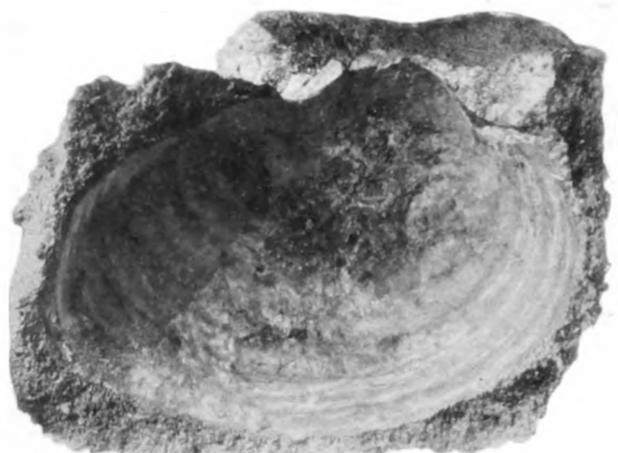
5



6b



6a



1c



6c



9



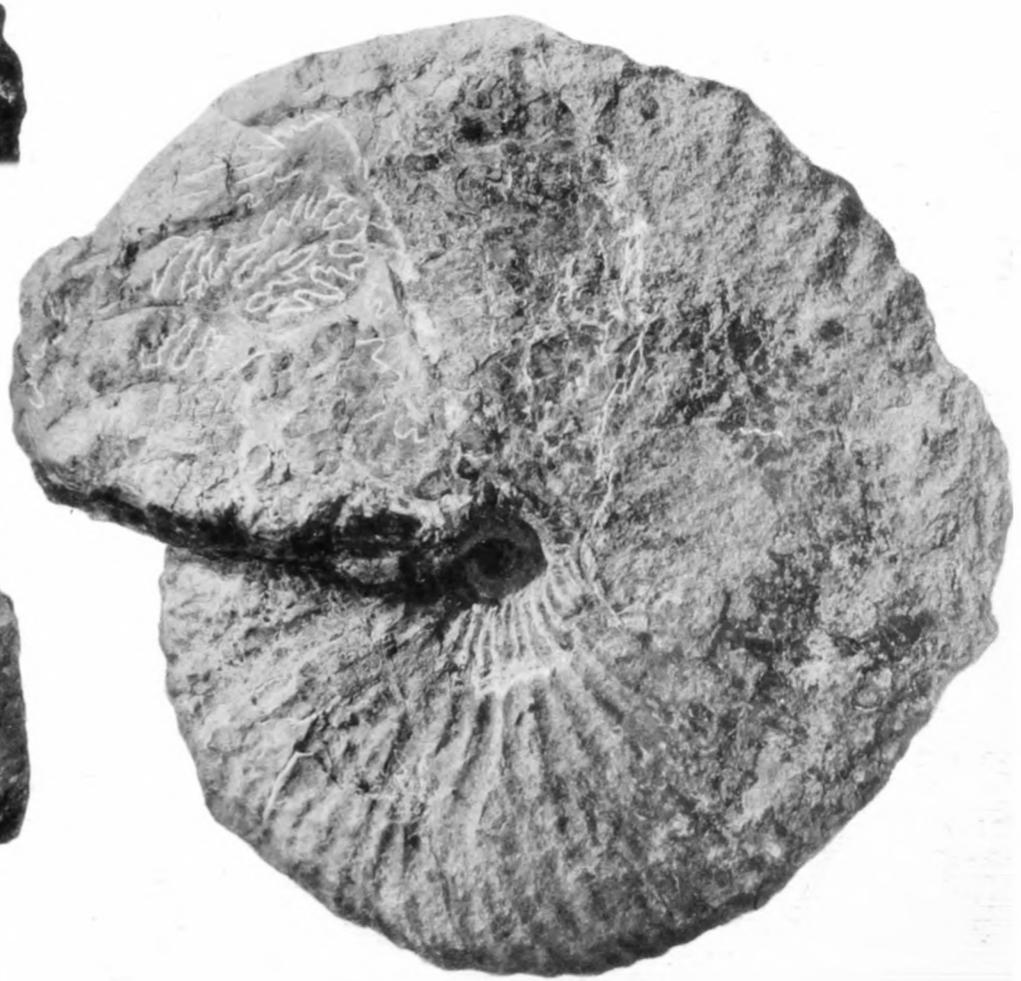
2



3



8



7



4c



4a



4b



1



2



3

Plate VIII.

