Meddelelser om Grønland.

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udgivne af

Commissionen for Ledelsen af de geologiske og geographiske Undersøgelser i Grønland.

Ni og tyvende Hefte.

Med 14 Tavler og 1 Kort.

Kjøbenhavn.
I Commission hos C. A. Reitzel.
Bianco Lunos Bogtrykkeri.
1909.

Carlsbergfondets Expedition

til

Øst-Grønland,

udført i Aarene 1898—1900

under Ledelse af

G. Amdrup.

Tredie Del.

Indhold.

Meddelelser om Grønland,

udgivne af

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I.

Mammals

observed on

Amdrup's journeys to East Greenland

1898—1900.

By

Søren Jensen.

Mag. sc. Søren Jensen had got the task of giving a description of the observations of mammals, made on Amdrup's two journeys to East Greenland, in 1898—99, and in the summer of 1900. He had himself taken part in the second journey, as the zoologist of the expedition; the observations from the first journey, put together by cand. med. Knud Poulsen, were left to his disposal. He executed the most essential part of the work, but death prohibited his fulfilling it. His manuscript on the terrestrial mammals had mainly got its final form, and is rendered here with scarcely any alterations. On the polar bear there was nothing but a rough sketch; its content is given here in almost his own words; but some things that had to be considered more immediately as preliminary studies have been left out. On seals and whales there was nothing but spread notes in his diary from the journey, among these, communications given him by Johan Petersen, commercial manager in Angmagsalik; below is given what has been found, in this direction, among K. Poulsen's and S. Jensen's notes. Some supplementary particulars from the physician H. Deichmann, the fellow traveller of S. Jensen, have been added. The mammals that have been brought home from these two journeys to East Greenland, are mentioned in Conspectus Faunae Groenlandicae, Medd. om Grønland, Hefte XXI. — The relations of Søren Jensen have wished it to be said that he was not himself content with his work on the mammals; the subject was a little unfamiliar to him.

Herluf Winge.

Lepus variabilis Pall. **Polar Hare.**

Scoresby saw 3 white Hares at Cape Hope, and shot one of them; he saw also hares at Cape Brewster. Clavering saw on August 30, 1823, white hares on Jordan Hill; its occurrence in these regions has thus been known for a long time. It was observed in a few places; during the second German arctic voyage, thus in Sabine Island and Clavering Island where 4 were seen together. During the expedition of Ryder[1]), it was observed in several places near Scoresby Sund: Nordvestfjord, Røde Ø, Danmarks Ø, and its traces were seen in Jameson Land and Gaaseland. Nathorst observed it in Pendulum Island, Clavering Island, where 4 were seen together, at Cape Broer Ruys, in Ruth's Island, and at Cape Weber. It was not rare at all in the regions travelled over by the ship expedition, and no greater landing was made without seeing it, thus in Sabine Island on July 11 (3), at Cape Borlase Warren on July 14, to the south of Scoresby Sund at Cape Dalton on July 20, and in Turner Sund on July 25 (2), in Hurry Inlet at the bottom of the inlet on August 5; in Jameson Land on August 7, at Point Constable, was seen a leveret, on August 10 on the Liverpool Kyst were seen 2 hares.

During the wandering of Nordenskiöld and Deichmann over Jameson Land, single hares were seen all over the country, mostly in very desert places rather high up; Koch observed it at Carlsberg Fjord; on August 18 one was shot at Forstenings-kløften, near the border of the plateau. Hartz and Koch brought 2 almost mature foetus on board the ship; they

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[1]) Bay, Medd. om Grønl., XIX, 1894, p. 17.

had taken them out of a hare, killed in Jameson Land on August 11, at Hurry Inlet. In Fleming Inlet Ditlevsen and Madsen met with 4 hares, walking together, on August 25 a little outside Cape Seaforth, three of them were leverets; on the same day one was seen at Cape Seaforth; finally 1 hare was seen in Canning Land at Cape Fletcher on September 1.

The polar hare is an easily contented little animal; it often lives in desert places, difficult of approach. On the

Fig. 1.
(From a photograph.)

whole it seems to be common in the tracts here mentioned. Probably it has several litters of young in summer; thus a hare killed in Turner Sund, on July 25, had milk in her teats; the three leverets, seen in Fleming Inlet on August 25, were walking with their mother; a hare, killed in Hurry Inlet in Jameson Land on August 18, had milk in her teats; and the hare, that was killed in Hurry Inlet on August 11, was soon to bear. When we left the coast, autumn began; it was snowing in Jameson Land on August 19, and new ice was formed on the pools; the end of August till late in September, is a typical autumn time (see Ryder, Medd. om Grønl., XVII, 1895, p. 66), already from September 7, 1891, the temperature was below zero during the day. We must therefore suppose that the litter of leverets, evidently born about the middle of August, cannot be the only litter, for the proper summertime comes before, and we must take it for granted that the polar hare has also bred in that time.

Ryder found its bones near the old hamlets of the Eskimo.

Myodes torquatus Pall. **Lemming.**

While the ship of Scoresby the elder was in Hurry Inlet, in 1822, the crew found in Jameson Land 2 or 3 Lemmings which they brought on board the ship (Scoresby jun., Journ. of a Voyage to the Northern Whale-Fishery, 1823, p. 416). Dr. Traill described it under the name of *Mus Groenlandicus*; but already Prof. Jameson (Scoresby, l. c., App. Zoology) lays stress on its near relationship with *Myodes Hudsonius*; later inquiries have shown that both of them are identical with *Myodes torquatus* (Pallas), and thus the species is circumpolar. During the second German expedition one specimen was caught, in September 1869, one was seen in Sabine Island at the Eskimo ruin near Germaniahafen, immediately after the arrival there, a dead animal was found in Shannon Island, its traces were seen in the snow in Walrus Island on November 7 1869, and in 1870 numerous excrements of foxes, with bones and hairs of the lemming, were found in Walrus Island. During the expedition of Ryder some few specimens were observed; one was found dead in Føhnfjord on May 15, 1892; on June 25 one was found, mummified, in Danmarks Ø, both in winter dress; in the beginning of June a living lemming in summer dress was caught in Gaasefjord, and on June 30, a specimen in summer dress was found in the stomach of a Buffon's skua. But during the winter, numerous traces of it were seen in Danmarks Ø round the station-house and the ship, and in fact, one night a lemming had even gone on board the ship (Bay, l. c., p. 15); its traces were also commonly seen in the snow, during the first sledge-drive, from March 27 till April 21, 1892 (Ryder, l. c., p. 97); its traces were seen at Cape Stewart; and in Hold with Hope, numerous signs of the presence of the lemming were found, but no animal was found; nests were also found here, lying on the ground. Nathorst found signs of the presence of the lemming in a few places: in Clavering Island, at Cape Weber, in the Walrus Island, and at Hold with Hope, but caught only one, at Sophie Fjord on August 16, 1899.

During the ship expedition, they met with the lemming in several places. Already on the first day we were on the coast, Amdrup caught a living lemming in Sabine Island, on July 11, in the ruin of an old Eskimo house near Germaniahafen; at Cape Borlase Warren, several signs of the presence of the lemming were seen. Also south of Scoresby Sund, the lemming was observed as far down as Cape Dalton. Here 2 were caught on July 19, respectively 600′ and 1000′ above the level of the sea, by Deichmann's excellent dog Janette, that turned out to be the greatest lemming-hunter of the expedition. The two lemmings were put into the same cage as the one, caught by Amdrup, in Sabine Island, but during the night one of them died, and its companions devoured a little of it.

Ditlevsen found, on July 25, in Turner Sund, in a stone heap where the ermines lived, a lemming, killed by the ermines. At the same time, Deichmann and Koch caught 4 on the south side of Manby Halvø. The three almost totally devoured the one that died. Also in Hurry Inlet a lemming was seen; in Jameson Land, one was caught at Forsteningskløften on Aug. 14. On the south coast of Jameson Land, where we went ashore on August 15, numerous holes, with sand recently thrown up outside, and fresh traces in the sand were seen; in Fleming Inlet several lemmings were caught on August 26, on the north side, a little within Cape Seaforth; most of them were caught in their holes. The day before I had seen in Ørsteds Dal no less than 6 lemmings, slipping from one hole to another in the bright sunshine; in some places several holes were connected with one another, so that the lemming ran into one hole, and came out of another. As the lemming goes about very little in daytime, there is scarcely any doubt that it was exceedingly common here, and numerous holes, with sand recently thrown up, showed this. The holes lead to a passage that may be sometimes as long as 2 metres, but often it is shorter; as a rule it has no outlet. At the bottom the passage widens, and there the nest has its place. Deichmann often found the nest under a stone; he also saw nests built in dried brooklets under loose stones, thus in Manby Halvø. The nest has a globular form, and is made of dry grass, and lined with the winter wool of the musk-ox; a little outside is found a heap of dung; the lemming seems to put off its excrements here, but never in the very nest; by and by a whole cake of dung is formed, which the lemming tramples down by running to and fro over it. Single lemmings, or pairs of them, were found in these holes, but there is reason to believe that several lemmings often live in the same nest, and especially the young must live there, at least for some time, before leaving the nest. Curiously enough, we did not see any newborn lemming or even a quite young animal; they don't seem to have young in August. Also at Forsblad Inlet, both near the mouth and farther in, 9 lemmings in all were caught, from August 27 till August 28. In Mackenzie Bay and in Musk-ox Inlet Kolthoff, in the same year, met with them in numbers, and brought home more than a hundred living ones; several of them bred in captivity.

There is no doubt that the lemming is very frequently met with in these regions, and I do not believe Nathorst is right, when supposing from the fact that many lemmings were caught in 1900 that it was a «lemming-year» (se Nathorst, Två Somrar i Norra Ishafvet, II, 1900, p. 289). Nothing was found to indicate this, no wandering or any trace of such a one was found. Indeed, the circumstances seem to be the ordinary ones (if I have understood Kolthoff rightly, he is of my opinion); this appears best from the fact that the lemming often was found, rather commonly, in places far from each other. It is rather so that former expeditions have not noticed the lemming in several places. As an instance of how easily this may happen, may be named that it was not till the snow had fallen, that the expedition of Ryder discovered that the lemming was rather common in Danmarks Ø; nevertheless it was never caught there. Its hidden way of living explains, as Bay lays stress on, this sufficiently, for it is probably rather seldom that one sees it running on the ground in the middle of the day, as we did sometimes. That the lemming is a nocturnal animal, we had best opportunity of seeing, during our way home, where we had several living ones in cages. During the day they were quiet, preferred staying in the passages they had made between the green turfs, we had put at the bottom of the cages; sometimes they came forth, but all of them only to get food. But during the night they led a restless life, they ran about screaming and piping; they often got to blows; they gnawed the cage and scraped the ground so eagerly that we understood, the night was their time. One night they gnawed themselves out from one of the cages, but were caught in time.

A thing deserving to be mentioned at greater length, is the dwellings of globular form, c. 5″ on an average, found not seldom lying freely on the earth; they are as the usual nests in the earth made of stalks of grass, inside they are lined with moss, and wool from the musk-ox; on the side they have a narrow entrance, sticking out like a little spout. Bay (l. c., p. 18) has already mentioned them; he found several of them in Hold with Hope; he does not think it impossible that they are made under the snow during the winter, but he did not find them in other places than here. Nathorst mentions them from the same place, (l. c., p. 168) and simply characterizes them as «winterlodge». In several places, (for instance in Sabine Island, at Cape Dalton, and in Turner Sund at Cape Borlase Warren) we found such dwellings; many of them were so unhurt that it is impossible to think they should have come up from the earth somehow, for instance brought forth by the water; they must have been made on the earth, and this can only be thought to happen during the winter, when the snow is covering the earth and spares the lemming from intruders. In Ørsteds Dal I saw several of that sort of dwellings lying on the ground, one of them had even a little heap of dung a little outside the opening of the entrance; and from the dwelling one sees rather distinctly small paths in the moss, probably made during the winter, under the snow. In captivity the lemmings made a similar nest of grass, and wool from the musk-ox, also with a little heap of dung outside; in this nest most of the lemmings of the cage lived, and were packed up very closely when resting; they were exceedingly comfortable and warm there; on our tearing the nest they mended it again. It is not improbable that the lemmings live in a similar way in these dwellings above ground, packed up perhaps in families; in that way they are comfortable and warm, even during the severest wintertime. From this dwelling the lemming makes excursions under the snow, to places where it may gnaw the bark from the willow, or secure food of other sorts. But it also digs holes through the snow, and runs about on it to go down again somewhere under it (compare Bay, l. c., p. 15). Bay searched for the dwelling of the lemming under the snow, by following the passages, but he never found such winterdwellings, the passages under the snow always led to holes in the ground. Thus it may reasonably be taken for granted that the lemming, during the winter, may also live in the same, or similar dwellings under the ground, where it is found in summer time, perhaps it is even the most common thing.

The food of the lemming consists of many different things; it devours very greedily the bark, buds and leaves from the willow (*Salix arctica*); it does not care so much for dwarf-birch; heather and crowberries it does not eat; but it is fond of grass, flowers of *Ranunculus, Dryas* etc., stems and leaves of *Taraxacum*, leaves of *Oxyria*, but especially it is fond of the small tuberous roots of *Polygonum viviparum*; it was very amusing to see them scrape such tubers from the green turfs which we put into the cage for them, pull them free, sit down on their tails, place the tuber between their small fore paws, and devour it in a great hurry. As above mentioned the lemming in no way disdains a dead friend; the lemmings which died in the cages were sometimes half devoured during the night.

All the lemmings we caught were in summer dress, but the colour varied rather much; some of them were on the upper part grey, with a dark streak down their backs, and were quite without the red-brown colours; scarcely two were of quite the same colour. During the way home, in September, those we had in the cages began to get a lighter colour; white hairs came forth round about in their furs; not till near Christmas one of them was almost quite white; unfortunately most of them died rather soon after our return, no one lived through the winter. At the same time as the hair changes, the strong clawish development of the tips of the two longest of the fore toes took place, and when we got home, all those that had outlived the voyage had got these clawish protuberances. Reflecting that winter begins in their harsh native country just at that time, and the earth gets frozen, one understands what an immense use the lemming may have from these protuberances; probably they have simply been developed by the assiduous use of the fore paws, when scraping the frozen earth. According to Bay it seems as if these formations are thrown off in spring, at the same time as the hair change takes place; at any rate, the lemmings, caught in June in summer dress during the expedition of Ryder, had not such protuberances.

The lemming has many enemies in its native country: fox, ermine, snowy-owl, Buffon's skua, raven; the gulps of birds of prey that I saw, for instance, at Cape Dalton in Turner Sund and in other places, were full of hairs and skeleton parts of the lemming.

Remains of lemming have been found, by Ryder, in the Eskimo kitchen-midden at Cape Stewart (Ryder, l. c., p. 288).

At Angmagsalik the lemming is known as little as on the west coast, and it was never seen during Amdrup's boat excursions.

Canis lagopus L. Arctic Fox.

The Arctic Fox is the only terrestrial mammal that lives over the whole of Greenland. In Northeast Greenland it was already observed by Clavering, who saw it on August 20, 1823 at Jordan Hill, but it is not mentioned by Scoresby. Several foxes were seen during the second German arctic expedition, a single time many together; and in winter foxes often came up to «Germania», when staying in Germaniahafen in Sabine Island. During the expedition of Ryder it was commonly seen in Scoresby Sund, in winter a dozen were caught near the station-house in Danmarks Ø, and Bay has seen several of its dens. Nathorst saw little of it; one was seen at Ryder's Elv, another in Ymer's Island, and a fox's den was found in Maria Island.

The arctic fox is found not only on land, but it also goes far out on the floating ice, and is not seldom killed by the whalers on the ice. Dr. Buchholz, drifting down together with the Hansa-men along the coast of East Greenland, has seen the polar fox get from one flake of ice to another by jumping on the small patches of ice, always found among the big flakes.

In summer one does not see so much of the polar fox; it is a nocturnal animal and is, in its brown-grey summer dress, difficult to distinguish from the surroundings at some distance. Yet we met with it in several places: in Sabine Island July 11 one was seen; at Cape Dalton one was heard on July 20, and here Deichmann found a very great fox's-den with many holes, at a height of 300—400 m.; in Hurry Inlet on the Liverpool Kyst one was seen on August 3, the day after another; on August 7 one was seen in Jameson Land; we only noticed it, because a skua flew screaming about it, else we should certainly not have discovered it; it disappeared quickly. It was further seen at Carlsberg Fjord by Koch. Professor Nathorst means that the polar wolf has decimated the foxes in these regions; but sufficient evidence in favour of this theory is not forthcoming.

In the region of Angmagsalik the fox is common, and is caught by the Greenlanders. On the last boat expedition of Amdrup, a family of a dozen foxes were seen at the bottom of Angmagsalik Fjord; they had their dwelling under a big stone; there were several outlets which they made use of on being turned out.

As generally known, the arctic fox is omnivorous; it is fond of berries, takes young grouses and nestlings, and devours also lemmings. In winter it must often suffer much from hunger; then it follows the traces of the bears. Amdrup and Søren Nielsen have told me, that the bear traces in the snow are almost always followed by fox traces, and it must be content with getting the rests from the meals of the bears; in winter it is also very thievish and forward.

In Jan Mayen the polar fox is common, several were heard and seen, and Hartz shot one here on June 26.

All the arctic foxes we saw were in summer dress; but probably the hair change takes place in the beginning of September; already on September 16, 1869, the Germania-men saw a white fox.

Ryder found remains of fox in the Eskimo hamlets at Scoresby Sund.

Canis lupus L. Arctic Wolf.

When Nathorst in 1899 was staying on the coast of East Greenland, he met on July 15, at Cape Berghaus, with some Norwegian whalers, who were there with their boats, and Captain Næsø of «Cecilie Malene» gave Nathorst the remarkable intelligence, that he a few days before had killed a white Wolf at Cape Berghaus, and seen another in Clavering Island (Nathorst, l. c. II, p. 156). This discovery of the arctic wolf in East Greenland was very remarkable, and the more so, as none of the former expeditions had seen the least of it neither the Germans nor Ryder, and both these expeditions had stayed in winter on the coast. As also the reindeer has decreased numerically very much in these places, where it was so common before, Nathorst means that the arctic wolf not till a few years ago has immigrated to East Greenland, to Scoresby Sund not till after 1892. It is before known from the northern parts of America, from Grinnell Land, in the north west part of Greenland, and Peary and Astrup saw its traces at Independence Bay on the north-east coast of Greenland; and in 1869 a wolf was killed at Umanak in West Greenland; probably it has walked over the ice of Baffin's Bay from America. Nathorst found its traces in Kierulf Inlet, in Ymer's Island; and in the bottom of Hurry Inlet 2 wolves, walking together, were seen on August 5, 1899. The day after they were seen together on Vargodden, but escaped both times.

During our expedition, traces of the wolf were seen in numerous places, also South of Scoresby Sund. At Cape Dalton traces of wolves were seen in several places; in Turner

Sund also, in Hurry Inlet, in Klitdalen and in Fleming Inlet. In the regions here named, excrements were found in several places; they consisted of hairs of the reindeer and fragments of bone and, to be sure, they were wolves' excrements. Generally two traces were found together, so that the wolves probably often walk together in pairs, strolling about all over the country. The traces were found along the beaches of the river beds, through the valleys (for instance Ørsteds Dal and Klitdalen); often the animals had run side by side over a long distance. Only in one place a wolf was seen: on August 9, near the place where Nathorst had seen one the year before, at Ryders Elv, and as then two were walking together; they bathed themselves and played. They walked up to Hartz and Kruuse and got quite near (c. 20 steps); unfortunately the hunting of them failed completely, Hartz and Kruuse having only revolvers; the wolves ran away and crossed the flat river. Later on they were again seen from the ship, but they escaped from being killed. The same year as we were on the coast, Kolthoff killed a wolf farther to the North, another was killed by a whaler.

Whether the wolf really not till lately has arrived to these regions, or it has been there also in former years, cannot be decided now. It does not seem to appear in very great numbers at present; indeed, few have been seen. It is not quite precluded, that it has also before strolled about the north-east coast of Greenland; one of Svend Foyen's old sealers, Julius Hansen, decidedly meant to have seen it on the ice, to the North of Jan Mayen many years ago (communicated to me by Henry Ette), and that it is not impossible, that the wolf may walk out on the ice, is shown distinctly enough, by the above named instance from West Greenland. Neither traces nor anything else that might indicate the presence of the wolf, were seen during Amdrup's boat expeditions.

Ursus maritimus L. Polar Bear.

On the sixth of July 1900 we met with the first Bear, c. 200 miles from the nearest main land. We had just got through the spread, much decayed field-ice, and were going through channels among mighty ice-fields. It was an elderly shebear with two young, both females; she was walking in an ice-field, but did not immediately observe us; she scraped a little hole in the snow, sat down and suckled the young. We set out in pursuit of her in a boat; not till then she discovered us, as we, along the edge of the ice flake, tried to get up with her. Now she ran away with her young and jumped into the water, climbed on to a flake, and again jumped into the water, but was very soon after got up with. It was strange to see how the two young sat down on her back and rested a little, while she swam through the water (Amdrup has made the same observation during his boat expedition southwards). They were all of them killed. The mother had in the stomach pieces of skin and blubber from a seal, the young only blubber and milk, no pieces of skin.

Still the polar bear is not common in the floating ice in summer; it stays mostly near land and in the inlets. Amdrup met, on his boat expedition from Cape Dalton southward, with numerous bears along the coast. During the ship expedition we met in Turner Sund with one bear, in Turner Ø with one, in Dunholm with one female, on the south coast of Jameson Land with one male, in Fleming Inlet with two, a shebear and her young, at the mouth of King Oscar's Fjord with five.

It has by and by become a known thing, that the polar bear in summer in a great measure lives on vegetables. Four of the bears, killed during the ship expedition, had plenty of vegetable substances in their stomachs; it was mostly *Oxyria*; also different other vegetable substances may serve it as food, bleaberries (*Vaccinium uliginosum*) (Bay), grass; Bay has even found sea-weeds. Several of the killed bears had nothing in their stomachs; one that came swimming up to the ship had swallowed a cork that had been thrown out from the ship. On the whole the polar bear is not fastidious; it may swallow the most strange things. A bear killed in Dunholm near Stewart Ø had eat, with good appetite, several eider ducks' eggs and eider ducks (the female is sitting so firmly on the nest, that you may go quite near it); it even went up to the hauled up boat, and eat a pair of killed birds that were in the boat. Though we in several places found lemmings in considerable numbers, no lemming was ever found in the stomach of any of the killed bears; especially in Ørsteds Dal where the above named bear with her young was killed, I had expected to find lemming in their stomachs; the lemming was there in great mumbers; but both the old and the young bear had nothing but *Oxyria* in their stomachs.

None of the bears we saw tried to attack; but indeed it was in the good time, in which they are very well fed. But they were very curious; during the days we stayed at the mouth of Kaiser Franz Joseph's Fjord, no less than four bears came by and by swimming up to the ship from curiosity. Still, one meagre bear we saw; it came paddling from land across the land-ice on Carlsberg Fjord, quite near the ship where it was killed; it was a very large and very lank bear; it was old and had worn off teeth; it walked, in a very strange way that looked exceedingly funny; it became apparent that it suffered from an affection of the hip; one of its thighs was rather spoiled, and it could no more support life.

According to the experiences gathered during the second German expedition, the bear appears on the coast through the whole of the winter. But at Scoresby Sund, and probably also at Kaiser Franz Joseph's Fjord, a migration takes place inward to the bottom of the inlet in spring, and outward in autumn. Thus not a single bear was seen at Hekla Havn, where

Ryder's expedition wintered, from the sixth of November 1891, till the 20th of February 1892 (see about this Bay: Medd. om Grønland XIX); in the beginning of March it appeared more and more frequently, and in the end of March a day scarcely ever passed without their seeing a bear. It is not difficult to find the cause of this wandering. When autumn comes, and the inlet gets frozen, the seal does not any more go up on the ice; it is now impossible for the bears to catch any seal, the time of hunger makes its appearance, and therefore they seek outward to the outer coast or out on the field-ice itself, where now and then they will get an opportunity of catching a seal, or perhaps a walrus, also dead seals, left by the sealers on the ice. In the month of March, the ringed seal produces her young, in chambers in the snow, on the ice on the inlets; again the seals come up on the ice, and now the bear appears to revel in an abundance of food, and goes on living there during the summer. When perhaps the ice in summer disappears here, and the bear therefore seldom catches a seal, *Vaccinium*, *Oxyria* etc. afford abundant food. On the coast Amdrup travelled over, he saw, as above mentioned, many bears; for in the places where glaciers were shooting out into the sea, exceedingly many seals were found. But on the arrival of winter, when the field-ice sets in hard towards land, the seals do not climb the ice, and a great many bears seek out on the field-ice.

At Angmagsalik the bears are generally found, when the field-ice is coming from the North; for they arrive drifting with it; in winters where there is not much field-ice, there are not many bears either; but in summer scarcely a single bear is found in the whole of the inhabited district; to such a degree they are persecuted by the inhabitants; but the field-ice of the next year again brings a new cargo of bears down there, and thus a considerable hunting of bears may yearly be carried on. The best bear hunting takes place in February. In the beginning the bears are very fat; but towards spring they are very emaciated which is connected with their being without food for a long time in winter. The commercial manager Petersen, who has given so many good informations on Greenland animals, tried a year to gain knowledge of how many bears had been seen in the district, and how many had been killed. He got to the strange result that c. 50 had been killed that year, but more than 200 had been seen. Most of them sought northward along the coast, of course, with numerous turns into the inlets; but their main direction was always northward. Probably they try to reach the old places on Blosseville coast, from where they have mostly started. Thus a regular migration of bears with the floating ice takes place from the North to the southern part of the east coast of Greenland (and round to the west coast). Then the bears again seek northward along the coast; and the reason of this wandering is probably the same as of the wandering that takes place inward, through Scoresby Sund, and outward again, that is the bear's search of food.

Mustela erminea L. Ermine.

The discovery of the Ermine in East Greenland, is due to the second German arctic expedition; in the autumn of 1869, Dr. Copeland saw its traces in the snow on Sattelberg, and in the beginning of June 1870, one was killed in Kuhn Island, finally another was killed in Franz Joseph's Fjord in August 1870. During the expedition of Ryder, fresh traces of it were seen in the snow, on the inlet-ice at Danmarks Ø, on November 11, 1891 (Bay), also many other times its traces were seen, but the animal itself was never seen.

While we were in Turner Sund, Ditlevsen, on July 25, brought the glad news, that he had found a place where 8 ermines lived; for some hours he had been observing the small, nice animals; they ran about him, snuffing at his boots, and putting their noses into his gun-barrel. Having no small shot for our guns on board, Master Lyhne, who had got a parlour-gun, went with us to the place where the ermines lived. It was on the west side of Turner Sund, almost straight before the river bay on a slope a little above the beach. A great collection of stones with many hiding places among them, formed their main dwelling; close by heather was found, a little farther on some willows were growing; the melt water had formed

Fig. 2.
(Drawn by E. Ditlevsen.)

runs through the earth, down towards Turner Sund, and in streaks swept off the looser layers of earth, in a way that only the bigger stones were left in the runs. Quietly we sat down waiting. Ditlevsen scraped with his pencil on a stone, and it was not long before the small animals curiously put forth their heads from their hiding places, to disappear again in a hurry. Then we scraped again on a stone, piped like a lemming, and in that way we repeatedly lured them out. By and by, we caught sight of 5 of the 8 members of the family; the most prominent one was the old female, that was very ill-tempered and seemed to be completely in command of the others. Now Master Lyhne shot two animals, both of them young males. One of them we used to allure others with, by tying a string round its waist, and placing it on a stone near the hole, where the old one several times had appeared. Nor was it long before she rushed out, got hold of the dead son, and tried to haul him down into the hole. By drawing the dead animal over a catcher, we succeeded in catching the female that followed; but she slipped out again. However strangely it sounds, we got her twice more into the catcher, both times we got hold of her, both times she slipped away, last time not till we were on the point of putting her down into a telescope-case, to bring her on board alive; finally we were obliged to shoot her, not being able to make her pass into the catcher any more. During all this, some ermines had slipped down towards the beach along the runs, filled with stones, and hidden themselves there. The day after, a young female of the same family was killed there in the same place; thus we carried with us 4 ermines in all. — On August 9, Hartz saw an ermine in Hurry Inlet, on the Jameson Land side, and finally Ditlevsen again saw an ermine in Segelsällskapets Fjord, on August 30, opposite to Berzelii Mountain. All the ermines that were seen were in summer dress.

Ditlevsen found in the dwelling, that he discovered in Turner Sund, a lemming, killed by the ermines; it had the peculiarly rank smell, possessed by the ermine, and which is due to its anal glands. A little hole behind the ear of the lemming had been bit by the ermine. Probably the lemming serves as the main food of the ermine, and must be supposed to be common in these regions.

At Angmagsalik the ermine is not known, nor was it found on Amdrup's boat expeditions, and it lives scarcely very far to the South of Cape Dalton.

Trichechus rosmarus L. Walrus.

At Angmagsalik K. Poulsen heard that the Walrus is now and then seen and caught, but seldom, often with intervals of years.

Near Sabine Island, close by the ship, two adult walruses were seen playing with each other on July 11, 1900. Two appeared in Turner Sund on July 27.

Erignathus barbatus Fabr. **Bearded Seal.**

On the boat expeditions to the North of Angmagsalik, in September 1898, and in the summer 1899, Poulsen now and then saw the Bearded Seal singly. At Angmagsalik it is said to be stationary, and it is caught rather commonly, yet not nearly so often as the ringed seal, and the harbour seal. According to the opinion of the Greenlanders, the reason of its wearing off its teeth so much is, that it swallows a great many small stones and gravel with its food, that consists mostly of mussels, which it fetches on the bottom of the sea.

A big bearded seal was seen at Sabine Island on July 11, 1900. In the last part of July several were seen in Turner Sund on the ice, that was carried to and fro by the stream continuously. One appeared in Hurry Inlet on August 20. In the stomachs of the two killed bearded seals, Deichmann found remains of fish.

Phoca vitulina L. Harbour Seal.

Poulsen saw the Harbour Seal singly, during the boat expeditions to the North of Angmagsalik, in September 1898, and in the summer of 1899. It is stationary at Angmagsalik, he says, less common than the ringed seal, and is scarcely ever caught, but in summer. Most common it seems to be in

Angmagsalik Fjord. It produces its young in June, and at this time climbs the stones. The Greenlanders say that it lives on mussels and small crustaceans.

Phoca foetida Fabr. **Ringed Seal.**

Poulsen found the Ringed Seal commonly along the coast to the North of Angmagsalik, both in September 1898, and in the summer of 1899. In spring 1899 it was to be seen on the ice in Angmagsalik Fjord, from the first of April, but in Tasiusak not till the 6^{th} of May. At Angmagsalik it is commonly caught during the whole of the year, most often in the inlets, in summer also outside them. From the beginning of April, it is said to be used to get up on the ice. The young are born in April. Poulsen examined the contents of 22 stomachs; most often smaller crustaceans were found, that seemed to have been swallowed almost entire, a single time also some squids, once an almost digested fish, certainly a *Gadus*.

A little ringed seal was shot near Sabine Island on July 10, 1900. In Turner Sund the species was found in the last part of July. In Fleming Inlet one was seen on August 24.

Phoca groenlandica Fabr. **Greenland Seal.**

Along the coast to the North of Angmagsalik, Poulsen saw the Greenland Seal singly during the summer 1899. To Angmagsalik, he says, it is said to arrive, wandering from the North, in June and July in numbers, yet not in swarms, and it is said to stay there till far into autumn. — According to the communications of Johan Petersen, it arrives twice a year, migrating, in July and September; in July both young and old arrive from without, and after that they are found singly, till the ice begins to form; in September they come in swarms, and according to the sayings of the Greenlanders, they are then going southward.

In the floating ice to the North of Jan Mayen, many were to be seen in the first days of July, 1900. Deichmann saw swarms of them in Fleming Inlet in the last part of August.

Cystophora cristata Erxl. **Crested Seal.**

Poulsen saw the Crested Seal singly along the coast to the North of Angmagsalik, in September 1898, and in summer 1899. According to the sayings of the Greenlanders, it arrives at Angmagsalik in April, from the North, in small numbers, and again disappears in the last part of May; in July it returns in greater numbers, yet not in swarms, also from the North, and after that it is to be seen till later in autumn. In April it is accompanied by its young. — Also according to the communications of Johan Petersen most of them come in July.

In the floating ice outside the northern part of the east coast, between Jan Mayen and Sabine Island, many were to be seen in the last part of June, and the first part of July 1900, a few also near land.

Rangifer tarandus L. **Reindeer.**

Scoresby is the first who has given informations of the Reindeer in East Greenland; he found numerous horns and bones of it, in the old Eskimo hamlets at Cape Stewart, Cape Swainson, Cape Hope, and on the south side of Scoresby Sund at Cape Brewster. Also Scoresby's father found rests of it at Cape Simpson (Traill Island) in an Eskimo hamlet, but no living reindeer was seen; in Scoresby's list of animals of East Greenland (l. c. App. Zoology) it is not put down. Clavering and Sabine did not see it, but during the second German arctic expedition, (1869—1870) it was observed in greater numbers from lat. 75° N. southward until Franz Joseph's Fjord, and it was observed in swarms of nearly 30 animals. Ryder's expedition (1891—92) found it in very great numbers in the regions round Scoresby Sund, in Jameson Land, at the Nordbugt in Vestfjord and Gaasefjord, besides in smaller numbers in Milne's Land and Rypefjord, and singly in Danmarks Ø.

Some reindeer were seen on August 13, 1892 in one of the «Islands» to the South of Scoresby Sund, probably Manby Halvø. It was found in parties of 4—7 or singly (Bay), and in several places paths were found, made by the reindeer. In winter they seemed to migrate outward from the inner part of the inlet, to places more free from snow. Nathorst (l. c., p. 329) found reindeer in 1899 in the following places: Franz Joseph's Fjord (25 or 26), King Oscar's Fjord (2 and a calf), Renbukten (12), and finally in Hurry Inlet a little to the North of the bottom (2), in all little more than 40. During the whole of the time we were staying at the coast, not a single reindeer was seen, and Kolthoff who visited the coast northward the same year as we, did not see any one either. This appeared strange, especially to the partakers who had also been partakers in Ryder's expedition (Hartz and Deichmann), for then the reindeer was very common, as mentioned, in Jameson Land, and while going along the south-coast of Jameson Land to Nordostbugt, this extraordinary fact was very much discussed. Was it really so that the wolf had extirpated the reindeer by its fierce hunting during a dozen years, or had perhaps the musk-ox that now appears in such great numbers in these regions expelled it? Perhaps both of them have assisted here.

Nathorst (l. c., p. 352) saw in Kierulf's Ø, many places where reindeer had been killed by wolves; hoofs, skeleton parts, hairs etc. were lying about; the wolves' excrements I have seen, always contained reindeer-hairs and fragments of bones, so there is no doubt that the animal, most chased by the wolf, is the reindeer. Another question is whether the wolf may really be able to eradicate it completely. This is scarcely probable, for many other places are known, where the polar wolf and the reindeer live, and have lived together for long times. The reindeer, seen by the Germans, were little afraid; it happened on their going ashore one day, that some reindeer came running quite near the boat, and a party of 7 animals ran up to Ryder, one day he was on shore in Jameson Land, took their stand at a distance of 30 steps, and showed a great interest in Ryder's examining the altitude of the sun. But the reindeer seen by Nathorst were very shy and in this Nathorst sees a sign of the wolf having not begun raging in these regions till the latest years.

In all places where the ship expedition made its way forth it found remains of the reindeer. Horns and hairs were seen everywhere, as far down as Cape Dalton; in Turner Sund in Turner Ø, one of the engineers found two skeletons of reindeer, much gnawed off, but they lying in a place not easily accessible, and the ship being on the point of leaving, I did not find any opportunity of seeing them. In Jameson Land were found numerous horns, and some skulls, much gnawed off, also in Fleming Inlet, but else we did not find any distinct instance of any reindeer having been killed by a wolf, except at Nordostbugt, where a shank was found, at which still muscular fibres and sinews were hanging. After our return home, Deichman has reported that he found the skeleton of a reindeer in Jameson Land, killed by a wolf.

Indeed, one should expect to find similar places of slaughter in Jameson Land, as Nathorst found in Kierulf's Ø, the Reindeer being so very numerous here such a short time ago, but this not happening, I feel inclined to mean, that the reindeer have been chased away for a great part, that they have sought away from the flat country, where the wolves so much more easily have been able to hunt them, to the mountainous regions deeper down in the inlets, and there sought a natural defence; but for the present time of course this can be nothing but a conjecture.

Far to the South of Cape Dalton the reindeer has not lived; it is not found at Angmagsalik, and scarcely ever was there, as else its horns must still now and then be found, and such ones are not known. Nevertheless it is known by the Greenlanders there and appears in their legends (Holm) and c. 70 years ago a man is said to have met with a living reindeer, according to the informations, received by Poulsen. The Greenlanders, Graah lived together with, in 1829—30 on the southern part of the east-coast, did not know anything of the reindeer, and on his showing to some of the inhabitants of the island of Aluik (c. $64^{1}/_{2}°$ lat. N.) a fur-cloak of reindeer skin, they thought it was made of a sort of dog skin.

At the old Eskimo hamlets at Scoresby Sund and farther northward, remains of reindeer, especially the horns, that were used in several ways, were exceedingly common.

Ovibos moschatus Zimmermann. **Musk-ox.**

Since the second German arctic expedition under Captain Koldewey, first found the Musk-Ox in Shannon Island on August 16, 1869, and during the autumn of 1869 till August 1870 showed its existence northward until lat. 77° N., southward till Franz Joseph's Fjord, it has been observed several times, both by whalers and by the different scientific expeditions, Ryder 1891—92, Nathorst 1899, Kolthoff 1900, that have later on visited the coast. Ryder found it in the regions round Scoresby Sund, Nathorst besides in the great complex of inlets, connected with Franz Joseph's Fjord.

By these investigations it has become an established fact, that the musk-ox appears generally on the east coast of Greenland, from Scoresby Sund northward, and it is found not only on the mainland itself, but it has also wandered out to several of the greater and smaller islands near this: Kuhn Island, Shannon Island, Sabine Island, Pendulum Island, Clavering Island and Ymer's Island, still in some of these it is perhaps only found in summer (W. Peters), thus in Sabine Island, Pendulum Island, and on the east coast of Shannon Island.

Peary and Astrup having observed the musk-ox at Independence Bay on the north east side of Greenland (lat. 81° 37′ N.), no doubt is left that a connection still exists between the musk-oxen of North Greenland and East Greenland. Already Dr. W. Peters (Geogr. Mittheil. 1873 p. 309), and Dr. G. Hartlaub (2te deutsche Nordpolarfahrt, B. I, p. 536—544), supposed

Fig. 3.
(Drawn by E. Ditlevsen.)

this to exist, musk-oxen having been found in Hall Land in 1871—72, by the «Polaris» expedition.

There is no doubt either that it appears also on the coast of East Greenland, betwen lat. 77° N. and lat. 81° 37′ N., as Nathorst has represented it, in his excellent little map of the present extension of the musk-ox.

But to the South of Scoresby Sund it was not observed with certainty by any former expedition. During the expedition of Ryder, Hartz found an old cranium at Gaasefjord, the most southern one of the inlets, issuing westward from Scoresby Sund; thus this was the most southern point where remains of the musk-ox were known, yet it was not seen alive on the

Fig. 4.
(Drawn by E. Ditlevsen.)

spot. — Bay writes (l. c. 1 p. 18): «To the south of Cape Brewster it was not seen»; but Ryder writes (l. c. p. 116): «In one of these islands that, as distinct from the others, is rather flat (probably Manby Halvø) we saw by our telescope reindeer, and perhaps musk-oxen».

Though we stayed for some time, from the 18[th] till the 30[th] of August, 1900, South of Scoresby Sund, and were on shore in several places, we did not see any musk-oxen; but still I feel no doubt that it is there. I saw traces of a great bull, that had crossed a little river near Amdrup's depot at Cape Dalton (lat. 69° 25′ N.), they were seen very distinctly in the soft ground along the river. Some days later, I saw traces of a party, having crossed a swampy fen stretch a little way up a mountain slope, finally I saw also traces of musk-oxen at Turner Sund. Now there might be the possibility of confounding the traces of the reindeer and the musk-ox, but still I do not believe there is; the big lateral toes of the reindeer, leave marks laterally behind the main hoofs, while the small lateral toes of the musk-ox leave a little mark just behind the main hoofs, and they do not appear distinctly, but when the animal is treading on soft ground. I drew in my pocket-book, a representation of the traces, I meant to be those of the musk-ox at Cape Dalton, then I later on compared them with the traces of musk-oxen in Jameson Land; they agreed completely. Also the dung I saw at Cape Dalton was like that of the musk-ox, as I later on got to know it farther northward. Strange to say the winter wool of the musk-ox was never found, though this is commonly found, where the musk-ox is living; it sticks very easily to willow, heather and the like, when the animal lies down; but, of course, it is by chance you come across such places, and the animal is hardly common in the regions named here. Besides, considering how the whole rest of the characteristic mammalianfauna of Greenland appears South of Scoresby Sund, it would be very strange, if the musk-ox did not live there also.

Very far South of Cape Dalton, the musk-ox is not found; nothing was seen of it during the boat expeditions of Amdrup, neither in 1898—99, nor in 1900, though the partakers directed their attention expressly towards this question; and at Angmagsalik it hardly ever lived, though the Greenlanders there know it, and have legends about it. In one of the stories Angitinguak, a 55 years old Greenlander, told Holm (Holm, Medd. om Grønl. X. p. 318) the following is told about a man who went out hunting reindeer at Kangerdluarsugsuak at Norsit (where Greenlanders lived in former times): The next day he again went out hunting. Then he saw a big black animal, bigger than a bear, having long hairs on its neck, and horns bent backwards. This animal is called «Pangnek» («musk-ox»). Properly «Pangnek» does not mean «musk-ox», but «reindeer». By the Eskimo that know the musk-ox, it is called Umingmak or Omingmak. Perhaps the story originates from a time when the East Greenlanders lived farther North, but it may happen that a dead musk-ox is carried southward by the floating ice, and from that the knowledge of it might originate.

Thus Holm reports (Medd. om Grønl. IX. p. 134) according to the relation of the Greenlanders, of a musk-ox, found drifting on the ice at Sermiligak; part of the meat was rotten, but the rest was eaten. Besides it may be observed that Graah, who wintered at Nukarbik on the east coast of Greenland in 1830, did not hear any relation of the musk-ox, from the Greenlanders he met with.

At what time the musk-ox has wandered to the regions about Scoresby Sund cannot be said with certainty, as long as no better informations are given.

Referring to the fact that rests of the musk-ox were found neither in the Eskimo hamlets, nor in the Eskimo kitchen-middens, seen during the expedition, that no carved figures of such a strange animal were found in the sites of the houses, that Scoresby did not meet with the musk-ox in the places where they are now so common, Ryder writes (l. c. p. 304): — — — one might be tempted to believe that the musk-oxen were not found in any great number in this part of the coast (Scoresby Sund), at the time when it was inhabited by the Eskimo, but that they did not come southward in greater numbers till later.

Later Nathorst has set forth the same opinion, and means that the musk-ox not till probably after 1822—25 immigrated to the regions South of lat. 75° N., as neither Sabine, who dwelt in Sabine Island in 1823, nor Clavering who at the same time made a boat expedition of a fortnight to Clavering Island, past Jordan Hill, and quite to the bottom of Loch Fine, an inlet on the north side of Hudson's Land, saw musk-oxen; farther Nathorst means, that on the whole the musk-ox has not lived together with the Eskimo.

However tempting such a theory might seem to be, yet I do not believe in its being right. — Certainly, neither Scoresby, Clavering, nor Sabine, found musk-oxen, when they were on the coast (1822 and 1823), and when the Germans made their sledge expedition in 1869, from October 27 till November 4, from Sabine Island to Clavering Island, and to the inmost part of Tyroler Inlet, thus a distance not less than that, travelled over by Clavering, they did not see a single musk-ox either; but how little importance is to be attached to this, is best seen from the fact, that they did not see a single reindeer either; Scoresby found nothing but its horns and bones in the old Eskimo hamlets, and there is scarcely any doubt that the reindeer lived there at this time. The want of remains of musk-oxen in the Eskimo hamlets, the main point of support of this theory, is not so conclusive either, as it might seem immediately; the numerous old Eskimo hamlets are far from having been so thoroughly examined, that one dares conclude anything decisively from that; indeed, it is not even excluded, that rests of the musk-ox were found in one hamlet. Of the bones of animals, found at Cape Stewart in the Eskimo hamlets, that are there, Scoresby writes (l. c. 214): «Among the bones discovered in the hamlets, we could distinguish those of seals, bears, reindeer, dogs, narwhals, and whales. The thighbone of some big animal was also met with, the species of which we could not determine». Scoresby knew the other bones, also those of the reindeer, so there is no small possibility that the above mentioned thighbone was that of a musk-ox.