Gresslya gregaria, (ZIETEN.) GOLDFUSS. *sp.*

Fig. 1. a) A cast seen from the left side, b) the same from the front, partly covered with shell-substance, c) interior of left valve of the same specimen. Brown sandstone of Mount Nathorst.

Fig. 2. Fragment of a cast, showing the sculpture. Brown sandstone of Mount Nathorst.

Gresslya abducta, PHILLIPS. *sp.*

Fig. 3. A cast seen from the right side. Brown sandstone of Mount Nathorst.

Gresslya peregrina, PHILLIPS. *sp.*

Fig. 4. A cast: a) from the left side, b) from the front, c) from above. Brown sandstone of Mount Nathorst.

Macrocephalites Pompeckji nov. sp.

Fig. 5. A cast in clay-ironstone with parts of the inner whorl visible. From Ammonite Mountain on the west side of the innermost part of Hurry's Inlet.

Fig. 6. Cast in clay-ironstone: a) seen from the side, b) view of external margin, c) portion of external margin showing traces of the suture-lines, which have weathered out. From Ammonite Mountain on the west side of the innermost part of Hurry's Inlet.

Macrocephalites Ishmæ, KEYSERLING. *sp.*

Fig. 7. A cast partially covered with shell-substance.

Fig. 8. Fragments of a cast, showing some of the whorls in transverse section.

Fig. 9. Portion of a whorl with a suture-line coloured to show its form.

These casts were found in concretions in a very micaceous clay-shale in Vardekløft.

Plate IX.

Cadoceras crassum nov. sp.

Fig. 1. A large fragment of a cast.

Fig. 2. The same specimen, with part of the outer whorl removed to show portions of the inner whorls.

Fig. 3. The middle part of the same specimen after some of the inner whorl has also been removed, so that a portion of the innermost whorl is exposed.

Concretion in a very micaceous clay-shale in Vardekløft.

Plate X.*Cadoceras crassum nov. sp.*

Fig. 1. View of the external margin of the specimen on Plate IX.

Olcostephanus NEUMAYR. (?*Simbirskites*, PAVLOW and LAMPLUGH.) *nov. sp.*

Fig. 2. Fragment of a cast: a) side view, b) the same specimen after a portion of the outer whorl has been removed, so that part of the inner whorl is seen, c) view of external margin of the same. Sandstone of «Fossil-locality 2» on Fossil Mountain in the northern part of Jameson's Land.

Perisphinctes sp. cf. Panderi D'ORBIGNY.

Fig. 3. A cast, somewhat crushed: a) side view, b) external margin. The cast is in light-coloured sandstone and was found as a loose block in Aucella River in the south-west of Jameson's Land.

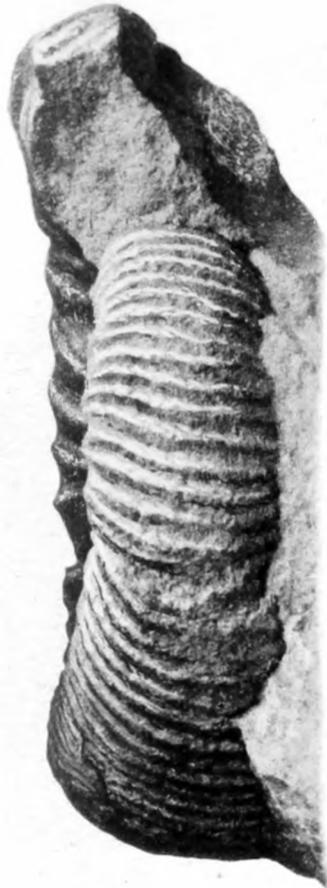




2c



2a



3b



1



2b



3a