During the expediton of Ryder a dozen craniums were gathered on a mountain slope in Nordbugt at Nordvestfjord; few of the other bones were found then. Ryder (l. c. p. 304) thinks it probable that the animals were killed by Eskimo, who have carried with them the meat, bones and the skin, and left the heavy heads. Nathorst (l. c., II, p. 143) feels most inclined to believe that some Scotch whaler killed the animals. But it is not very likely that a whaler should go so far into Scoresby Sund; Nordvestfjord is so closed in by high ice mountains, that no ship ventures upon going there, and hardly whale-boats, but of course, the question is open, though several things might indicate that Ryder is right.

Much weight must not be attached to the fact that musk-oxen are not found among the found carved figures of animals. Certainly, some figures of bears, seals, narwhals etc. are known, found in the old Eskimo houses, and Nathorst has (l. c. p. 348 Fig. c.) given a figure of an animal from East Greenland, the single known that is perhaps a reindeer. Therefore nothing can be built on this, especially as the above mentioned figure of a reindeer with as great right might be said to be that of a musk-ox, the horns that might show with complete certainty the difference are wanting.

During the expedition of Ryder a very old skull of a musk-ox was found at Vestfjord, another at Gaasefjord; in neither place musk-oxen were seen «so that it does not seem to live in so great a part of the country as it used to do» (Bay l. c. p. 18). Nathorst found two very decayed skulls in the inmost part of Franz Joseph's Fjord, and thinks that the musk-ox lived before in this region, then it disappeared, and then again it returned. After our return home, Hartz has communicated to me that he saw a very old cranium, covered with lichens, near Ryder's Elv. These informations show, that the musk-ox in East Greenland lived in former times in almost the same places as now-a-days. How old the other craniums are that were found during the later expeditions cannot be decided; several of those I saw did not seem quite young.

While O. Fabricius was staying in Greenland, 1768—74, a Greenlander brought him a fragment of the skull of a musk-ox that together with some hoofs and knots of hair had been found on the field ice «undoubtedly near Frederikshaab» (Winge). Fabricius described it in Fauna Groenlandica (p. 28, sp. 17) under the name of Bos grunniens. In his later work «Om Drivis i Davids Strædet» (Vid. Selsk. Skrft. N. Sml. III p. 81) he mentions the remains again, and draws the piece of the skull; it was brought on the field ice round Cape Farewell, and he thinks that it originates from Asia, as the above named species of oxen is found there. Not till later (Zoologiske Bidrag p. 61, K. D. Vid. Selsk. Skrft. 3 R. 4 Bd.), he perceives that his definition is not right, Pennant (Arctic Zoology p. 11) having shown that the cranium must belong to the musk-ox, and he grants, Pennant is right. Now he supposes that the ice, on which the rests of the animal were found, originates from North America, where at this time the musk-ox was known to live, and that the ice has drifted down along the east coast of Greenland round Cape Farewell. However, there is no doubt at all that the found rests originate from the east coast of Greenland, according to what is known now about the East Greenland ice stream. The skull is still found in the Zoological Museum in Copenhagen. Thus it is a fact that the musk-ox lived in East Greenland in the end of the 18th century, certainly, it cannot be seen from that, whether the musk-ox was found then North or South of lat. 75° N. as Nathorst (l. c., p. 141 Anm.) has observed. Still nothing is found at 75° n. l. that might put a stop to the progression of the musk-ox, no large glaciers or other natural bars, the country is the same on both sides; if the musk-ox lived North, probably it also lived South of lat. 75° N. If the above mentioned facts are compared with this, it will be seen that several things indicate that the musk-ox has lived in East Greenland for long times almost in its present territory, perhaps in changing multitudes, and that the time of its immigration cannot be decided by way of the present informations.

Already the first day on which we went ashore in Greenland, Sabine Island, on July 11th, musk-oxen were met with. They were walking on the left side of a river bed, between Germania Mountain and Hasen Mountain. In several places the ground was very moist and soft, in other places rather hard and dry, the vegetation poor, a few willows were found. One bull and two heifers were walking together, all of them were killed. The bull that was carried on board whole, weighed more than 600 pound without the skin. Skeletons and skins are now in the Zoological Museum in Copenhagen together with different parts of the entrails. Besides these three animals a single bull was seen in the neighbourhood. Also Nathorst found the musk-ox (1 ♂) in Sabine Island the year before.

On July 14th, we went ashore at Cape Borlase Warren; the country was exceedingly sparely covered, traces of the musk-oxen were seen.

The traces, seen South of Scoresby Sund, have been mentioned already.

From July 31st, till August 21st, we were staying in Scoresby Sund, mostly in Hurry Inlet, where the ship was lying at the Fame Øer, and during that time a great many musk-oxen were seen.

On July 31st, we went ashore 5 kilometers North of Cape Stewart, we were 9 men in all; through a river bed most of us ascended the plateau that is precipitously ended towards Hurry Inlet by the steep Neill's cliffs. Towards the edge of the plateau the ground is very barren, consisting of nothing but sandy, gravelly and stony soil, covering the subjacent sandstones, slates etc.; at this time of the year the ground was very dry and hard as stone. Musk-oxen had been walking here lately, fresh dung was found, and I also found a place where they had been lying. Westward the country was sloping down towards Scoresby Sund, in soft undulating forms; the heather strew a brownish tone of colour over the whole scenery, and round about green fens were seen, continued by streaks along the water-course. Here Master Høyberg met with 4 musk-oxen, 2 bulls and 2 cows, they were lying at a little fen; he shot the two bulls, the cows hurried away, I saw them at a little distance, walking fast, one behind the other. — When skins, skulls and meat were fetched later on in the night, a party of 14 animals with 2 calves were met with close by. The herd was drawn up in array, and set out on the crew, but returned hastily and disappeared; of this party a cow was killed (Høyberg). From that day the crew were very afraid of musk-oxen, and would not go with us when not armed. The rest of the partakers of the expedition, being on shore at the same time, did not see a single musk-ox.

On the same day (July 31st) when we were on shore in Jameson Land, numerous musk-oxen were seen from the ship on the Liverpool Kyst near the beach. Mate Munck counted parties of 7, 8 and 11 animals, and on the low point towards Cape Hope a very large party of at least 21 animals were walking. Captain Kjøller went ashore with some of the crew; they met with a party with 2 calves. The herd took up a position of assault, the calves being kept behind, but then they ran away in a great hurry, crossing a country where one edged stone was beside the other, and where men went on only with difficulty; those, following the party, were obliged to give up persecuting after a short time.

At the very bottom of Hurry Inlet, where the ship was lying from August 1st till August 10th, no musk-ox was seen, but numerous traces were seen; winter wool was also seen in many places.

But during an expedition, made by Nordenskiöld and Deichmann over Jameson Land from Hurry Inlet to Fossil-Bjerget (c. 60 kilometers) from August 2nd till August 7th, a very considerable number of musk-oxen were found. Deichmann has given an account of this expedition, and of the catching of the musk-calf in Dansk Jagttidende 17de Aargang Nr. 9 og 12, 18de Aargang Nr. 1 og 2 (1900—1901). On the third in the morning was seen a party of a dozen animals in a hollow, close by 3 single bulls were found, besides two bulls were seen near the herd; later on these penetrated into the herd, but the chief bull went for one of them, and swept his sides with his horns so that the hairs flew about. The chief bull was killed (Deichmann); the troop ran away, and was later on seen walking away, one after the other. On the return in a fertile fen near Ryder's Elv a dozen oxen with a calf were seen, and over an extent of 12 miles in the plateau of Jameson Land numerous musk-oxen were seen. A bull walking in a little party of 4—5 animals first assailed the dog, and then Deichmann; else the dog was able to stop a whole herd of musk-oxen, by attacking the animals while baying. Later a single bull was seen, finally a large party of animals were seen, exactly at the moment when the chief bull was soundly beating a forward single bull; besides two single bulls were seen. In this country where scarcely any human being before set foot, and probably shall not for long times, more than 80 oxen were seen. This gives a good idea of the frequency of the musk-ox in these regions.

At the same time (from August 2nd till August 6th), Koch and Mate Christensen made an expedition from Hurry Inlet to the bottom of Carlsberg Fjord through Klitdalen (c. 40 kilometers). In a poorly covered place in the northern part of Klitdalen a party of 10 musk-oxen were seen.

In the days August 6th—August 9th, Ditlevsen and the author together with two of the crew, Christian and Laurits, were at Point Constable on the west side of Hurry Inlet. Immediately in the morning of the 7th of August, Ditlevsen went to the large river beds from which the sandy downs where we had pitched our tent have been swept out into Hurry Inlet. He had scarcely got up there when two young bulls, walking together, came down towards him. A little time after, a very large herd came forth from the river bed that is turning to the South. The animals walking among each other, and now appearing, now disappearing, he was not able to count them exactly, but there were at least 20 adult animals in the party; whether there were calves he did not see, as the two young bulls grew rather forward, and he therefore retired. Soon after, he and I went up there, but then the large herd had disappeared, and we saw nothing more of it. Now we walked together to the west slope of the river bed; here was a very rich vegetation of heather, bleaberry, willow, dwarf-birch; in several places were small boggy fens. Here we met with the two bulls; standing, as they did, their mighty heads turned against us, their noses against the earth, staring at us with their small sticking eyes, they looked exceedingly imposing. First we killed one bull, later the other, but he had come near the river bed which was here very steep, and falling, hit by the ball in his heart, he made a high jump, fell down and rolled with crash and crach at a furious pace down into the river, far below. Farther to the South we now saw a party of 11 animals with two calves, they being at a great distance from us we returned. Meat and skull of the killed bull was secured. In his liver was found a tape-worm in the bladder phase. On the return we again met with a single bull that ran away. During the expedition we found the skull of a musk-ox together with some parts of a skeleton, besides the skull of a calf, all things very much gnawed off, and the horns of the skull were quite loose, cocoons of flies were found in the skull, but as these are very durable and may he conserved for a long time, they are no hold for the estimation of the age of the skull. All parts were very bleached. Three and a half hour later we returned to try to catch a calf, if possible, together with Madsen and the two sailors. Immediately at the mouth of the river bed we found an old bull with a large cake of winter wool across his back; one of his horns was half broken off, but as he was looking very malicious, and we did not appreciate his attacking us from behind on our passing, he was killed. When we came up to the old place from where we had seen the troop, it was away. The whole night we walked in the most beautiful weather over Jameson Land; it was a rather fertile country we passed; now and then we found fens, that got their moisture from the melt water of an old dirty snow drift, lying above; farther in, curiously shaped sandstone formations peeped forth; about them the country looked very barren and waste. We only met with one single bull; galloping he rushed against us, put his nose against the earth snuffing, and scraping with one of his fore legs in the earth; thus he stood for some time; then he rushed forth again, and in that way he approached us at a distance of 20 ells; we dared not let him approach us any more, we were quite still, looking at him, our guns ready. If he had sprung at us again, he must die. But suddenly he turned round, and hurried away as fast as he had come. Now he crossed the river, ran up the opposite waste side, stones and gravel rattled down round him at his running up; he followed us almost an hour; now and then he set up loud roars, followed by an energetic snorting, resounding far about, at last he left us, and paddled his own ways. We had thus seen 36 animals in all, and probably there had been at least 1 calf in the large herd.

In the night between August 10th and August 11th, we went ashore on the Liverpool Kyst, in the place where so many

Fig. 5.
(From a photograph by Joh. Madsen.)

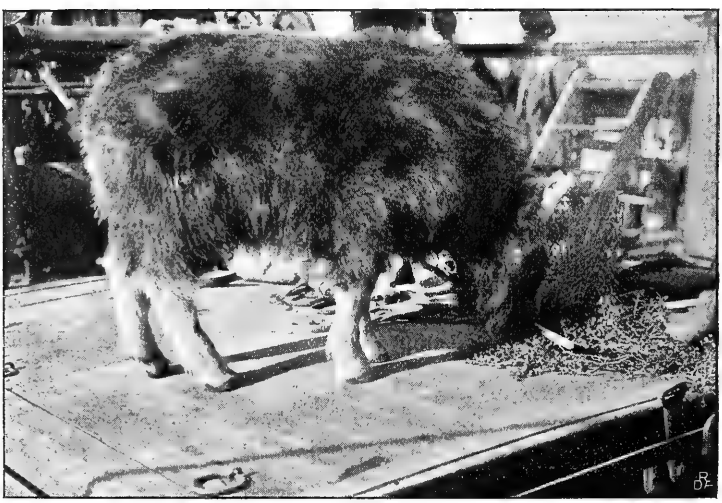

Fig. 6.
(From a photograph by Joh. Madsen.)

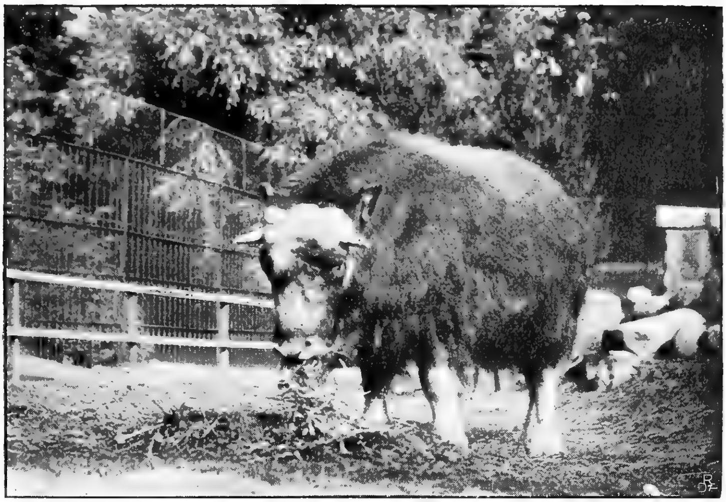

Fig. 7.
(From a photograph by Riise.)

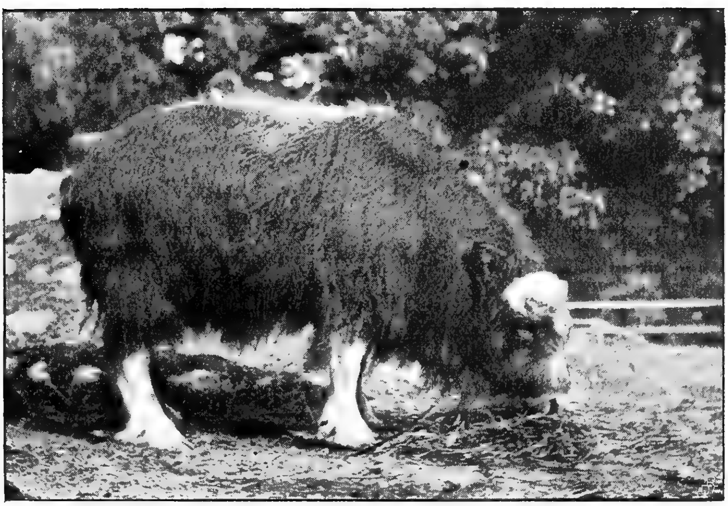

Fig. 8.
(From a photograph by Riise.)

musk-oxen had been seen 10 days before, divided in two parties; we searched a great stretch of the country, but met with no musk-oxen, except an old bull that was walking near the beach; he had been wounded at the last landing. All the other animals had left the place. Of course, traces of musk-oxen were found, at a little stretch of boggy land which Ditlevsen and I came across, a herd had been rather lately; rather fresh dung was found; besides the country round about was very difficult to travel over, one large edged stone being beside the other; for as already mentioned before, Liverpool Kyst is made up of primitive rock.

Nordenskiöld, walking at the same time from the Fame Island southward along the Liverpool Kyst, saw a single bull, but no herd.

On August 11th, in the evening, Deichmann and Madsen[1]) went ashore i Jameson Land to try to catch a calf. They had taken with them a setter that on former occasions had shown that he was able to stop a herd when on flight. During the night they met with several single bulls; in all a score of vagrant animals were seen, among them a little party, in which 5 cows (Madsen). One of the bulls that attacked was killed, after having gored the dog and tossed him up into the air with his horns. While the bull was lying wounded in a river bed, another bull came rushing against him and began fighting with the wounded bull that rose; still, he quickly gave up his purpose and went away. At eleven o'clock a. m. the next day (August 12th), they met with a herd consisting of 11 cows, 3 bulls and 1 calf (Madsen), a little South of Ryder's depot on Cape Stewart. Deichmann states «12 adult animals and 1 calf», but the party consisted of 14 animals, as I had later an occa-

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[1]) Deichmann has written about this expedition in his above named article in «Dansk Jagttidende». Madsen has written about it in several places, among others in Zool. Garten Jahrg. XLII 1901. The accounts differ at several points.

sion to see; the fact is that Deichmann does not include the two bulls in the sum. Two bulls were walking near the party; they joined it and «got the same fate as the troop» (Deichmann). Some of the animals were grazing, others were chewing the cud. One bull paired with one of the cows. The whole herd was now killed, by and by, by Deichmann, the dog repeatedly stopping the flying party. The calf, a vigorous bull-calf was caught and tied; 4 and a half hour it was lying tied, before a sufficient number of sailors came up to carry it on board the ship. Together with some other partakers of the expedition I visited the place where the animals had been killed; they were spread over a rather long stretch of ground, I counted then 15 killed animals in all, 11 cows, 4 bulls; one bull was seen in the neighbourhood, he seemed wounded (Ditlevsen). Some meat, some skins with the skulls of the killed animals were secured, but part of the meat of some animals that lay the night through without being taken out, had already begun to get tainted.

During the first day the calf was on board, it was faint and exhausted from the catching, but soon it grew so tame that it walked freely about the deck; but it was discontented, when nobody played with it. It eat very greedily leaves and twigs from the willow, still, it also eat grass when it could get it; by and by it grew accustomed to eating hay, softened in boiled water, and crushed oats. Being hungry or discontented, it lamented in the same way as a sucking-calf. Being teazed, it snuffed and rushed against us. It was very dissatisfied with the cat and the dog, it could not see them without snuffing and rushing against them. It had evidently been born in the same spring, had not yet got any horns, only the first small rudiments, it had not yet changed its calf's dress on coming on board. The two photographs Fig. 5 and 6 have been taken of it on board «Antarctic» in the end of August 1900; on both pictures it is seen busily eating willow. But the two photographs Fig. 7 and 8 have been taken of it in August 1901, in the Zoological Garden in Copenhagen; now it has got horns, directed slantingly forward; not till later they will get the characteristic form of those of the full grown bull (Fig. 3 and 4).

During a stop Hartz and the author made from August 16th till August 19th, we saw on the plateau at Vardekløft, on August 18th, a little party of 6 musk-oxen (perhaps there were more); they came walking along the edge of a fertile valley; we cried to them; they stopped a little, but then went on again. The day after I saw a single bull on the low fore-beach, but he ran away in a hurry, probably he had seen men before.

Going on August 14th from Hurry Inlet along the south coast of Jameson Land to Nordbugt, several flocks were seen from the ship, one party counted 16, another at least 12, a third 7; on account of the distance we could not make out whether there were calves in the flocks; single bulls were also seen in the country.

On the return we went ashore in Jameson Land on August 15th, at two o'clock p. m. The country here was looking like the rest of the South coast of Jameson Land, mounting northward, undulating, covered by formations of moraines, thickly covered with stones. The vegetation consists mainly of heather with willow and dwarf-birch; round about several small moors with lakes were found. Here Madsen succeeded in taking some photographs of a herd in its different positions. The drawings Fig. 9—12 are from these photographs, executed with much fidelity to nature by my friend and fellow partaker of the expedition, E. Ditlevsen, who himself attended the photographing [1]). Fig. 9 shows the arrival of the party; it consisted of 12 adult animals, 7 bulls, 5 cows, and 2 calves; it is the greatest number of bulls,seen during the expedition in the same herd.

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[1]) Unfortunately I was not present myself, having got too far away.

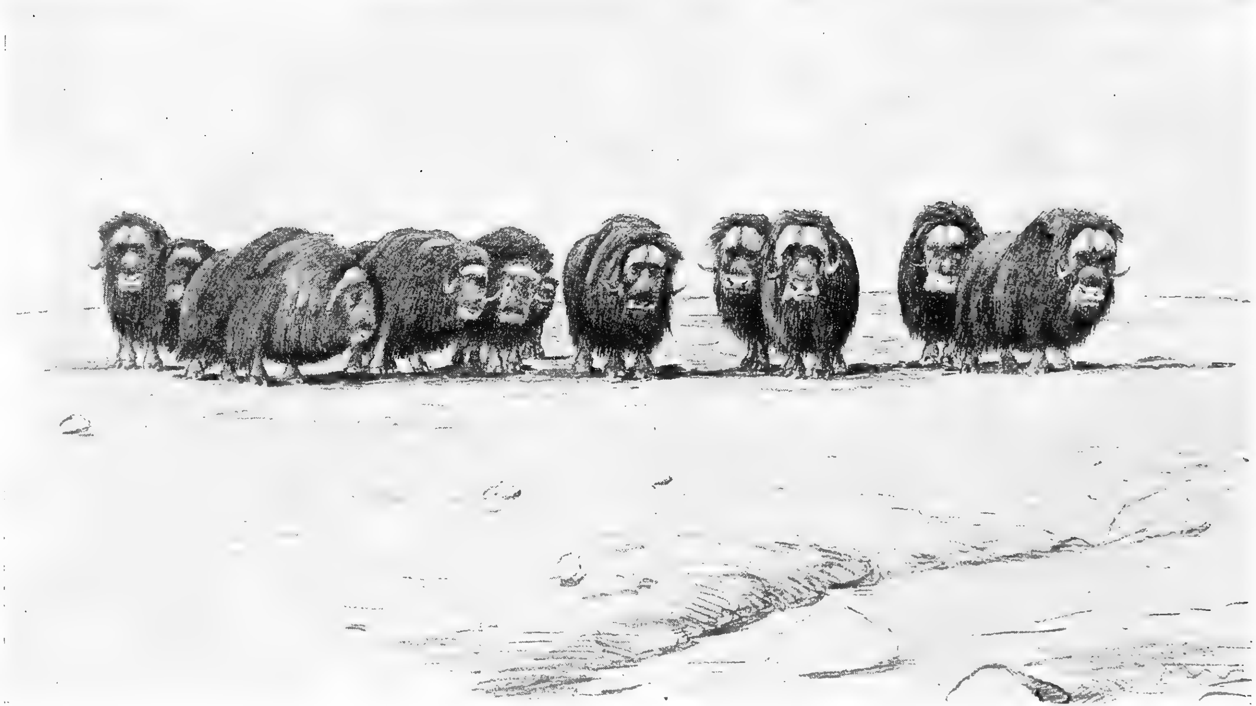

Fig. 9.
(From a photograph by Joh. Madsen drawn by E. Ditlevsen.)

Fig. 10.
(From a photograph by Joh. Madsen drawn by E. Ditlevsen.)

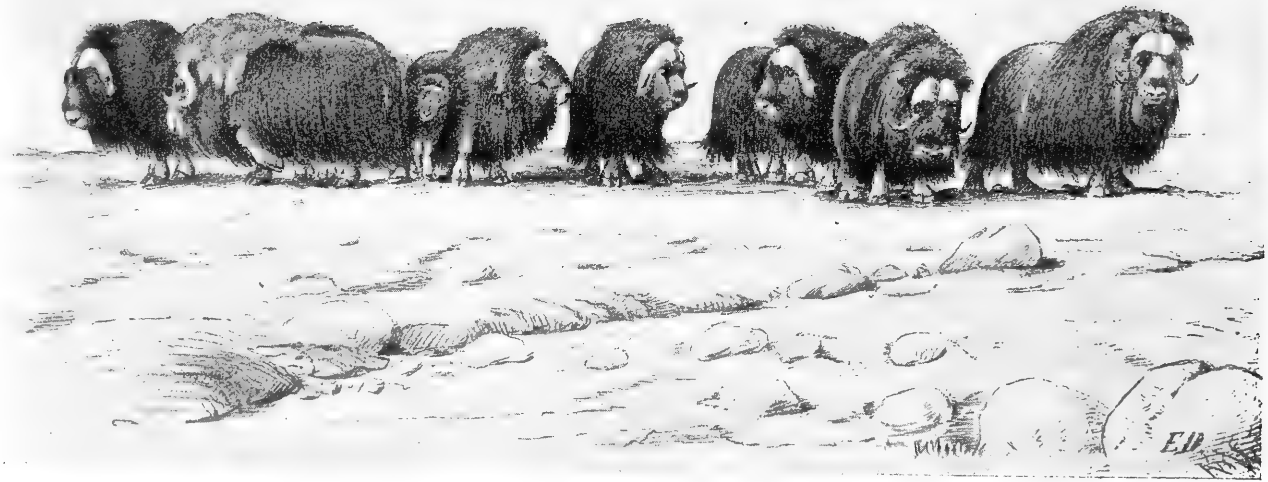

Fig. 11.
(From a photograph by Joh. Madsen drawn by E. Ditlevsen.)

Fig. 12.
(From a photograph by Joh. Madsen drawn by E. Ditlevsen.)

It has stopped, astonished at seeing the funny two legged beings before them; the magnificent old chief bull, having tufts of winter wool hanging on him, is found foremost on the left, and is just taking a walk before the front of the herd; his example is followed by the whole herd, he is their absolute monarch. The calves have been forced farthest back in the troop, protected by the adult animals. — A moment's disturbance and seeming confusion arises; then the animals place themselves in a row and approach (Fig. 10), two cows instantly place themselves at each calf, and put the calf between them. The chief bull hiding at this moment one of the calves, is found foremost on the left steadily walking to and fro before the herd, snuffing and snorting; the other bulls are on the wings. In this position the troop can make several movements, always keeping almost the same order; it can swing half to the right and left, rush straight forth; on the whole it is the position, in which the troop can make a joint attack: its aggressive position. Again disturbance arises, the troop has approached, and the animals, having grown afraid, draw close together, the calves are pushed into the middle, and the adult animals place themselves round them, their heads turned outward (Fig. 11). The animals farthest to the right have not yet got near the others. The foremost bull has lowered his head, ready to run his horns through the enemy's body. This is the position of defence of the herd, a position they must be thought to take up when wolves try to attack them. — It is funny to see the curiosity of the calves during all this, it is very difficult for them to keep quiet; they will always press forward to see what is the matter, but the old ones push them gently back again. — Thus both parties were standing for some time, staring at each other, suddenly the herd turned round and left the place, always protecting the calves (Fig. 12). When the herd had got at some distance, the animals began to play and cut the most curious capers.

From August 15th till August 21st some of the partakers of the expedition made a boat expedition along the south coast of Jameson Land, during this expedition several musk-oxen were seen (communicated to me by Koch); perhaps some of them had been seen from the ship before.

Though we stayed only some few days in Fleming Inlet, we saw also here several musk-oxen. On August 25th Ditlevsen and Madsen met with a little troop of 4 a little inside Cape

Fig. 13.
(Photograph by Joh. Madsen).

Biot; in the troop was a younger animal with short horns (yearling calf). The bull rushed on against them, first against Ditlevsen, then against Madsen, and was only at a distance of 15 ells from him when Ditlevsen shot a ball through its heart; shortly after Madsen killed a cow, the others ran away over a stony and not easily passable territory. — On the return they were followed by a single bull (Fig. 13), he followed them for half an hour quite near, observing each of their movements, but did not attack, and at last paddled away. At Cape Seaforth the bodies of 5 musk-oxen were seen that had been killed shortly before; ravens and gulls stayed there, revelling in the meat, also several falcons were staying in the neighbourhood. In Ørsteds Dal numerous traces were seen of musk-oxen which shows that they are often walking here.

On August 26th numerous musk-oxen were seen at the bottom of Fleming Inlet from the ship; they were walking on the coast, and there being already one calf on board Ditlevsen and I resolved to go ashore and try to catch one more. We got with us one of the sailors, Peter, and went ashore on the north-west side of the inlet. Along the beach was a flat sandy fore shore on which several pieces of floating timber had been thrown up. Fleming Inlet is continued in southwestern direction by three greater valleys, through which several rivers run, forming deltas at their mouths, and carrying considerable multitudes of sand into the inlet. The country is rising on both sides of Fleming Inlet and the valleys to rather considerable heights; the slopes were covered with looser layers of earth where we were walking; they were richly covered with heather, bleaberries, willow and some birch. The melt water made its way hrough the looser layers of earth and had in several places cut deep beds into the firmer substratum, lighter and darker clay, quite red slates and sandstones; towards the beach the melt water spread itself out to all sides, and formed a somewhat swampy little covered strech of land (compare fig. 15). At this time of the year one can however pass it, only now and then we went through where the water was still oozing down. We had scarcely got on shore when we met with a little party of 4 animals, 2 bulls and 2 cows, walking a little up the slope. There being no calf in the herd we went on westward, and the party ran away in a great hurry upwards and disappeared. Then we met with a young single bull, but he ran away westward. We had not walked very long, when we caught sight of a herd that approached us grazing. Having observed before that the musk-ox is much more fond of going up than down if possible, we went a little farther up, and thus got above the flock. It did not observe us immediately, and we lay down quietly watching it. The party consisted of 7 cows, 3 bulls and 1 calf. The above named young bull came just up to the troop trying to approach, but the old chief bull a very vigorous animal with a large cake of winter wool on his back rushed immediately against him. Snorting, snuffing and scraping the earth with his fore legs he approached the forward guest sideways, the young bull ran away a little, and the same scene was repeated, the other animals looking on quietly. Then suddenly the old bull went for him, the young bull ran away in a hurry, and both of them disappeared, wildly galloping. The chief bull being away we used our chance to go for the herd. For a long time we had had a clear understanding that it was impossible for us to catch adult animals, if we should catch a calf, the herd must he shot down. Divided in two parties we went down on each side of the flock. As soon as we had got a little down, the herd observed us. The calf walking a little above the others together with a cow it had sucked a little before, and that therefore probably was its mother, sprang up to the others, that instantly formed a circle round it and pressed it into the middle. All the animals turned their heads outward; so they were taking up their position of defence. Snuffing and snorting, their noses turned towards the earth, the animals were ready to receive the enemy. But the enemy was not now polar wolves, but something much worse: men with guns. — By the two first shots two animals fell, it was strange to see a trembling go through the herd, the animals pressed closer round the calf, by the next 4 shots 3 animals fell, and a bull went away, shot in his lung; soon he fell, soon after a cow fell. The two cows, now left, pressed the calf between them, then one fell bleeding; the other protected the calf. Just a the same moment the chiet bull returned; he stopped for a moment, saw the strange sight of the dying herd and immediately sprang up to defend the calf. But also the old bull was forced to give way, only by the fourth shot he sank down[1]) and bored one of his horns into the earth, he rose again, but his vigour was exhausted, he went out a little to the side (Fig. 14) sank down and fell dying (Fig 15). We now tried to chase the left cow on to the beach; she had sought cover beside the killed bull, and the little calf pressed closely to her (Fig. 16). The cow walked a little, but then turned towards us, fell and died. The calf took up its position at the hind legs of the cow (Fig. 17) snorting at our approach, a few times we got hold of it, but it slipped away again, still it ran only round the cow, and it was not long before it was tied; it pulled hard to get free and must have worked too hard, for having got on board, it became ill and died in the morning of the next day, though the transport did not last long. It was a bull-calf, somewhat smaller than the other calf, that was caught in Jameson Land, it had not yet changed its dirty brown tufted calf's dress and was thus a little younger than the other. Skin, skeleton and bowels are now in the Zoological Museum in Copenhagen.

While we were shooting at this herd, another was seen from the ship a little farther in; it was galloping past the valley and counted about 14 animals; probably there were 3 calves in it. Of the killed herd as much meat as possible was saved, but order having been given by the captain not to save anything but meat, as the ship was to leave Fleming Inlet already in the evening, unfortunately there was not any opportunity to get any of the skeletons of the killed animals, only a skull was taken on board. Of the cows of the herd 2 had, strange to say, milk in their udders, so both of them have

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[1]) It is quite curious to see how hard lived the old bulls are; it is seldom that they fall for the first shot, and dying they are possessed of great vigour.

Fig. 14.
(Photograph by Joh. Madsen.)

Fig. 15.
(Photograph by Joh. Madsen.)

Fig. 16.
(Photograph by Joh. Madsen.)

Fig. 17.
(Photograph by Joh. Madsen.)

probably calved in the same spring, but one calf must have died; perhaps the wolf had played its pranks here.

In Polhems Dal a single bull was seen on August 28^{th}, this was the last musk-ox, seen during the expedition.

In all about 400 animals had been seen. Of these 18 animals had been killed, besides the two herds of in all 24 animals; of these 4 were cows, the rest mostly single bulls; besides 2 calves were caught, both bull calves; of these one died.

The number of the herds we saw was very different, from three till more than 20. In some cases it has been decided, how many of each sex were found in the herd thus: a party of 3 animals (Sabine Island) 1 ♂, 2 ♀ (one ♀ had scarcely before had calf and was perhaps only a 2 years old heifer); a party of 4 animals (Fleming Inlet) 2 ♂; 2 ♀; a party of 5 animals (Fleming Inlet) 2 ♂, 2 ♀ and a yearling calf; a party of 11 animals (Fleming Inlet) 3 ♂, 1 ♀ and 1 calf (♂); a party of 14 animals (Jameson Land) 1 ♂, 5 ♀, 2 calves; a party of 15 animals (Jameson Land) 11 ♀, 3 ♂, 1 calf (♂).

On the whole only 13 calves were seen, but certainly there must have been more, for it is often difficult at some distance to discover calves in a herd, and in several of the herds that were seen at some distance, there were certainly calves. Therefore one cannot rashly say that of all the animals we saw, only 13 were calves; the 13 calves are dispersed over herds of about 88 animals, if one says now that 12 single bulls belong to the 88 animals in the herds, it will be found that 13 calves belong to every 100 animals, or with a round number: that 10 % are calves. We saw never more than 2 calves in a herd, but on former expeditions more have been seen. On the second German expedition a party of 15 animals with 4 calves was seen in Kuhn Island on July 11^{th} 1870. Ryder met with a herd of 9 animals at Cape Stewart, of them 1 old bull, one cow with 2 small calves[1]) and 2 heifers (?) without horns; the horns always appearing during the first year, the two latter must also have been born in the same spring; as there have been in all 4 calves in the herd. In Strindberg Peninsula in Geologfjord, Nathorst met with a herd of 19 with 3 calves. As far as known the calves are born in the beginning of May; in Shannon Island the Germans saw 6 animals with 2 calves on May 19th, and 11 animals with 3 calves on May 21st and they put the age of the calves to almost a fortnight. There is no reason to believe that the cows should go far away before bearing, as Nathorst means.

The numerous single bulls that are found, are either old animals that have been chased away from a party, or young bulls, having not yet been able to gain a place by fighting in the herd; one is apt to believe that these young animals that have been educated in a herd, at a certain time of their development are chased away by the other bulls of the herd. Then a period of fighting and strife begins for them. They try steadily to gain admission to the herd. Numerous fights of that sort have been observed. Often such young bulls unite by two. But the old bulls have scarcely any hope of regaining any sway of a flock; their time is over, and now they walk about very malicious, till death overtakes them.

Orca gladiator Bonn. **Killer.**

At Angmagsalik the Killer has sometimes been seen and caught, according to what the Greenlanders reported to Poulsen.

Monodon monoceros L. **Narwhal.**

At Angmagsalik the Narwhal arrives in swarms from June to August and is then caught rather commonly, says Poulsen.

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[1]) It is a question whether Ryder has seen rightly here, for no instance is known of a cow having born two calves at a time.

In Turner Sund it was seen on July 27th 1900. At Skærgaardshalvø Amdrup saw some on August 8th. Three narwhals, two dark ones and 1 very light one, were seen by Deichmann at the mouth of Carlsberg Fjord on Sept. 1st; they were swimming about in the inlet in the night and forenoon, and then disappeared in southern direction.

II.

Echinoderms from East Greenland.

By

Th. Mortensen.

Crinoidea.

1. **Antedon Eschrichti** Müll. — Pl. I. Fig. 4—6.

Duncan & Sladen: A memoir on the Echinodermata of the Arctic Sea to the West of Greenland. 1881. p. 73. — P. H. Carpenter: Report upon the Crinoidea collected during the voyage of H. M. S. Challenger. Part II. The Comatulæ. Vol. 26. 1888. p. 138. — F. Jeffr. Bell: Catalogue of the British Echinoderms. 1892. p. 53.

Forsblad Fjord, 90—50 fathoms. 3 specimens. — Off Henry Land, c. 20 fath. 4 sp. — Turner Sund, 120 fath. 7 sp. — Kap Tobin, 57 fath. 1 sp. — All large specimens.

2. **Antedon prolixa** Sladen. — Pl. I. Fig. 1—3.

Duncan & Sladen: Op. cit. p. 77. — F. Jeffr. Bell: Op. cit. p. 58.

Forsblad Fjord, 90—50 fathoms. 1 specimen. — S. E. of Sabine Island, 110 fath. 2 sp. — Kap Hope, 120 fath. 2 sp. — Kap Brewster, 250 fath. 6 sp.

Without entering upon the question about the possibility of distinguishing with certainty *A. quadrata* Carp. from *A. Eschrichti* or *A. prolixa* from *A. tenella* (Retz.) (= *A. Sarsii* Düb. Kor.), I may point out some features, by which these two groups are very easily distinguished; though very easily seen, the structures here dealt with have, to my knowledge, as yet remained unnoticed, a fact the more curious as good distinguishing characters are rather scarce in the great, difficult genus *Antedon*. While the three lowermost pinnulæ have been very carefully examined, little attention has been paid to all the numerous pinnulæ from the fourth to the end of the arm (except, of course, as regards their anatomical and histological structure); they may, however, prove to be of no smaller importance from a systematic point of view than are the three lowermost ones — if it be allowed to conclude from the fact that they are so in these two groups.

A. Eschrichti. The joints are rather thick and robust, on the interior side with a sharp, thin keel, well marked off from the thick part of the joint; only on the last joint no such keel is distinctly seen. The last 6—7 joints have their outer side provided with numerous spines or hooks, especially the last joint has 2—3 groups of large hooks. (Pl. I. Fig. 5).

The covering-plates («ambulacrals») (Pl. I. Fig. 6) are large, cribrous, of very irregular outline; the lower part is much the larger and may consist of two separate plates, lying very closely together; they unite with the neighbouring plates and thus form a complete covering on the side of the ambulacral groove, interrupted only by the narrow spaces in which the sacculi are lodged, sacculi and covering-plates alternating regularly. The upper part of the covering-plate may be more or less separate, forming a very irregular plate, whose adoral side is bent somewhat inwards; this part is much smaller than the lower part, the plates being thus widely separated from each other. The connection between the two parts may be represented by a single rod, which forms, however, mostly a more or less extensive network on its aboral, but not on its adoral side. On the genital pinnulæ there are formed a number of thin irregular plates, covering the widened portion between the joints and the «ambulacral» plates. When dried these pinnulæ thus show a very distinct, irregular plating. (Pl. I. Fig. 4). It may yet be added about the pinnulæ of this species that the ambulacral groove persists almost to the end, though, of course, rather rudimentary; the covering-plates are not found on the last 6—7 joints, but the sacculi may proceed almost to the last joint. (Pl. I. Fig. 5).

In «The Comatulæ of the Willem Barents Expeditions», 1880—84 (Bijdr. tot de Dierk. 13. Afl. 1886) P. H. Carpenter describes a new species, *A. Barentsi*, remarkable through «the extensive development of anambulacral plates in the perisome of the genital pinnules. In this respect it differs from all the Comatulæ of the arctic and temperate regions». — From the informations given above it is clear that *A. Barentsi* in this respect closely agrees with *A. Eschrichti* — and this is the main character of the species. The only other character of some importance is the length of the cirri, which is said not to reach 20 mm. Now there are on the figure given by Carpenter of the single specimen found only three unbroken cirri represented, and the longest of these is c. 25 mm. Carpenter further points out that the third pinnule is much shorter than the second; in this respect, however, much variation is found there being great differences not only between the individuals but between the different arms of the same specimen and even between the two sides of the same arm. From what here is said, I think, we may safely regard *A. Barentsi* as synonymous with *A. Eschrichti*.

A. prolixa. The joints are rather long and slender; a thin keel is found on the interior side, but the outer 4—5 joints are quite cylindrical without such a keel. The outer side of the joints is smooth, only at the upper end of all the joints there is a circlet of thorns. (Pl. I. Fig. 1—3). The covering-plates are long, narrow, curved rods, at the outer end a little widened and with a few holes; the lower part is beautifully bent, parallel to the joint. (Pl. I. Fig. 3). As in *A. Eschrichti* sacculi and covering-plates alternate regularly. In the genital pinnules no secondary plates are developed in the skin of the widened part, it remains quite naked. The ambulacral groove is not found on the 3—4 last joints. (Pl. I. Fig. 2.) It may yet be noted that the covering-plates are sometimes a little irregular in the lover part, they may even be a little fenestrated.

As will be seen, these differences are very striking. Whether specific characters can be found here, I dare not assert; I have not on this occasion been able to take the other species of the two groups into consideration. At any case these structures deserve to be carefully examined.

Asteroidea.

3. **Asterias Mülleri** Sars. — Pl. II. Fig. 2.

M. Sars: Norges Echinodermer. 1861. p. 88. — Danielssen & Koren: Asteroidea. Norske Nordhavsexpedition. 1884. p. 21. — Levinsen: Karahavets Echinodermata. Dijmphnatogtets zoologisk-botaniske Udbytte. 1887. p. 392. — F. Fischer: Echinodermen von Jan Mayen. p. 31. (Die internationale Polarforschung 1882—83. Die Österreichische Polarstation Jan Mayen. III. Bd.). — L. Döderlein: Die Echinodermen, in: Zoologische Ergebnisse einer Untersuchungsfahrt des deutschen Seefischerei-Vereins nach der Bäreninsel und Westspitzbergen. Wiss. Meeresunters. herausg. v. d. Komm. z. Unters. d. deutschen Meere in Kiel u. d. Biol Anst. auf Helgoland. N. F. IV. Abth. Helgoland. H. 2. 1900. p. 202. — H. Ludvig: Arktische Seesterne. Fauna arctica, herausg. v. F. Römer u. F. Schaudinn. Bd. I. 3. p. 481. — Bell: Op. cit. p. 100.

Several specimens from Ingolf's Fjord (5/8 1899), Angmagsalik 9—0 fathoms and off Henry Land, 20 fath. Those from the latter locality must be referred to the var. *floccosa* Levinsen; the larger specimens from Angmagsalik have very few and small spines on the abactinal side and thus look remarkably naked; also the form of the arms is uncommonly rounded.

It is a very difficult task to distinguish between the species *A. Mülleri* and *A. groenlandica* (Stp.). None of the characters, when commonly used to separate the two species, holds good, a large material is examined. The most important character is found in the adambulacral spines, which form in *A. groenlandica* a double series at least in a larger part of the arm, whereas in *A. Mülleri* they are alternately single and double. — On the larger specimens from Angmagsalik they are disposed in a single series or alternately one and two, but on most of them a double series is found on some part (4—6 pairs) at the basis of the arm or farther out, sometimes only on one side of the arm. — At Angmagsalik are taken some small specimens (8) together, whose habitus is so much the same, that it would be quite absurd to make two species of them. Now most of them have the adambulacral spines disposed in a single series or alternately one and two, but in one specimen they form a regular double series in the inner half of the arms, also in a few of the other specimens 2—3 paired spines may be found together in some part of the arms. The same may be found in the specimens from Henry Land. This character is thus not to be relied upon.

As distinguishing characteristics the following features are further pointed out: in *A. groenlandica* there is an impression across the basis of the arms, the disc thus forming a «polygon with rounded corners»; this feature is not found in *A. Mülleri*, «vel rarissime indistincte». (Levinsen p. 392). Though mostly very distinct this character is neither to be relied upon, as it may be found well developed also in typical *A. Mülleri*, as well as in other species (*rubens*).

In *A. groenlandica* there are no pedicellaries on the disc (Lütken: Grønlands Echinodermata p. 29. Levinsen: loc. cit.), whereas pedicellaries are found here in *A. Mülleri*. But in many specimens of *Mülleri* there are found only very few pedicellaries on the disc, and in *groenlandica* a few pedicellaries may also be found there in some specimens. — In *A. Mülleri* there are always pedicellaries on the adambulacral spines, in *groenlandica* pedicellaries are not found here. This character evidently is the best one, but neither this is to be relied upon with certainty, as there may sometimes be found pedicellaries on the adambulacral spines also in *groenlandica*.

Further the madreporite is said to be encircled and almost covered by spines in *groenlandica*, which is not the case in *Mülleri* (Sars. Op. cit. p. 91). This seems to be of very little specific value, as well because this circle of spines is very indistinct in many specimens of *groenlandica*, as because it is a relative thing, what is here to be understood by a circle of spines. The madreporite may always be said to be encircled by spines in species, where the disc has a dense covering of spines.

The «forcipiform» pedicellariæ (Pl. II. Fig. 2) are quite identical in both species, as Danielssen & Koren (Op. cit. p. 22) have pointed out. But as several other species (f. i. *A. rubens*, *polaris*, *glacialis*) have just the same form of pedicellariæ, that proves nothing against their being two distinct species. In the «forficiform» pedicellariæ Danielssen & Koren find this difference between the two species that in *A. groenlandica* they form small tufts along the ambulacral groove, whereas in *A. Mülleri* they are disposed singly. This character does neither hold good; also in *A. groenlandica* they are often singly arranged.

Though a typical *A. groenlandica* as to habitus differs very much from a typical *A. Mülleri*, especially of the var. *islandica* Levinsen, there is evidently not a single character to be relied upon by which they may be distinguished; I think, we must then conclude that they cannot be maintained as two distinct species, the form *groenlandica* must be regarded as a, more or less distinct, variety of *A. Mülleri*.

4. **Asterias panopla** Stuxb. (Pl. II. Fig. 1.)

Danielssen & Koren: Op. cit. p. 17. — Levinsen: Op. cit. p. 394. — Döderlein: Op. cit. p. 204. — Ludwig: Op. cit. p. 486.

Off Henry Land, 200—100 fathoms. 1 specimen, medium-sized.

The disc and abactinal side of the arms almost without spines, only a few, inconspicuous spines, hardly larger than the pedicellariæ are found at the basis of the arms. On the disc only forcipiform pedicellariæ are found, the forficiform ones being found only along the ambulacral groove and very sparingly. Danielssen & Koren have figured the forcipiform pedicellariæ, but it is not distinctly seen, that they differ in a more marked manner from those of other *Asterias*-species. So they do indeed, the more remarkably as the forcipiform pedicellariæ are almost identical in structure in so many different species (Pl. II. Fig. 2). To be able to see the structure of these pedicellariæ they must be examined from the inner surface ; it is then seen that there is only a single series of small teeth along the outer margin and a few ones irregularly disposed below this series in the median line. (Pl. II. Fig. 1). Also the whole outline is quite different from the common form, as seen by comparing the figures 1 and 2. In sideview this curious structure is not to be seen.

5. **Asterias Linckii** (Müll. & Troschel). — Pl. II. Fig. 3.
Synonym: *Asterias stellionura* Perr.

Danielssen & Koren: Op. cit. p. 14. — Levinsen: Op. cit. p. 395. — Döderlein: Op. cit. p. 200. — Ludwig: Op. cit. p. 486.

Forsblad Fjord, 14—3 fathoms, 1 large specimen. — Hurry Inlet, 7—0 fath., 1 large sp. — Kap Dalton, 9—11 fath., 1 small sp.

The specimens in hand must be referred to the Var. *Gunneri*, though not being very marked. One of them, preserved in formaline, has retained the red colour on the abactinal side very well. The small specimen (R = 41 mm., r. = 17 mm,) looks rather curious, the spines of the disc being well developed, whereas pedicellariæ and papulæ are as yet very scarce. There can be no doubt, however, that it is the same species as the large specimens.

In this species the forcipiform pedicellariæ are even more characteristic and unlike the common form than in *A. panopla*. (Pl. II. Fig. 3). The upper end of the valve is not at all widened, ending in two large hooks and—mostly—a smaller one between them. Below there is a continuous series of teeth along the median line of the valve, a single series in the upper part, a double series in the lower part; at the lower end of the valve there is a larger group of teeth, as usually. This curious structure can only be rightly understood, when the valve is examined from the inner surface. Danielssen & Koren, who have figured the pedicellariæ in side-wiew only, therefore have failed to understand it.

6. **Stichaster albulus** (Stimps.).

Lütken: Oversigt over Grønlands Echinodermata. 1857. p. 30. (*Ast. problema* Stp.). — Danielssen & Koren. Op. cit. p. 31. — Duncan & Sladen. Op. cit. p. 29. — Ludwig: Op. cit. p. 479.

Angmagsalik, 9—0 fathoms, 1 specimen. — Ryders Sund, 30 fath. 1 sp. — Off Henry Land, 20 fath., 2 sp. — Jan Mayen, 15 fath., 3 sp. — Kap Borlasse, 2 sp.

The figure given by Danielssen & Koren of the forcipiform pedicellariæ is not good; upon the whole it is impossible to get a clear conception of the structure of these pedicellariæ without isolating the valves and examining them from the inner surface. They are much like the common form in *Asterias* (Pl. II. Fig. 2).

7. **Cribrella sanguinolenta** (O. F. Müll.). — Pl. II. Fig. 7—9.

Lütken: Op. cit. p. 31. — Sars: Norges Echinodermer. p. 84. — Duncan & Sladen: Op. cit. p. 32. — Bell: Op. cit. p. 95. — Ludwig: Op. cit. p. 472.

Kap Tobin, 57 fathoms, 2 small specimens. — Jan Mayen, 155 fath., 1 large specimen (R = 70 mm.).

From Forsblad Fjord there are two rather large, but badly preserved specimens which are so unlike the typical form that it seems to me to be rather doubtful, if they can be referred to this otherwise very variable species. As, however, I cannot on this occasion carefully examine the variations of this species, I will only here point out the differences between these two specimens and the typical form. The question, if they must form another species, I intend to deal with in a more detailed manner, when working out the «Ingolf»-Asteroidea.

The dorsal skeleton is a rather open, irregular meshwork, and in the meshes are found one or more (3—5) small, isolated, round or a little elongated plates. The spines are placed singly, not in clusters (pseudopaxillæ), along the frames. Also the small plates in the meshes carry isolated spines. The spines are slender, a little longer (0,2—3 mm.) than in the typical *Cr. sanguinolenta*;

they are not trifid, as is commonly the case in this species, but end irregularly; they are all covered with a thick skin, which often unites with the skin of the neighbouring spines, forming thus a thin web along the frames. But one or two papulæ in each mesh. (Pl. II. Fig. 7).

For comparison a part of the abactinal skeleton of a typical *Cr. sanguinolenta* is figured (Pl. II. Fig. 9). The difference is very striking, but as the species is so extremely variable, transitional forms may be found. In Fig. 8 is represented a part of the abactinal skeleton of a specimen from the Cattegat. Here the spines stand only 3—4 together, and there may be one or a few small plates in the meshes, some of them even bearing a single spine. These are not trifid and not covered by thick skin.

The adambulacral spines do not offer any marked difference from those of the typical *Cr. sanguinolenta*; there is only a single series of spines outside these, whereas there is a double series in the typical form. The inner small spine is present, but often little developed. — The arms are not very slender; R = c. 35 mm., width at the basis c. 10 mm. (The measures cannot be quite exact because of the bad preservation of the specimens).

These specimens are very interesting, showing how close is the relationship between the genera *Cribrella* and *Echinaster*. In fact they might as well be referred to *Echinaster*, there being, as far as I can see, no distinguishing character of any importance. Especially they resemble *Echinaster scrobiculatus* Dan. Kor. so much (the spines of this species being small and arranged in a similar manner as here, even occasionally two together. Danielssen & Koren: Op. cit. p. 40) that it seems rather irrational to refer them to two different genera. Also M. Sars (Norges Ech. p. 86) has found specimens of *Cr. sanguinolenta* with the spines arranged in the manner here described, and says: «hereby it is thus brought nearer to the mediterranean *E. sepositus*»[1]).

8. **Rhegaster tumidus** (Stuxb.).

Danielssen & Koren: Op. cit. p. 60. — Levinsen: Op. cit. p. 399. — Döderlein: Op. cit. p. 219. — Ludwig: Op. cit. p. 459.

Forsblad Fjord, 90—50 fathoms, 2 specimens.

These two specimens differ rather much. In one the adambulacral spines are mostly disposed in single transverse series, their number varying from 3 to 5; here and there a single spinelet is found in the ambulacral groove, reminding of *Cr. sanguinolenta.* — In the other specimen the adambulacral spines are disposed in double transverse series, very crowded, especially at the oral end of the groove. The marginal plates are very distinct in this specimen and the larger tubercles on the abactinal side rather numerous. The one of these specimens thus unites two of the most important characters of the Var. *tuberculata* Dan. Kor.: the distinct marginal plates and the numerous tubercles of the abactinal side, with the disposition of the adambulacral spines found in the typical form, whereas the other specimen has the adambulacral spines disposed as in the Var. *tuberculata*, but no marginal plates and very indistinct tubercles on the abactinal side. The Var. *tuberculata* Dan. Kor. thus evidently cannot be maintained as a distinct variety—as also results from the researches of Döderlein and Levinsen.

9. **Solaster syrtensis** Verr.

E A. Verrill: Descriptions of new species of Starfishes and Ophiurans. Proc. U. S. Nat. Mus. 17. 1894. p. 271. — Döderlein: Op. cit. p. 211.

Hurry Inlet, 50 fathoms (Clay with stones). One specimen, agreeing perfectly with the descriptions given by Verrill and

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[1]) In a recently published paper (Oversigt over det nordlige Norges Echimodermer. Bergens Museum Aarbog 1902 p. 28). J. A. Grieg states the *Echinaster scrobiculatus* to be only a young stage of *Cr. sanguinolenta.*

Döderlein. According to Ludwig (Op. cit. p. 465) it is only a form of *S. endeca*; I cannot feel sure of that and think that Döderlein is right in regarding it as a distinct species. But whether species or variety, as it is easily recognised, it must at all events be treated separately from the typical *S. endeca*.

10. **Solaster papposus** (L.). Pl. II. Fig. 6.

Lütken: Op. cit. p. 40. — Sars: Op. cit. p. 76. — Danielssen & Koren: Op. cit. p. 48. — Fischer: Op. cit. p. 33. — Duncan & Sladen: Op. cit. p. 36. — Döderlein: Op. cit. p. 205. — Bell: Op. cit. p. 89. — Ludwig: Op. cit. p. 460.

Jan Mayen, 55 fathoms, 13 specimens (one 9-armed, one 13-armed, the others with 10 arms). — Kap Tobin, 57 fath., 1 sp. — Turner Sund, 120 fath., 1 sp.

One 10-armed specimen from Angmagsalik, 140 fathoms, differs from the typical form in having 5—6 adambulacral spines, the adoral one mostly smaller than the others, and in the abactinal skeleton forming rather small meshes; the papulæ are disposed singly, seldom 2—3 together in one mesh. The paxillæ are rather small and closeset, the thorns not truncated. This, rather badly preserved, specimen undoubtedly is nearly related to the Var. *septentrionalis* Sladen («Challenger»-Asteroidea p. 445); however, it does not agree so exactly with the description, that it can be definitively referred to that variety.

Three specimens from Hurry Inlet, 50 fathoms, may be referred to the var. *squamata* Döderlein. (Op. cit. p. 208). They agree with this form in the curious, scalelike, abactinal skeleton (Pl. II. Fig. 6) and in the number of adambulacral and external spines. The paxillæ of the abactinal side are rather closeset, uniform, long and slender, with about 3—10 spines, mostly 4—6, disposed in a single circle and all of the same length (about 1,5 mm.). This form looks very different from the typical *S. papposus*, in which small and large paxillæ are found together. All the three specimens have 11 arms. R. = $2^1/_4$ r.

This very curious form might well be separated from *pap-*

posus as a distinct species, though a similar development of the abactinal skeleton may be found in some specimens of the latter. However, it is of little importance, if it be called a distinct species or variety, if it be only kept distinct from the typical *S. papposus*. — Possibly it is also nearly related to *S. echinatus* Storm, in which species the abactinal skeleton is likewise composed of «cruciform» plates. But the description and figure of this species, given by Storm are not sufficient for recognizing the species with certainty.

11. Solaster furcifer Düb. Kor.

Düben & Koren: Øfversigt af Skandinaviens Echinodermer. K. Sv. Vet. Akad. Handl. 1844. p. 243. — Danielssen & Koren. Op. cit. p. 47. — Duncan & Sladen: Op. cit. p. 43. — Fischer: Op. cit. p. 33. — Bell: Op. cit. p. 91. — Ludwig: Op. cit. p. 467.

Kap Brewster, c. 250 fathoms, 2 specimens. — Forsblad Fjord, 90—50 fath., 5 sp. — Hurry Inlet, 50 fath., 1 sp. — Turner Sund, 120 fath., 1 large specimen (R = 80 mm., r = 37 mm.).

In the large specimen all the spines and paxillæ are clothed with a thick skin, in the same manner as in the large specimen mentioned by Duncan & Sladen. The arms are very broad almost to the end (not so in Duncan & Sladen's specimen). There is an unusually broad naked space between the ventral and dorsal marginal paxillæ in the outer half of the arm.

With regard to this species I might here only point out, that the spines in the transverse series outside the adambulacral spines are distinctly thorny, whereas the latter are smooth. This is most distinct in young specimens, where the spines are covered only by a thin, translucent skin; — another character by which this very curious species is distinguished from the other species of *Solaster*.

12. **Pteraster obscurus** (Perrier).

Hexaster obscurus Perrier.

Perrier: Contribution à l'étude des Stellérides de l'Atlantique Nord. Resultats des campagnes scientifiques par Albert Ier, Prince Souverain de Monaco. Fasc. XI. 1896. p. 41. — Döderlein: Op. cit. p. 213. — Ludwig: Op. cit. p. 468.

Hurry Inlet, 50 fathoms, 1 specimen.

13. **Pteraster militaris** (O. F. Müll.). — Pl. II. Fig. 4—5.

Lütken: Op. cit. p. 43. — Sars: Op. cit. p. 48. — Duncan & Sladen. Op. cit. p. 46. — Bell: Op. cit. p. 93. — Ludwig: Op. cit. p. 469.

Turner Sund, 120 fathoms, 1 specimen.

Duncan & Sladen (Op. cit. p. 47) have pointed out that the secondary mouthspines in *Pteraster militaris* have «the tip abruptly pointed, transparent and glass-like», and Sladen makes the same remark («Challenger»-Asteroidea) for several other *Pteraster*- and *Retaster*-species. Perrier (Mém. sur les Étoiles de mer recueillis dans la mer des Antilles et le Golf de Mexique. Nouv. Arch. d. Mus. d'hist. nat. 2 Sér. 6. 1884) finds the same structure in *Pteraster caribæus*. Also in *Goniodon dilatatus* Perr. such transparent, glasslike secondary mouthspines are found (De Loriol: Notes pour servir à l'étude des Echinodermes. IX.), and in the family *Odontasteridæ* Verrill likewise one or two mouthspines have that structure.

These spines, in my opinion, are extremely interesting; I cannot see but that they must be regarded as the Homologa of the sphæridia of Echinids. These curious organs are indeed only spines, which have been transformed into a homogenous, compact calcareous mass, the basal part alone retaining traces of the original structure. Not seldom sphæridiæ may be found, which have been so little transformed that one scarcely knows what to call them: spines or sphæridiæ. An especially striking example of this fact I have found in a specimen of *Echinus esculentus* from the North Sea (a curious variety, resembling to an extraordinary degree *Ech. elegans*, with which species it has, however, nothing to do). In this specimen the spines of the buccal plates were partly transformed into sphæridiæ, all transitional stages being found between common spines and true sphæridiæ. (Textfig. 1—3). — Now these secondary mouthspines in *Pteraster militaris* are constructed just in the same way as the sphæridiæ: the lower part has retained the common calcareous structure, whereas the upper part has been transformed

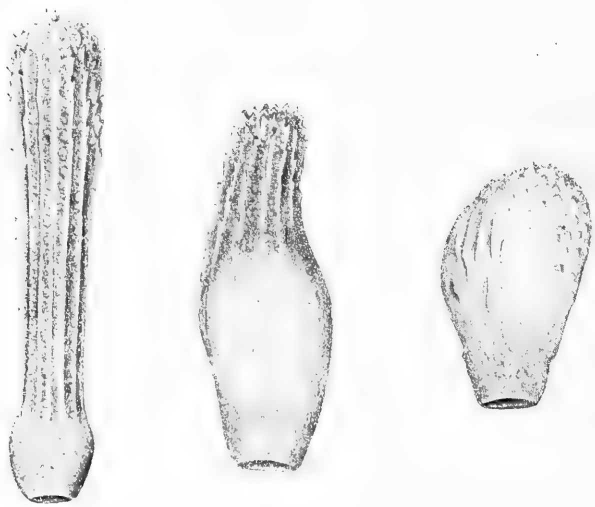

Fig. 1—3. Transformation of spines into sphæridiæ, in *Echinus esculentus*. 1. Spine of the typical form. 2. Transitional form. 3. Sphæridia. (Seibert: Obj. II. Oc. I.).

into a clear, compact, glass-like mass (Pl. II. Fig. 4). That the surface is not smooth, but covered with small, scalelike thorns (Fig. 5) is no proof against their being true sphæridiæ; also in the Echinids they are often more or less thorny. Neither is the fact that they are covered with a thick skin an objection against my view, the sphæridiæ of Echinids being likewise covered with skin (though a thin and transparent one). In short, I cannot find a single essential difference between these structures and the sphæridiæ of Echinids, except in their position. In Echinids the sphæridiæ are always placed in the ambulacral areas, though otherwise a great variation prevails as to their position and number; in the Asterids they are placed interradially. This fact, to be sure, seems to be a serious objection, but, in my opinion, it does not disprove the homology of the mentioned organs. The radial or interradial position is an extremely important character in Echinoderm morphology, and as a whole it must be maintained that the relation to the radia or interradia is a criterion of homology. In this case, however, it cannot be applied. It must be remembered that the sphæridiæ are only transformed spines; but spines are not exclusively radial or interradial, and nobody, I think, would maintain that the ambulacral (radial) spines of Echinids are not homologous to the interradial spines of Asterids. Further it must be remembered that the homology of the ambulacral plates in Echinids is very uncertain; at any rate they are scarcely homologous to the ambulacral plates of Asterids, more likely they are homologous with the adambulacral ones of the Asterids. In that case the sphæridiæ in both Asterids and Echinids would be placed on plates of the same morphological value. But, be that as it will, at any rate it seems to me undoubtful that the mentioned structures in the Asterids are true sphæridiæ. — A careful examination of their histological structure especially of the thick covering of skin is very desirable.

In itself it is not so very surprising to find sphæridiæ in Asterids. Pedicellariæ are likewise found only in Asterids and Echinids (with the single exception of *Trichaster*, in which Ludwig has found a curious kind of pedicellariæ). But it is of no small importance that the Homologa of these curious organs, hitherto thought characteristic of Echinids alone, have thus been found also in Asterids. In accordance with the well known fact that pedicellariæ are found only in certain families of Asterids the sphæridiæ are likewise not found in all Asterids, but are known to occur only in the families *Pterasteridæ* and *Odontasteridæ* and in *Goniodon dilatatus.* Doubtless they will be found yet in some other Asterids, though in most of the families they are certainly not found. It may be remembered that neither in the Cidarids sphæridiæ are found. In *Chætaster longipes* the spinules on the adambulacral plates and the abactinal skeleton are of a homogenous, glassy structure in their outer part, especially those of the adambulacral plates looking very much like sphæridiæ[1]. Whether they are also to be regarded as true sphæridiæ I dare not say, but I should think so, though it seems a very curious thought that the whole animal should be covered with sphæridiæ. — Also these spines ought to be examined as to their histological structure.

In the *Pterasteridæ* sphæridiæ are commonly occurring, but not in all species. Thus in *Pteraster obscurus* the secondary mouthspines are almost not transformed at all. Neither in *Hymenaster pellucidus* such a structure is found, if indeed in any *Hymenaster* at all.

14. **Hymenaster pellucidus.** Wyv. Thomson.

Danielssen & Koren: Op. cit. p. 72. — Sladen: Report on the Asteroidea of H. M. S. «Challenger». Vol. XXX. 1889. p. 508. — Ludwig: Op. cit. p. 472.

Forsblad Fjord, 90—50 fathoms, 2 specimens. — SE. off Sabine Island, 110 fath., 1 sp.

The latter specimen differs very strikingly from the two others and from the common form of *H. pellucidus* in having three adambulacral spines, whereas this species otherwise has only two adambulacral spines. The number of these spines is of great systematic importance in this genus; Sladen (op. cit. p. 494) even groups the species after their having one, two, three or more adambulacral spines. It is then very remarkable

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[1]) Ludwig: Die Seesterne des Mittelmeeres. Flora u. Fauna des Golfes von Neapel. XXIV. Monogr. 1897. (p. 144. T. IX. Fig. 15—23).

to find a specimen varying in this respect, and one might suppose this specimen to belong to another species. I cannot, however, find one single other character of any importance, by which it may be distinguished from the specimens with two adambulacral spines. — In the figure given by Sladen (Op. cit. Pl. LXXX. 5) there is only one pair of secondary mouthspines, and Danielssen & Koren have seen and figured none at all; now there are two pairs of secondary mouthspines in this specimen. This would be an excellent character, if the statements of Sladen and Danielssen & Koren were to be relied upon. I find, however, that also specimens with two adambulacral spines have regularly two pairs of secondary mouthspines. To found a new species on account of the three adambulacral spines alone would be rather absurd, to my opinion; I prefer, at any rate till more material has been procured, to regard it as a variety of *H. pellucidus*.

15. **Pentagonaster granularis** (Retzius).

Sars: Op. cit. p. 46. — Lütken: Kritiske Bemærkninger om forskellige Søstjærner (Asterider) med Beskrivelse af nogle nye Arter. Vidensk. Medd. Naturh. Foren. Københ. 1864. p. 146. — Bell: Op. cit. p. 73. — Ludwig: Op. cit. p. 456.

Angmagsalik, 140 fathoms, 1 specimen (R = 15 mm., r = 9,5 mm.

The arms are very distinctly marked off; the margin of the disc between the arms quite straight. The marginal plates with an uncommonly small naked, oval spot near the upper (or lower) margin. Most of the upper marginal plates have not, as is commonly the case in *P. granularis*, a series of small grains along the upper margin, but the abactinal plates are directly in contact with the marginal plates. There are 12 dorsal and 14 ventral marginal plates, the last of the ventral ones being very small. The two distal pairs of dorsal marginal plates are in contact in the median line on the abactinal side of the arm; but, whereas there is in the typical *P. granularis* a series of grains between the plates both in the median line and along the sides, such grains are here not found on the sides between the three last pairs of plates, and in the median line the grains cease at the last pair of plates but one, only a small separate group of grains being found between the last and the last but one pair.

This specimen reminds somewhat of *P. simplex* Verrill (Distribution of the Echinoderms of Northeastern America. Amer. Journ. Sc. 49. 1895. p. 135), but does not agree exactly with the — not very detailed — description. In spite of the differences here pointed out it must evidently be referred to *P. granularis*.

This species had not previously been recorded from these regions; but as it is known from N. America as well as from the European coast, it is not surprising that it has now been found also at East Greenland.

16. **Pontaster tenuispinus** (Düb. Kor.).

Düben & Koren: Op. cit. p. 251. — Sars: Op. cit. p. 38. — Lütken: Fortsatte kritiske og beskrivende Bidrag til Kundskab om Søstjærnerne (Asteriderne). Vidensk. Medd. Naturh. Foren. København. 1871. p. 240. — Danielssen & Koren: Op. cit. p. 85. — Levinsen: Op. cit. p. 401. — Sladen: Op. cit. p. 28. — Bell: Op. cit. p. 60. — Ludwig: Op. cit. p. 447.

Forsblad Fjord, 90—50 fathoms, 10 specimens. — Off Henry Land, 200—160 fath., 3 sp. — Hurry Inlet, 50 fath., 1 sp. — Off Canning Island, 202 fath., 1 sp. — S. E. off Sabine Island, 110 fath., 1 sp.

Ophiuroidea.

17. **Ophioglypha Sarsii** (Ltk.).

Lütken: Additamenta ad historiam Ophiuridarum. I. Vidensk. Selsk. Skr. 5. Række; math. naturv. Afd. 5. Bd. p. 42. — Duncan & Sladen: Op. cit. p. 60. — Bell: Op. cit. p. 109. — Grieg: Die Ophiuriden der Arktis. Fauna arctica, herausg. von Römer u. Schaudinn. I. 2. 1900. p. 261.

Jan Mayen, 55 fathoms, numerous large specimens. Hurry Inlet, 10 fath., 2 specimens.

Lütken has pointed out that there may sometimes be found a third, small tentacle scale besides the two normal ones. In these specimens two and three tentacle scales are found equally often, and not only on the inner armjoints, but farther out, until about the 16th joint. Sometimes there are even 4 tentacle scales on some of the inner joints. On the other hand, I have seen none with only one tentacle scale, as in some specimens from Greenland, mentioned by Lütken. In some specimens the armcomb is very little developed or even totally wanting; these specimens, however, are in no other respect different from the typical form.

It is a noticeable fact that all the numerous specimens are of about the same size (15—20 mm. diameter of the disc); as numerous specimens of the small *O. robusta* are taken in the same haul, the small specimens of *O. Sarsii* cannot have been overlooked; really none have been living here together with the large specimens. Otherwise it is a common thing to find all different sizes represented in places, where some species occurs in great numbers; by measuring the specimens of different sizes from such a locality it may be possible to show the age of the specimens—as I have done elsewhere for *O. texturata*. (Smaa Biologiske Meddelelser. Vidensk. Medd. Naturh. Foren. København. 1897. p. 321). How this may be in *O. Sarsii*, I dare not say; the occurrence of only one size on the locality named might mean that they are only one year old.

18. **Ophioglypha robusta** (Ayres).

Ophiura squamosa Lütken.

Lütken: Additamenta. p. 46. — Duncan & Sladen: Op. cit. p. 62. — Bell: Op. cit. p. 109. — Grieg: Op. cit. p. 262.

Jan Mayen, 15 fathoms, 1 specimen. — Jan Mayen, 50—60 fath., numerous sp. — Henry Land, 20 fath., 2 sp. — Sabine Island, anchoring place; 4 sp. — Kap Tobin, 57 fath., 2 sp. — Rathbom Island, 94 fath., 2 sp. — Hurry Inlet, 10 fath., 1 sp.

In some specimens the armcomb is totally wanting, and the resemblance of such specimens to *O. maculata* Ludwig is very great; also the number of tentacle scales at the first pair of pores is variable, and sometimes there may be two tentacle scales farther out on the arm; this character is then not to be relied upon either. I have, however, never in *O. robusta* found the papillæ on the adoral side of the innermost tentacle pores uniting with the mouthpapillæ, as Ludwig figures it in *O. maculata*; the latter species therefore must be maintained, though evidently very nearly related to *O. robusta*.

19. **Ophiocten sericeum** (Forbes).

Lütken: Additamenta. p. 52. — Duncan & Sladen: Op. cit. p. 62. — Bell: Op. cit. p. 113. — Grieg: Op. cit. p. 264.

Forsblad Fjord, 14—3 fathoms and 90—50 fath., numerous specimens. — Hurry Inlet, 7—0 fath. and 70 fath., several sp. — Sabine Island, anchoring place, several sp. — Kap Dalton, 9—11 fath., several sp. — Ryders Sund, 3 fath., several sp. — Henry Land, 20 fath., several sp. — Jan Mayen, 50—60 fath., several sp.

20. **Ophiopleura borealis**. Dan. Kor.

Danielssen & Koren: Fra den norske Nordhavs-Expedition. Nyt Mag. for Naturv. 25. 1879. p. 33. — Duncan & Sladen: Op. cit. p. 55. — Levinsen: Op. cit. p. 403. — Grieg: Ophiuroidea; Norske Nordhavs-Exped. p. 3. — Grieg: Die Ophiuriden der Arktis. p. 261.

Hurry Inlet, 50 fath., numerous specimens. — Kap Hope, 121 fath., 3 sp. — Off Canning Island, 202 fath., 1 sp. — Kap Tobin, 57 fath., 1 sp. — Forsblad Fjord, 90—50 fath., 8 large, 7 small sp. — Fleming Inlet, 118 fath., 8 sp. — SE. off Sabine Island, 110 fath., 2 sp.

According to Danielssen & Koren the disc is covered by a thick skin, which conceals the scaling; they think this so remarkable, that they establish a new family, *Ophiopleuridæ*, whose main character is that «the disc is clothed with a firm thick skin, through which the scaling is faintly seen». Levinsen (Op. cit. p. 405) has rightly pointed out that the naked skin covering the scaling of the disc is a character of very little importance, as it is found very well developed also in several species of *Ophioglypha*. (That a naked skin covers the plates of all Echinoderms, I need scarcely name). I quite agree with Levinsen herein, but I must further add the rather curious that in *Ophiopleura* there is no thick skin at all, covering tbe scaling. On the contrary the skin is very thin and delicate, and quite translucent, as is easily seen by preparing it off the disc; it is by no means thicker than in our common *Ophioglypha*-species or in *Ophiocten sericeum*, and is quite unable to conceal the scaling; it is from the character of the scaling itself that it looks, as if the disc were covered with that famous thick skin.

21. **Ophiopholis aculeata** (O. F. Müll.).

Lütken: Additamenta. p. 60. — Bell: Op. cit. p. 125. — Grieg: Oph. d. Arktis. p. 264.

Angmagsalik, 130 fathoms, 16 specimens. — Jan Mayen, 15 fath., 1 sp.

22. **Ophiopus arcticus** Ljungm.
Ophiaregma abyssarum G. O. Sars.

Ljungman: Ophiuroidea viventia huc usque cognita. Øfvers. K. Vetensk. Ak. Förh. 1866. p. 309. — G. O. Sars: Bidrag til Kundskaben om Dyrelivet paa vore Havbanker. Forh. i Vidensk. Selsk. Christiania. 1872. p. 112. — Th. Mortensen: Über Ophiopus arcticus Ljungm., eine Ophiure mit rudimentären Bursæ. Zeitschr. f. wiss. Zool. 56. 1893. p. 506. — Grieg: Ophiuroidea; Norske Nordh. Exped. p. 17. — Grieg: Oph. d. Arktis. p. 266.

Henry Land, 20 fathoms, 10 specimens. — Rathbom Island, 94 fath., 5 sp. — SE. off Sabine Island, 110 fath., 3 sp. — Kap Brewster, 250 fath., 1 sp. — Kap Tobin, 57 fath., 1 sp. — Forsblad Fjord, 90—50 fath., 2 sp. — Turner Sund. 120 fath., 2 sp. — Hurry Inlet, 50 fath., 2 specimens.

23. **Amphiura Sundevalli** (Mr. Tr.).
Amphiura Holbølli Ltk.

Lütken: Additamenta. p. 55. — Duncan & Sladen: Op. cit. p. 67. — Grieg: Oph. d. Arktis. p. 265.

Off Henry Land, 20 fathoms, 1 specimen.

24. **Ophiacantha bidentata** (Retz.).
Ophiacantha spinulosa M. Tr.

Lütken: Additamenta. p. 65. — Duncan & Sladen: Op. cit. p. 68. — Bell: Op. cit. p. 127. — Grieg: Oph. d. Arktis. p. 267.

Numerous specimens from the following localities.

Kap Brewster, 250 fathoms; Kap Tobin, 57 fath.; Kap Hope, 120 fath.; Kap Dalton, 9—11 fath.; Forsblad Fjord, 90—50 fath.; Hurry Inlet, 50 fath.; Off Henry Land, 20 fath.; Turner Sund, 120 F.; Ryders Sund, 3 fath.; Off Canning Island, 202 fath.; Angmagsalik, 140 fath.; Jan Mayen, 50—60 fath.

Several specimens have two tentacle scales at the inner pair of pores, though mostly not on all the arms; sometimes two tentacle scales may be found farther out on a single arm. One specimen from Forsblad Fjord is remarkable by having 3—4 extra mouthpapillæ, outside the normal series; such groups of papillæ outside the true mouthpapillæ distinguish *O. enopla* Verrill (and a few other species, *O. cosmica* Lym., *rosea* Lym., *scutata* Lym.). As, however, this specimen does not differ in any other respect from the typical *O. bidentata*, it must be regarded as an abnormal form of this otherwise very variable species.

25. **Ophiacantha anomala** G. O. Sars.

G. O. Sars: Nye Echinodermer fra den norske Kyst. Forh. i Vidensk. Selsk. Christiania. 1871. p. 12.

Angmagsalik, 140 fathoms, 5 specimens. (In one of the specimens the young ones are protruding from the bursal slits).

This species was hitherto known only from Norway and the Eastcoast of North-America (Verrill).

26. **Ophioscolex glacialis** M. Tr. — Pl. II. Fig. 10.

Sars: Norges Echinodermer. p. 7. — Bell: Op. cit. p. 134. — Grieg: Oph. d. Arktis. p. 268.

Off Canning Island, 202 fathoms, 4 specimens, the three large, 30 mm. diameter of disk, 130 mm. length of arms. —

N. off Stewart Island, 158 fath., 1 large specimen. — SE. off Sabine Island, 110 fath., 1 small specimen.

Ludwig (Ophiuren der Sammlung Plate. Zool. Jahrb. Suppl. IV. 1898. p. 770) describes from the disc skin of *Ophiomyxa* some small plates, almost quite homogenous, without the holes commonly found in the plates (scales) of Echinoderms. «Glasplättchen» he names these structures. He rightly points out that they are only a special development of the scales, usually found in Ophiurids. — In *Ophioscolex glacialis* and *purpureus* I find just the same sort of curious plates in the skin (Pl. II. Fig. 10). In small specimens they are little developed, not differing much from the usual scales, but in large specimens only a small spot in the middle of each plate retains traces of the original structure, the rest being converted into a homogenous calcareous substance, in which mostly some concentric rings are seen. In the larger specimens these plates are very scarce, in the smaller they lie closely together and overlap as common scales. There may be some specific difference between *O. glacialis* and *purpureus* in this respect, but I have not sufficient material for ascertaining that fact.

27. **Ophioscolex purpureus** Düb. Kor.

Düben & Koren: Øfvers. af Skand. Ech. p. 235. — Sars: Norges Echinodermer. p. 8. — Bell: Op. cit. p. 134.

Angmagsalik, 140 fathoms, 1 specimen.

Possibly this specimen has to be referred to *O. quadrispinus* Verrill (Results of the Explorations made by the steamer Albatross off the northern Coast of the U. S. in 1883. Washington. 1885. p. 48) instead of to *O. purpureus*. It differs from the latter species in the dorsal plates not being divided through a delicate transverse line into two almost equal parts; otherwise it completely agrees with the descriptions of this species. As Verrill does not say anything about the form of the dorsal (or ventral) plates in *O. quadrispinus*, it cannot be decided, whether it be that species — or whether, indeed, *O. quadrispinus* be not identical with *O. purpureus.*

O. purpureus is known only from the coasts of North Europe and from the Westindies; from the East coast of North-America *O. quadrispinus* is recorded instead of this species. The geographical distribution thus seems to indicate that the two species are synonymous; that *O. purpureus* should occur at the Westindies but not at the Eastcoast of N.-America, is very improbable. But a close examination of authentic specimens of *O. quadrispinus* is needed, before this question can be settled.

28. **Gorgonocephalus eucnemis** (M. Tr.).

Lütken: Additamenta. p. 70. — Sars: Norges Echinodermer. p. 4. — Döderlein: Op. cit. p. 226. — Bell: Op. cit. p. 138. — Grieg: Oph. d. Arktis. p. 268.

Turner Sund, 120 fathoms, 8 specimens, large and small. — Kap Brewster, 250 fath., 1 sp. — Kap Tobin, 57 fath., 2 sp. — Kap Hope, 121 fath., 1 sp.

29. **Gorgonocephalus Agassizii** (Stimpson).

Duncan & Sladen: Op. cit. p. 69. — Fischer: Echinodermen von Jan Mayen. p. 37. — Döderlein: Op. cit. p. 227. — Grieg: Oph. d. Arktis. p. 271.

Jan Mayen, 50 fath., 1 specimen (12 mm. diameter of disc).

Echinoidea.

30. **Strongylocentrotus drøbachiensis** (O. F. Müll.).

Lütken: Oversigt over Grønlands Echinodermata. p. 24. — Duncan & Sladen: Op. cit. p. 19. — Agassiz: Revision of Echini. p. 277. — Bell: Op. cit. p. 156.

Kap Tobin, 57 fathoms, 41 specimens. — Kap Hope, 120 fath., 3 sp. — Kap Dalton, 9—10 fath., 1 sp. — Forsblad Fjord, 90—50 fath., 3 sp. — Rathbom Island, 94 fath., 6 sp. — Henry Land, 20 fath., 32 sp. — Jan Mayen, 15 fath., 3 sp. Jan Mayen, 50—60 fath., 1 specimen.

Holothurioidea.

31. **Myriotrochus Rinkii** Stp.

Lütken: Overs. over Grønlands Echinodermer. p. 22. — Danielssen & Koren: Holothurioidea. Norske Nordhavs-Expedition. p. 28. — Duncan & Sladen: Op, cit. p. 15. — Ludwig: Arktische und subarktische Holothurien. Fauna Arctica. I. 1. 1900. p. 166.

Kap Dalton, 9—11 fathoms, 5 specimens. — Forsblad Fjord, 14—3 fath., 3 sp. — Turner Sund, 3 fath., 2 sp.

32. **Eupyrgus scaber** Ltk.

Lütken: Overs. over Grønlands Echinodermer. p. 23. — Ludwig: Arktische u. subarktische Holoth. p. 160.

Hurry Inlet, 10 fathoms, 1 specimen.

33. **Trochostoma boreale** (Sars).
Molpadia borealis Sars.

Sars: Norges Echinodermer. p. 116. — Danielsen & Koren: Holothuroidea; Norske Nordh. Exp. p. 64. — Levinsen: Op. cit. p. 388. — Ludwig: Op. cit. p. 161.

Flemming Inlet, 118 fathoms, 3 specimens. — Off Angmagsalik, 140 fath., 1 sp.

Explanation of the plates.

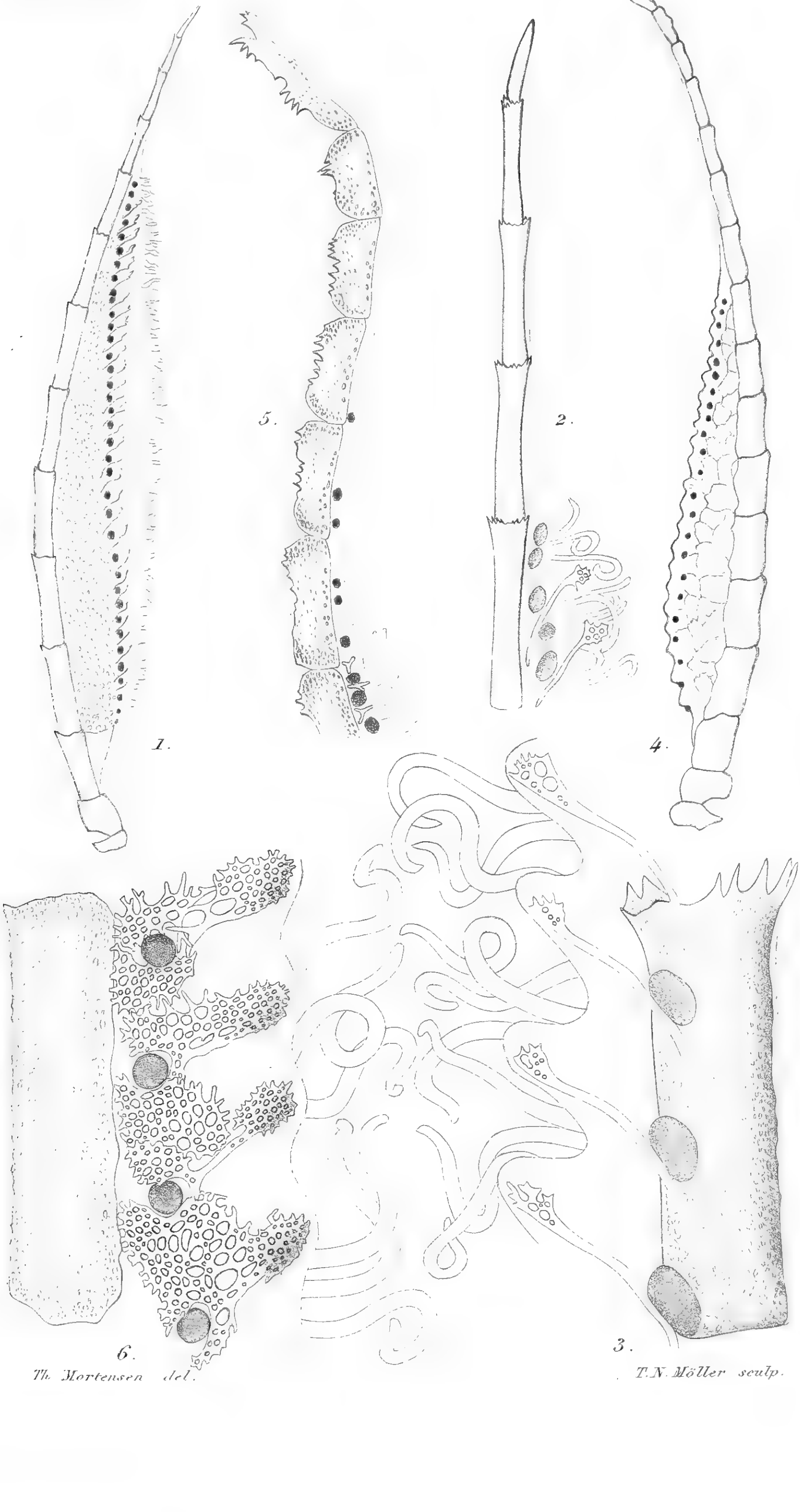
Plate I.

Fig. 1. Genital pinnule of *Antedon prolixa* (♂). $^{8}/_{1}$.
- 2. Distal end of a pinnule of *Antedon prolixa*. $^{31}/_{1}$.
- 3. Joint of a pinnule, with the covering-plates, sacculi and tentacles of *Antedon prolixa*. $^{62}/_{1}$.
- 4. Genital pinnule of *Antedon Eschrichti*; dried. $^{8}/_{1}$.
- 5. Distal end of a pinnule of *Antedon Eschrichti*. $^{31}/_{1}$.
- 6. Joint of a pinnule of *Antedon Eschrichti*, showing the covering-plates, sacculi and tentacles. $^{62}/_{1}$.

Plate II.

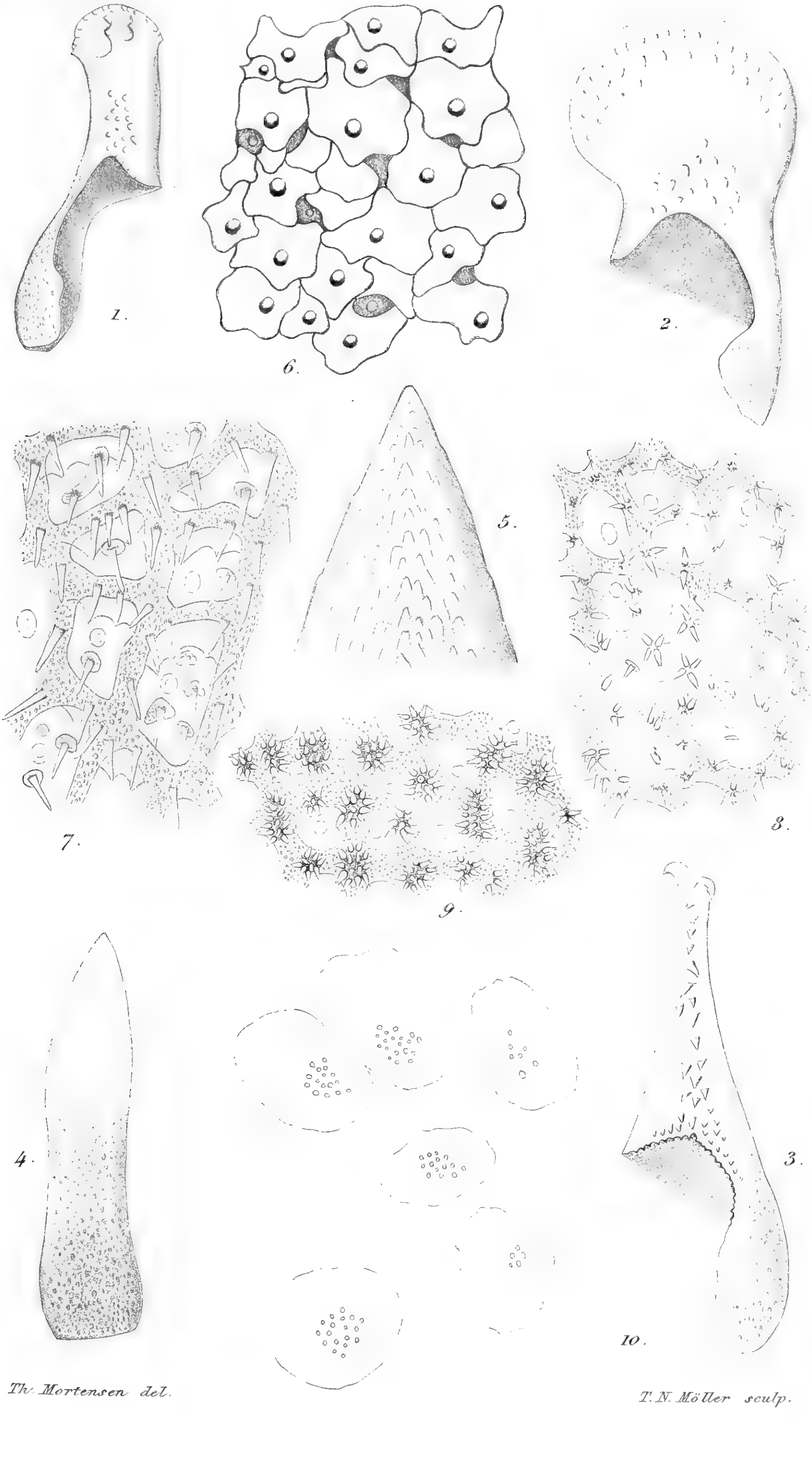
Fig. 1. Valve of forcipiform pedicellaria of *Asterias panopla*; seen from the inner surface. $^{70}/_{1}$.
- 2. The same of *Asterias Mülleri*. $^{175}/_{1}$.
- 3. The same of *Asterias Linckii*. $^{50}/_{1}$.
- 4. Sphæridia (secondary mouthspine) of *Pteraster militaris*. $^{30}/_{1}$.
- 5. The outer end of the same. $^{70}/_{1}$.
- 6. Portion of the abactinal skeleton of *Solaster papposus*, var. *squamata* Döderl. $^{8}/_{1}$.
- 7. Portion of the abactinal skeleton of *Cribrella sanguinolenta*, Var. $^{14}/_{1}$.
- 8. Portion of the abactinal skeleton of a specimen of *Cribrella sanguinolenta* from the Cattegat, intermediate between the Var. and the typical form. $^{14}/_{1}$.
- 9. Portion of the abactinal skeleton of *Cribrella sanguinolenta*, typical form. $^{14}/_{1}$.
- 10. Portion of the disc-skin of *Ophioscolex glacialis*, showing the transformed scales. $^{31}/_{1}$.

All the figures are drawn with Abbé's Camera; the microscope used, for which I am indebted to the Carlsberg Fond, is a Zeiss's-instrument.



Th. Mortensen del.

T. N. Möller sculp.



Th. Mortensen del.

T. N. Möller sculp.

III.

The Tertiary Fauna at Kap Dalton in East-Greenland.

By

J. P. J. Ravn.

Tertiary deposits have, as is well known, a rather wide extension in the northern Arctic countries, and have often been examined, but yet the stage has not been reached where we can, with sufficient certainty, determine their exact age in relation to the Tertiary formations of other places. The reason of this uncertainty consists chiefly in the fact, that in the Arctic Tertiary deposits generally fossil plants only have been found which as a rule are less satisfactory than fossil animals for the determination of age. Although in the course of time a very considerable number of well preserved fossil plants have been collected, we see nevertheless, that the views regarding their age vary very much. O. Heer, who specially occupied himself with fossil plants from the Arctic regions, arrived at the conclusion that the greater part was Miocene, while younger naturalists suppose them to be considerably older. This question can scarcely be solved with certainty, until the plant-bearing deposits are found in connection with formations containing marine fossils, sufficiently well preserved for correct determination. All Tertiary marine-fossils, found in the above named regions, will therefore be received with great interest, and must be examined as carefully as possible.

With special regard to the Tertiary deposits of Greenland, it may be remarked that the formations abounding with fossil plants from this period in the northern part of West-Greenland, have been known for a long time; however no determinable marine fossils have been found in connection with them, and their age is therefore, as above mentioned, somewhat problematical.

Tertiary deposits are known also in East-Greenland. In the years 1869—1870 the Second German Northpole Expedition brought home from Hochstetters Vorland and the Sabine Island some Tertiary fossils. In the former locality was found in a yellowish or partly brick-coloured, quartzose sandstone, about 63 m. thick, a great many marine fossils, which were however very badly preserved (as casts and moulds) so that only the genera could be determined. O. LENZ [1]), who is of the opinion that these deposits belong to the Miocene, mentions from this locality the following genera:

Lucina,
Cytherea and
Venus.

By a renewed search into the material TH. FUCHS [2]) has added a couple of other forms viz.

Astarte sp. and
Pecten sp.

In the same work TH. FUCHS gives the result of his examinations of the Tertiary fossils animals which NATHORST, during his expedition to Spitzbergen in the year 1882, had collected East of Kolbay. The fossils were here found in a sandstone lying between deposits containing impressions of leaves. They were however in a similarly bad state of preservation as the above mentioned fossils from Hochstetters Vorland, and only the genera could therefore be determined, and even

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1) OSKAR LENZ: Specielle Darstellung der geologischen Verhältnisse Ostgrönlands. — Die zweite deutsche Nordpolarfahrt in den Jahren 1869 und 1870. 2. Bd. III. Geologie. Leipzig 1874. p. 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. Handlingar. Bd. 8. Nr. 15. Stockholm 1883.

that with some uncertainty. Fuchs[1]) gives from here the following list of fossils:

Siliquaria sp.
Pharella sp.
Psammosolen (Macha) sp.
* ? *Psammobia sp.*
? *Thracia sp.*
* *Cytherea (Callista) sp.*
? *Venus (Circomphalus) sp.*
? *Terebratula sp.*

Moreover these fossils come from two different horizons, the two here marked with asterisks are supposed to belong to a somewhat higher horizon than the others; but though these two species are different from those that were found in the lower horizon, they do not appear to Fuchs to belong to any essentially different Fauna. The whole fauna was critically examined by him, and he came to the conclusion that it probably must be called Miocene.

M. Semper[2]) was, on account of a misapprehension, doubtful as to the presence of marine Tertiary in East-Greenland and at Spitzbergen, but Nathorst[3]) maintained the occurrence of very large Tertiary deposits with marine-shells at Spitzbergen; and after having mentioned Fuchs's examinations of the fossils from Hochstetters Vorland, he expresses himself in the following terms about the Marine Tertiary of East-Greenland: »Auch das Vorkommen mariner Tertiär-Conchylien in Ost-Grönland scheint demnach ganz sicher; und man wird wohl mit der

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[1]) Th. Fuchs: l. c. p. 7—8.

[2]) M. Semper: Das palaeothermale Problem, speciell die klimatischen Verhältnisse des Eocaen in Europa und im Polargebiet. — Zeitschr. d. deutsch. geol. Gesellschaft. Bd. 48. Berlin 1896. S. 266.

[3]) A. G. Nathorst: Marine Conchylien im Tertiär Spitzbergens und Ostgrönlands. — Zeitschr. d. deutsch. geol. Ges. Bd. 48. Berlin 1896. S. 983—86.

Annahme nicht irren, dass die marinen Tertiärlager Spitzbergens und Ost-Grönlands in demselben Meere abgelagert wurden.»

During the Swedish expedition to North-east Greenland, in the year 1899, conducted by A. G. NATHORST, some localities with Tertiary deposits were also visited. In the map which accompanies Nathorst's important work on the geology of North-east Greenland[1]), Tertiary is stated to be found in the following places: Hochstetters Vorland, Pendulum Island, Sabine Island, Flache Bay, and Jackson Island. As a new locality is here added Pendulum Island. NATHORST found here a shaly sandstone, and sand and clay covered over by basalt-sheets. No fossils were found; NATHORST nevertheless supposes these deposits to be Tertiary. On the other hand he is doubtful as to the existence of Tertiary at Flache Bay; he found nothing here to indicate it, but is more inclined to believe in the occurrence of the Jurassic at this place.

Besides the above named observations on Tertiary deposits in the Arctic regions, we find in literature also other occurrences stated, but these statements have partly proved to be wrong, and partly they are founded upon exclusively plant-bearing deposits, and are therefore of less interest to the subject which is treated here.

We have already stated the most important part of what little was hitherto known about marine Tertiary deposits in those parts of the northern Arctic-sea. The news was therefore received with great interest that the Danish expedition to the East coast of Greenland in the year 1900, brought home a collection of partly well preserved marine Tertiary-fossils from Kap Dalton. After the return of the expedition, I was charged with the examination of this material. As however, there is in Copenhagen a want of the material required for

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[1]) A. G. NATHORST: Bidrag till nordöstra Grönlands geologi. — Geolog. Fören. i Stockholm Förhandl. Bd. 23. Stockholm 1901. S. 275—306.

purposes of comparison, the Carlsberg-fund granted the necessary means for a journey to Göttingen that I might, during my work avail myself of the very valuable collection in that town. The permission to do so was readily granted to me by Geheimerath, Professor V. Koenen, to whom I render my heartiest thanks.

Mag. scient. N. E. K. Hartz, who was the leader of that part of the expedition in 1900, during which these fossils were found, has already given a short description of the locality where the fossils were found[1]). Further he has communicated to me some supplementary information, of which I give here the essential part.

The fossils were discovered at Kap Dalton, (69° 24,'6 Lat. N.) on the 18th of July 1900, by Dr. O. Nordenskjöld; the greater part of the material that was brought home, was collected on the following days by Mag. N. E. K. Hartz. The fossils were found in the little point, bounding the Bay of Kap Dalton to the North, which is connected by a low ridge (about 300 meters high) with the basalt-cliff to the West of it which is about 1300 meters high. At a height of about 300 meters, on a flat mountain ridge, running almost from E. to W., at right angles to the coast, the following deposits were found, in passing from West to East:

1) A coarse whitish-yellowish sandstone devoid of fossils.

2) A brown, soft, easily crumbled argillaceous shale with numerous concretions. The greater part of these concretions contained brachyura, bits of coal, leaves, macrura etc., and likewise some partly black, partly white silicified wood, perforated by teredos; a shark's tooth was also found here. In the argillaceous shale itself, little shells and fragmentary leaves were discovered, and also a specimen of an *Aporrhais* was found.

On account of the frequent occurrence in the concretions

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[1]) «Meddelelser om Grønland». Bd. 27. Kjøbenhavn 1902. S. 158.

of a species belonging to the genus *Coeloma*, I shall in the following term this bed the *Coeloma*-bed.

3) A greenish sandstone with wood and fossil animals.

4) A sandstone which in some places was quite filled up with pelecypods and gastropods.

On account of the frequent occurrence in this bed of a species of *Cyrena*, I shall in the following pages term this bed the *Cyrena*-bed.

Of the stratigraphical relations between the Tertiary sediments and the basalt nothing is known beyond what has been related above, but as farther to the NW. considerable beds of sandstone were seen in the basalt-cliff, it may be reasonably supposed, that the fossiliferous deposits of Kap Dalton form subordinate beds in the basalt. This agrees with the fact that in the above mentioned, more northerly situated Tertiary-localities, with the exception of Hochstetters Vorland, the Tertiary deposits are in contact with the basalt.

Professor N. V. Ussing who has been kind enough to examine the Tertiary rocks occurring at Kap Dalton, has, as the results of his examinations, sent me the following communications:

«By an examination through the microscope of the Tertiary «rocks brought home by the Amdrup expedition in 1900, I have «tried to determine the question of the origin of the material. «As the age of these fragmental rocks in relation to the basalt «formation has not been finally decided at the place in question, «it might be supposed that the material of these sediments

«a) originates exclusively from the destruction of Archæan «rocks, or

«b) originates exclusively from the destruction of the vol«canic rocks (basalts etc.) of the district, or finally

«c) that they contain detritus both from the Archæan «formations and the basalt formation.»

«The result of the petrographic examination is, that the «sediments which have been examined are found to contain — «though in very varying proportions — detritus both of ordi- «nary granite or gneiss, and of fresh basic igneous rocks. «The examination thus proves that the eruption of the basalts «had commenced before the deposition of the fossiliferous «formations.»

«The samples examined are:

«1) **The Coeloma-bed**. Marly concretion from the greyish- «brown shale (p. 99, Nr. 2).

«The colour of this concretion is grey; with the naked «eye we see besides the organic remains numerous little flakes «of muscovite.

«The microscope shows that the principal part is formed «of a dusty brown clayish material; in this material there are «enclosed, besides flakes of muscovite, a number of colourless «grains of sand having a diameter of 0,2 mm. A number of «these are grains of *quartz* (they were found to be optically «uniaxial with weak positive double refraction); others, optically «biaxial, are polysynthetic anhedra of a plagioclase with large «extinction angles. The grains of plagioclase are perfectly «transparent, and contain no alteration-products.

«2) **The Cyrena-bed.** From this bed two different samples «of sandstone were examined. Both are presumably closely «associated with each other; the sample to be mentioned first «consists chiefly of grains of quartz, while the other consists «of grains of relatively high specific gravity.

«*a*. Dark brownish-grey calcareous sandstone with nume- «rous and distinctly visible flakes of muscovite. Fossils are «very plentiful in this sandstone.

«By aid of the microscope I discerned that the grains of «sand belong to the following minerals:

«*Quartz* forms by far the greatest number of the grains;

«these grains reach a diameter of up to 0,75 mm., and have «quite sharp edges.

«*Felspar* is found rather abundantly. Some of these grains «are not quite free from alteration-products, and either have «the appearance of orthoclase or they consist of microcline. «Others, which are quite fresh, belong to a plagioclase with «sharply defined twin-lamellæ and large extinction-angles.

«*Augite*, light-greyish, of the same appearance as this «mineral often has in basalts.

«*Muscovite* in flakes of up to 1 mm.'s length.

«Besides these minerals a small number of grains were «found, consisting of rock-fragments of a micro-crystalline, «somewhat decomposed basalt.

«The *cement* consists partly of micro-crystalline calcite, «partly of brownish-green alteration-products which did not «allow of a more exact determination.

«This sandstone thus chiefly consists of detritus from the «Archæan rocks, but basaltic material forms also an essential «part of it.

«*b*. An almost black, coarsely grained calcareous sand-«stone with large fragments of brownish-grey shale or volcanic «tuff.

«Seen through the microscope this sandstone has a very «characteristic appearance, as it consists wholly of volcanic «material, especially of grains of augite. The size of the grains «is 0,6—0,9 mm.; the grains are rounded and consist partly of «mineral-fragments, partly of rock-fragments.

«*Augite* occurs in two varieties: one which is colourless or «greyish-violet, and looks like an ordinary basalt-augite, and one «which is green, and somewhat pleochroic (yellowish-green—«greyish-green). In longitudinal sections both show large ex-«tinction angles.

«*Grains of microcrystalline basalt*, rather weathered and «well rounded.

«The grains of augite and those of basalt are plentifully «represented, but those which will now be mentioned are only «sparsely represented:

«*Plagioclase* with large extinction angles.

«*Magnetite*;

«*Brown garnet* (?), brown, optically isotropic grains with «strong refraction, and of the same appearance as the dark «garnet in igneous rocks rich in alkalis;

«*Quartz*; of this mineral only one single grain was found «in two thin sections.

«The *cement* consists chiefly of calcite; but in a few places «pyrite occurs as a cement between the grains of sand. In the «above enumeration have not been included alteration products «of brown and green colour, whose exact nature has not been «determined.

«This last sample thus consists almost wholly of volcanic «material; it seems to originate from the disintegration of at «least three different rocks:

«(1) A fresh medium-grained basalt (dolerite) with violet «augite,

«(2) a very fine-grained and somewhat weathered basalt,

«(2) a basic igneous rock more rich in alkalis.»

With regard to the fossils I have only found determinable specimens in the two beds which I have above termed the Coeloma-bed, and the Cyrena-bed. On closer examination it was however proved, that though the state of preservation of the material far exceeded all that had hitherto been brought home from Greenland, yet much was left to be desired. In the best state of preservation were the Crabs occurring in the concretions, and moreover there was an abundance of these. The Mollusca, on the contrary, were almost all found in the very hard sandstone, forming the Cyrena-bed, from which it was difficult to extract or expose the specimens. Moreover the shells were either dissolved or, for the greater part, transformed into crystalline calcite, and for this reason they were exceedingly brittle, and the preparation of them was very difficult.

In the following account, the species that were found will first be mentioned and described, and subsequently the conclusions with regard to the age and the conditions of formation of these deposits will be given. Once more I must draw attention to the unfortunate state of preservation of the material; the determinations are therefore not always so certain as could be wished.

A. Pelecypoda.

1. Nucula similis J. Sowerby.

Plate III, figs. 1 a—c.

1818. *Nucula similis* J. Sowerby; Mineral Conch. pl. 192, fig. 10.
1864. — — — ; S. Wood, Monogr. of the Eocene Bivalves of England. Vol. I. (Palæont. Soc.) p. 118; pl. 18, fig. 11.

A single specimen of a *Nucula* seems to belong to this species. Both valves are here in their natural position, but a little of the central part is missing. The outline and their whole form correspond well with the descriptions of *N. similis* J. Sow; thus the siphonal region is short, with the basal termination somewhat pointed, which is said to be characteristic of this species. The angle at the umbones is about 90°. The surface is weathered and thereby finely and rather irregularly concentrically furrowed, and it is also covered with radiating striae. The shell itself was originally thick.

Height 13,5 mm., length 16,5 mm. and thickness about 9 mm.

Another specimen of a *Nucula* was found among the fossils from the Coeloma-bed. It probably belongs to the same species, but the specimen is so imperfect, that a definite decision of this question is impossible.

The Coelma-bed. One or two specimens.

Occurrence. England: Barton Beds (Wood).

2. Mytilus affinis J. Sowerby.

Plate III, figs. 2—3 b.

1829. *Mytilus affinis* J. Sowerby; Miner. Conch. pl. 532. fig. 1.
1861. — — — ; S. Wood, Eocene Bivalves. Vol. I. p. 61. pl. 12.

In a rather large piece of sandstone from the Cyrena-bed, which was broken up after the return of the expedition, some specimens of a little *Mytilus* were found. These resemble closely *M. affinis* J. Sow., but generally seem to be somewhat smaller. The form varies a little, some specimens are decidedly triangular (as in Wood: Eocene Bivalves. pl. 12, fig. 1 d.), while others are more rounded (as in Wood, pl. 12, fig. 1 b.); likewise the thickness seems to vary somewhat. The reason of these variations is perhaps due chiefly to the various specimens having been subjected to pressures in different directions. — The shell itself is thin, and the inner parts are probably pearly; the surface is covered by finer and coarser concentric furrows and ridges; no trace is found of radiating striae.

The best preserved specimen only measures 9 mm. from the umbo to the posterior margin and 5 mm. at right angles to that direction; in another larger specimen these measurements are relatively 21 mm. and 12 mm.

The smaller specimens seem to differ only by their size from Wood's description of *M. affinis* J. Sow. For comparison I have obtained a specimen from the Headon Beds of Colwell Bay.

The Cyrena-bed: 15 specimens.

Occurrence. England: Barton Beds of Barton. Headon Beds of Colwell Bay, Headon Hill, Whitecliff Bay, Hordwell (Wood).

3. **Modiola cfr. simplex** J. Sowerby.

Plate III, figs. 4 a—b.

1850. *Modiola simplex* J. Sowerby, in Dixon's Geol. of Sussex. p. 117 and 225; pl. 14, fig. 16.

1861. *Modiola simplex* J. Sowerby; S. Wood, Eocene Bivalves. I. p. 71; pl. 12, fig. 7.

A rather well preserved imprint of a *Modiola* was found in a concretion. Of all the forms with which I am familiar it seems to have the greatest resemblance to *M. simplex* J. Sow; however, I only know this species from figures and from a cast from Bognor. The specimen in question differs from the above mentioned species by being somewhat broader in front, and moreover it seems to be a little more inflated. The umbo is small, depressed and almost terminal. The shell has lines of growth; otherwise it is smooth.

The length is about 60 mm., the greatest height about 30 mm.

By its form the specimen in question also resembles *M. Brocchii* Mayer, but the keel is not nearly so sharp as in the latter species.

The Coeloma-bed: 1 specimen.

Occurrence. England: Eocene of Bognor, Herne Bay (Wood).

4. **Cyprina sp.**

From the Cyrena-bed we have two specimens (one right and one left valve) of a *Cyprina*. It is very flat, almost circular, and only slightly inequilateral; the beak is only slightly projecting. That the two valves really belong to a *Cyprina* is proved by the nature of the hinge. By grinding I have succeeded in demonstrating its close resemblance with the hinge of the genus *Cyprina*. The pallial line is without a sinus. No lunule.

I have not succeeded in determining the species, the material being insufficient for this purpose.

Another shell from the Cyrena-bed also seems to belong to a *Cyprina*, but most likely to another species. It is a little more inflated, its outlines more curved and oblong, and its beak more prominent.

5. **Cyprina sp.**

Besides the above mentioned species of the genus *Cyprina* there has been found still another species at Kap Dalton, which differs very much from the former, but on account of its bad state of preservation it does not allow of exact determination. The only specimen we have consists of the remains of two united valves in their natural position. The shell is oblique and oblong, rather strongly inflated, the umbo is rather short and thick. The lunule is absent.

This specimen was found in the Coeloma-bed.

6. **Astarte cfr. tenera** Morris.

Plate III, figs. 5 a—b.

1852. *Astarte tenera* Morris, Fossil shells from the Lower Thanet Sands. Quart. Journ. Geol. Soc. vol. VIII; p. 265, pl. 16, fig. 6.

1871. *Astarte tenera* Morris; S. Wood, Eocene Bivalves. I. p. 157, pl. 24, fig. 14.

One fragment of a shell has a close resemblance to *Astarte tenera*, as described and drawn by Morris from Thanet Sands at Herne Bay. But even for a moderately certain determination the material is too insufficient.

The Cyrena-bed: 1 specimen.

Occurrence. England: Eocene of Herne Bay (Morris, Wood).

7. **Cyrena Gravesi** Deshayes.

Plate III, figs. 6—9.

1824. *Cyrena Gravii* Deshayes, Coquilles fos. des envir. de Paris. I. p. 120, pl. 19, fig. 3—4.

1860. *Cyrena Gravesi* Deshayes, Animaux sans vertèbres. I. p. 498.

The most frequent fossil in the material brought home is a *Cyrena*, which agrees well with *C. Gravesi* Desh. On account of its being so plentiful, it is highly characteristic of the sandstone which I have named the Cyrena-bed.

Some specimens which I have succeeded in developing from the sandstone agree, as above mentioned, with *C. Gravesi* Desh. For comparison I have obtained specimens from France, determined by Deshayes himself. Like these the Greenland specimens are comparatively high and greatly inflated, the outline is almost circular. The umbo is large and prominent. On some specimens at any rate, there seems at the posterior region to be an intimation of a strongly rounded keel. The surface is covered by numerous irregular growth lines, that seem originally to have been fine, in most specimens they are now rather coarse, which is most likely due to the bad state of preservation. The hinge seems to correspond perfectly with the hinge of *C. Gravesi* Desh. Thus three cardinal teeth are found, and the lateral teeth (especially the posterior one) are long like those of the latter species. — The only difference I have been able to find between the French and Greenland specimens is that the latter seem to have a somewhat thicker shell than the former.

Some specimens differ somewhat from the above described form, as they are higher and their keel is more prominent. Whether they belong to the same or to several different species it is impossible for me to decide on account of the incompleteness of the material. The shells are all transformed into calcite and therefore exceedingly brittle, so that the preparation of them generally fails. As the sandstone contains calcium carbonate as cement, it is also impossible to dissolve the shells, and by means of the resulting moulds to study the construction of the hinge.

The species does not seem to attain the same size in Greenland as in France, but a few of the Greenland specimens reach the considerable length of about 40 mm., and about the same height.

It is rather common to find two united valves in their natural position.

The Cyrena-bed: Very common.

Occurrence. France: Cuisse-la-Motte. (Deshayes).

8. **Cryptodon cfr. unicarinatus** Nyst. sp.

Plate III, figs. 14 a—b.

1835. *Axinus unicarinatus* Nyst, Rech. coquil. foss. d'Anvers. p. 6, pl. 1, fig. 22.
1843. *Axinus angulatus* Sow. *pro parte*; Nyst., Coquilles et polypiers foss. de la Belgique. pl. 141; pl. 6, fig. 13.
1867. *Cryptodon unicarinatus* Nyst; v. Koenen, Das marine Mittel-Oligocän. p. 101; pl. 4, fig. 9.

A somewhat imperfect specimen of a little *Cryptodon* has been found in one of the concretions. It consists of two connected valves, of which both, but especially the left valve, are somewhat imperfect. Of the hitherto described species it most resembles the *Cr. unicarinatus* Nyst, but it perhaps belongs to a new species. The outline agrees rather well with the above named Oligocene form, and is like the former rather high. The most essential difference is, that the lunule in the Greenland specimen is comparatively longer, more lancet-shaped, and less deep, moreover the keel which runs from the umbo to the posterior margin seems to be less sharp; but these differences may possibly arise from the shell being somewhat worn. On the surface of the shell only indistinct concentric growth lines are seen.

Height 7,5 mm., length 6,5 mm. and thickness about 4,5 mm.

Also in the Cyrena-bed there has been found a single specimen of a species of *Cryptodon* which is probably identical with the species above mentioned, but unfortunately the specimen is somewhat crushed and imperfect. The lunule here seems to agree exactly with the lunule of *Cr. unicarinatus* Nyst, as it is both shorter and deeper than in the specimen from the concretion, and in other characters, as far as can be seen, the two specimens are otherwise identical.

The Coeloma-bed: 1 specimen.

The Cyrena-bed: 1 specimen.

Occurrence: *Cr. unicarinatus* Nyst is rather plentiful in the Oligocene deposits of Belgium and Germany.

9. **Erycina sp.**

Plate III, fig. 12.

In the Cyrena-bed is found a small shell showing its interior, and the cast thereof. I have not been able to examine the hinge, but on account of its form and the thin translucent shell, I have determined the specimen as belonging to the genus *Erycina*. The pallial line is without a sinus. The surface is most probably covered by fine concentric striae. With regard to form the shell resembles most *E. striatissima* Desh. from Calcaire grossier near Paris.

Height 5 mm., length 7 mm.

The Cyrena-bed: 1 specimen.

10. **Tellina sp.**

Plate III, fig. 10.

There was also found a species of the genus *Tellina* in the material which was brought home, it was however only represented by a very imperfect specimen, and therefore not suitable for exact determination. Both the united valves are preserved, but only one allows of examination. The form is comparatively high, and the surface is covered by fine concentric striae.

Height 15 mm., length 18 mm.

The Cyrena-bed: 1 specimen.

11. Psammobia sp.?

Plate III, fig. 11.

Some shells found in the *Cyrena*-bed I consider, though somewhat doubtfully, to belong to the genus *Psammobia.*

The shell is oval, very oblong and rather flat. The umbo is only slightly prominent and is situated at about the middle of the shell. The valves seem to gape both at the front and at the back. On the surface concentric growth lines are seen; at the ends the lines are coarser and here form a moire-like ornamentation.

The species in question resembles in form somewhat *Ps. plana* Desh. but it is in too bad a state of preservation for more definite determination.

Height about 9 mm., length about 18 mm.

The Cyrena-bed: 4 specimens.

12. Donax sp.

Plate III, fig. 13.

In the Cyrena-bed has been found a single shell, which probably belongs to a species of the genus *Donax.* The shell is thin and flat, oblong-triangular, very inequilateral; narrowing in front, but yet rounded; at the posterior regions short and rounded. The surface is covered by irregular growth lines. — As I have not been able to examine the hinge and the course of the pallial line a more exact determination is impossible.

Height about 20 mm., length about 30 mm.

The Cyrena-bed: 1 specimen.

13. Teredo sp.

Some pieces of fossil wood of some foliferous tree is quite perforated by Teredos. The borings are now filled with sandstone or calcite. The perforations are more or less curved, and vary considerably in thickness (maximum is about 11 mm.). Their surface seems to have been smooth. — As all that I have seen of the shells are a few insignificant casts, a closer determination is impossible.

The Coeloma-bed: Many specimens.

Besides the above mentioned lamellibranchs I have seen a few other species from the Cyrena-bed, which however are so imperfect, that even the determination of the genus is impossible. One has some resemblance to certain species of *Corbula*.

B. Gastropoda.

14. Natica sp.

Plate IV, fig. 3.

Some specimens of a Gastropod certainly belong to the genus *Natica*. As it is impossible to separate the shell from the sandstone only the casts are available for examination, and a more exact determination is therefore unfortunately impossible.

The Cyrena-bed: 4 specimens.

15. Aporrhais speciosa v. Schlotheim sp.

Plate IV, figs. 4—5.

1820. *Strombites speciosus* v. Schloth. *sp.*; Petrefactenkunde p. 155.
1854. *Aporrhais speciosa* — - Beyrich, Conch. des norddeutsch. Tertiärgeb. p. 170; pl. 11, fig. 1—6.
1867. *Aporrhais speciosa* Schloth.; v. Koenen, Das marine Mitteloli g. Norddeutschlands. p. 14.

Four specimens from the Cyrena-bed, one rather perfect, the others casts, seem to belong to this species. This is at any rate undoubtedly the case with the specimen which is in the best state of preservation, since it shows distinctly the numerous sloping transverse ribs, and here and there parts of the spiral ornamentation. On the last whorl the three keels with their rows of nodes are distinctly seen; on the superior keel the nodes are more strongly developed than on the others; on the lowest keel they are least developed. The distance between the lowest and the middle keel is somewhat less than between the middle and the superior keel. In this specimen it is moreover seen that the inner lip is broadly expanded, and very thick. The wing at any rate reached to the fourth whorl from the base of the shell; whether it reached higher up cannot be seen, as the shell is broken here. The prolonged part of the wing is missing in this specimen.

From the Coeloma-bed we have likewise a specimen of this species with the shell partly preserved. From the cast it is seen that on the last whorl the superior row of nodes is well developed; the middle keel is only faintly indicated, while nothing is left of the lowest keel. The slanting transverse ribs, which are characteristic for this species, are present on the middle whorls, and have left their impressions on the cast. Of the shell itself the wing is preserved, but is somewhat decayed on the surface. It is of about the same shape as in Beyrich: pl. 11, fig. 3; but the part rising along the spire seems to have been very narrow. On the surface of the wing the three stubby keels are seen; two of these are about equally strongly developed, while the lowest is very sligthly developed. The wing almost reached the apex. The aperture is considerably contracted.

This form greatly resembles the species which Gardner [1]) has described under the name of *A. Margerini* de Koninck.

According to Gardner however the wing of this form only reaches the last whorl but one or the last but three, while as mentioned, in the Greenland form it almost reaches the apex.

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[1]) J. Starkie Gardner: British eocene Aporrhaïdae. — Geol. Magazine. New Series, Decade III, Volume I. London 1884. p. 532, pl. 17. figs. 7—8.

In this respect the Greenland specimens have a stronger resemblance to *A. firma* Gardner[1]) from the Headon Series.

The Coeloma-bed: 1 specimen.

The Cyrena-bed: 4 specimens.

Occurrence: This species with its varietées is plentiful in Eocene, Oligocene, and Miocene deposits in Denmark, England, Belgium and Germany.

16. Fusus sp.

In the material from the Cyrena-bed I have found a small specimen of a *Fusus*, but unfortunately it is too imperfect for the determination of the species. It is 6—7 mm. long; partly it presents itself in a longitudinal section, and partly it shows some of the surface. The former has a small number of somewhat curved transverse ribs, and a great number of fine regularly elevated spiral ridges. The columella seems to have been without folds.

The Cyrena-bed: 1 specimen.

In the brown shale of the Coeloma-bed has been found a gastropod, which seems to be the last whorl of a *Fusus*. As the surface here has numerous quite fine transverse ribs, it cannot be the same species as the specimen from the Cyrena-bed.

17. Bulimulus sp.?

Some specimens of a gastropod I determine — though not without some doubt — as belonging to the genus *Bulimulus* Leach. The shell is rather thick, and as it is now transformed into calcite, and consequently very brittle, I have only to a slight degree been able to perform any preparation. The form is oblong-oval; the whorls slightly arched, and the suture slightly visible. The aperture is oblong. The outer lip seems to have been somewhat thickened. No folds at the

[1]) J. S. Gardner: l. c. p. 553; pl. 17, figs. 1—2.

columella. The surface is covered by rather thick transverse striae almost as in *Glandina costellata* Sow. *sp.*

The Cyrena-bed: 11 specimens.

Besides the above mentioned gastropods I have, in the material from the Cyrena-bed which was brought home, found some other species of which, on account of their bad state of preservation, I have not even succeeded in determining the genus. Rather frequently a slender, turreted form appears, of which I have only seen sections; it looks as if it might belong to the genus *Cerithium.* Moreover I have seen a couple of specimens of a quite small form, which rather resemble certain recent species of *Planorbis.*

C. Crustacea.

18. Hoploparia groenlandica n. sp.

Plate IV, figs. 1—2.

In the concretions from the Coeloma-bed several specimens of a macrurous crustacean have been found, but only one is tolerably perfect and in a good state of preservation. This one will therefore serve as foundation for the following description. It is somewhat smaller than the other specimens which probably belong to the same species.

The carapace is rather long; its length reckoned from the posterior margin to the base of the rostrum, 44 mm. The greatest breadth of the flanks is near the middle and is 25 mm.; the greatest thickness, which is near the posterior margin, is about 17 mm.; but it has probably been a great deal larger as the shell after the animal's death has become somewhat compressed. At a distance of 18 mm. from the posterior margin is the cervical furrow which is deep and broad; it first runs in a straight direction down the flank at a length of about 9 mm., and then rather suddenly bends forward at the same time getting flatter, by degrees it disappears long before reaching the lateral margin. A little below the point where it bends forward it sends out a short indistinct branch, which slants toward the front and disappears by degrees before it reaches as far down the lateral margin as the head branch.

In front of the lower part of the cervical furrow, and at about 5,5 mm. distance from the latter, the λ-formed hepatic furrow is found. It starts from about the same height as the ramification of the cervical furrow, runs first at a right angle to the lateral margin, deepening at the same time; then it sends forth a branch in front, which gets shallower and shallower but yet almost reaches right to the anterior margin; before reaching so far it has sent out a very fine and short branch towards the side margin. After having sent forward the above mentioned branch, the head branch of the hepatic furrow is directed somewhat backwards and is quite short.

There is a broad incision in the middle line of the posterior margin which in an even curve unites itself with the side margin. A furrow which is specially deep at the flank runs alongside it.

The length of the *rostrum* is unknown, it seems to have been slenderly constructed. At the top of the middle line is found a furrow which is continued on to the carapace itself, but here it quickly gets shallower and broader, and at last it quite disappears. This furrow is bordered by two rounded keels, which at the carapace proper, diverge from each other, and at last resolve themselves into two rows of pointed spines; these two rows later on approach each other, and may be traced almost to the cervical furrow.

The postorbital ridge ends in front with a little spine, which is now broken off. It quickly decreases in height at the back. Its distance from the above mentioned keel is 2,5 mm. from the orbit 2 mm. The part of the carapace which is between the keel and the ridge is pretty strongly excavated. Below, and somewhat behind the spine of the ridge, there is still another spine whose distance from the border is 3,5 mm. Between the two spines the shell sinks a great deal towards the region round the lower part of the orbit.

The orbits are large and surrounded by a thickened margin.

The whole surface of the carapace seems to have been covered by rather widely spaced little oblong, somewhat squamiformed granulations.

Of the oral organs I have not seen anything preserved. On the other hand one chela (the right one) is present; it is very long and large, and projects far in front of the body. The first segment which is accessible for examination is the upper part of the arm, the length of which is 19 mm., and greatest breadth 10 mm.; its innerside is hidden, the outerside is strongly arched, the lateral margin is here accompanied by a flat furrow. At the top part of the upper arm nearest the back is seen the trace of a short spine, and at its front part is seen a strong spine directed slantingly upwards; about the middle is found another, still stronger spine, directed forwards.

Of the forearm only insignificant remains are seen; it also seems to have been provided with strong spines.

The chela itself is large and compressed, 52 mm. long, its greatest breadth is 20 mm. The outer margin of the hand and the immoveable finger form a gentle curve. The middle part of the hand itself is arched, much stronger on the inside than on the outside. On the latter there is a furrow near the outer margin which broadens in front, and almost occupies the whole breadth of the immoveable finger; towards the tip of the finger it decreases somewhat. Along the outer margin of the hand is a row of small, widely spaced, forwardly directed spines. At the inner margin of the hand a somewhat hollowed part is seen; on the margin itself a few forwardly directed spines are visible. On the innerside of the hand there is along the outer margin a deep furrow, and here also a row of small spines occurs. The greater part of the innerside has however been inaccessible for examination. Along the inner margin of the immoveable finger, which is slightly concave, is found a row of oblong, jagged teeth or nodes whereof two are much larger than the rest.

The moveable finger is long (25 mm.) and narrow (at the utmost 6 mm. broad). The upperside is flat, the underside I have not seen. The outer margin is slightly convex, and has a row of small, forwardly directed spines; the inner margin is almost straight, and has, like the immoveable finger, oblong teeth or nodes, whereof one at any rate far exceeds the others in size. At the base of the moveable finger is a small point or node, and opposite to this, on the hand, another but larger node is seen. Whether or not these nodes formed a kind of joint cannot now be determined.

The surface of the chela seems to have been of the same nature as the surface of the carapace.

Of the rest of the walking feet I have only seen indistinct remains; they seem to have been long and rather thin.

The specimen here described has only the four first segments of the abdomen preserved. The first segment is only 8 mm. long, while the others measure 10—12 mm. On the sides it runs into two rounded plates; about 1,5 mm. from its posterior margin is a furrow which, on the sides, retreats more and more from the posterior margin, and at last ends on the epimeral plates. On the following segments the epimeral plates end in backwardly directed falcate points. Also these segments have a transverse-furrow, but here it is found nearest the anterior margin, on the sides it approaches still more the anterior margin, but reaching the epimeral plates it forms a backward curve, and at the same time it gets very deep; however it soon disappears after having united itself with an indistinct furrow, which is found near the posterior margin of the epimeral plates. This furrow is best developed on the second segment, it disappears before reaching the transverse-furrow, and on the fourth segment I have not been able to discover it at all.

In two other concretions have been found the back part of the abdomen with the strong caudal fin. Unfortunately both specimens are in a bad state of preservation, but there seems to be a great resemblance to *H. gammaroides* Mc Coy.

In a fourth concretion remains of the new species of *Hoploparia* were found. The carapace is preserved, but in part as an imprint only. It is somewhat larger than in the above described specimen, measuring a little over 50 mm. in length. Otherwise the two specimens agree as far as can be seen. But in this fourth specimen a left chela is preserved, and this differs considerably from the above described right chela. It has a length of about 70 mm., and the greatest breadth is 17 mm. The middle part of the surface is strongly arched. Moreover it differs from the right chela by both fingers having on their inner margin very pointed spines, whereof a few are much larger than the rest, as is the case with *H. gammaroides* Mc Coy, according to Bell's description of that species.

Hoploparia groenlandica n. sp. is certainly closely related to *H. gammaroides* Mc Coy. Unfortunately I have only succeeded in getting a specimen of the latter species (from Sheppey), which is in a bad state of preservation, for comparison. I have therefore been obliged to rely on Bell's descriptions and figures [1]).

I shall therefore, from Bell's description and figures indicate in a few words the features in which the two species seem to differ.

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[1]) Bell: A monograph of the fossil malacostracous Crustacea of Great Britain. Part I. Crustacea of the London clay. p. 38. pl. 8, figs. 4—6 and pl. 9. The palaeontogr. Society. London 1857.

In the *H. gammaroides* M^c^ Coy the carapace is comparatively narrower both at the front and at the back, and it seems to have a deeper incision at the back in the middle line than in the Greenland species. The two keels which start from the rostrum do not reach so far back on the carapace in *H. gammmaroides* M^c^ Coy; moreover the cervical furrow in this species is considerably nearer the middle of the carapace, and the spine under the postorbital ridge is situated somewhat farther forward. Also the construction of the chela seems to be somewhat different, especially with regard to the right one. On account of all these little differences I consider it advisable to regard the Greenland specimens as belonging to an independent species, remarking however that, although rather improbable, I do not think it quite impossible, that by further comparison it may prove to be identical with *H. gammaroides* M^c^ Coy.

H. groenlandica n. sp. differs so much from *Hoploparia Klebsii* Noetling[1]) that any confusion of the two species may be considered impossible.

The Coeloma-bed: 4 specimens.

19. **Coeloma bicarinatum n. sp.**

Plate IV, fig. 6; plate V, figs. 1—6.

The carapace is trapezoidal, its length is about $^4/_5$ of its breadth; in a specimen in a very good state of preservation the measurements are relatively 22 mm. and 28 mm. (The following measurements of the carapace also refer to this specimen.) The greatest breadth is formed by a line between the two spines farthest back on the anterio-lateral margins; about $^3/_7$ of the length of the carapace lies in front of this line, and about $^4/_7$ of the length behind it. The upper side is rather

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[1]) F. Noetling: Die Fauna des samländischen Tertiärs. I. Th. — Abhandl. zur geol. Specialkarte von Preussen und den Thüringsch. Staaten. Bd. 6, Heft 3. Berlin 1885. p. 436; pl. 7, figs. 1—4; pl. 8; pl. 9, fig. 1.

flat, somewhat arched from the front backwards, less from side to side.

The front is broad and somewhat bent down, its breadth is about $^1/_4$ of the whole breadth of the carapace; in the above mentioned specimen it is thus 6 mm. broad. The whole breadth of the anterior margin (22 mm.) is about $^4/_5$ of the greatest breadth of the carapace. The front is somewhat prominent, projecting by about half its breadth beyond the anterior margin. The front margin ends in four short spines, separated by incurvations, they are about on the same plane, the innermost however are a little deeper than the outer ones because the sides of the front rise a little in proportion to the middle part. The outer spines are somewhat stronger than the inner ones, and directed somewhat to the side, all four spines project about equally. The distance between the two middle spines is only half as great as between one of the middle spines and one of the outer ones. After the outer spine comes a little furrow, and at the same time the anterior margin bends backwards, and forms a bowed incurvation the margin of which turns somewhat upwards; this incurvation is bordered by a small slit which extends itself into a furrow. Then follows a small slightly prominent part which is again bordered by a slit. The margin now bends forward again, and ends in a strong triangular spine where the anterior margin, and the anterio-lateral margin meet. The margin from the front to this place is the supraorbital margin which forms the border of the orbit upwards; it is surmounted by a row of small tubercles. The angle between the anterior margin, and the anterio-lateral margin is about 120°. The anterio-lateral margin is slightly convex, and has the same length (8 mm.) as the supraorbital margin. It carries five strong spines, whereof the fifth and the first are the strongest, while the second and the fourth are the weakest, and lie on a somewhat lower level than the rest. The four front spines are (in casts) flat, and directed more or less towards the front, whereas the fifth is more round, and directed straight out to the side, and at the same time somewhat upwards. The first spine belongs to the orbital region, the second and third to the hepatic region, the fourth to the epibranchial lobe, and lastly the fifth to the mesobranchial lobe.

After the last spines of the anterio-lateral margin comes the posterio-lateral margin, the length of which (12 mm.) far surpasses that of the former margin. It is almost straight, and forms an obtuse angle with the posterior margin. The anterio- and posterio-lateral margins have not, like the anterior margin, a row of regular small tubercles.

The posterior margin (17 mm. broad) forms a flattened curve, the middle part as well as the side parts are slightly bent inwards. The posterior margin carries throughout its length a row of quite small regular tubercles.

The furrows which border the different regions of the carapace are shallow, but yet rather distinct. In the casts they are seen most distinctly; on weathered shells it is sometimes somewhat difficult to follow their course.

From the incurvation between the two middle of the four front spines, runs a small flat furrow which divides the front into two symmetrical parts. Farther back, where it separates the two epigastric lobes, it gets deeper and broader, and then it divides itself into two branches which between them enclose the long forward extension of the mesogastric lobe. The epigastric lobes are seen as a small, crooked, square prominence on either side of the furrow; by another furrow they are separated from the elevated part of the supraorbital margin.

Between the epigastric and protogastric lobes a broad, flat furrow is found. The last mentioned lobe is large, and rather flat, its highest part is near the furrow which separates it from the long mesogastric lobe.

The metagastric lobe has grown together with the mesogastric lobe, and forms with the latter a hexagonal, slightly elevated part, which as already mentioned sends forward a long projection.

The furrows which separate the urogastric lobe in front from the metagastric lobe, and at the back from the cardiac region, are curved, (with the concavity towards the front) broad and flat, but yet distinct. The urogastric lobe is formed like a flat, curved, rather narrow elevation.

The epicardiac lobe is rather large, slightly heart-shaped. In the casts indistinct traces of a few nodes are sometimes seen on its front part.

The metacardiac lobe is narrower than the epicardiac lobe, and there is no distinct partition between the two. In the casts traces of a small node on its front part are often seen. In specimens with shell preserved I have not seen this node, nor have I seen the two nodes on the epicardiac lobe.

The orbital region is narrow, and rather long; the inner part of its outer margin (the supraorbital margin) is thickened. It is separated from the protogastric region, and the hepatic region by flat, but distinct furrows.

The hepatic region is rather large and bordered at the back by the cervical furrow. Its highest part is about at the middle, and somewhat behind that.

The epibranchial lobe is — especially in the casts — distinctly separated from the hepatic region; its border towards the mesobranchial lobe is less distinct. The fourth node of the anterio-lateral margin belongs as above mentioned to the epibranchial lobe.

The mesobranchial lobe is well developed. It forms a long fairly arched wall which, towards the middle of the carapace, bends strongly backwards; at the back it slopes more steeply than in front, where it is bordered by a very flat furrow. At the back it is not bordered by any furrow, but here gradually unites itself with the metabranchial lobe. The strong fifth spine on the anterio-lateral margin belongs to the mesobranchial lobe.

The metabranchial lobe is very large. About at its middle is a sharply marked, somewhat rounded keel, which runs nearly parallel with the longitudinal axis, as the two keels from their respective sides only converge slightly forwards. This keel, which is very conspicuous in the casts as well as in the specimens with shells, forms something like an extension of the elevated part of the mesobranchial lobe, from which it is however separated by a furrow. Frequently a couple of points on the keel, especially in the casts, give indications of little nodes. The part of the lobe situated outside the keel is rather strongly excavated, and the same is the case, in a somewhat less degree, with the part inside the keel.

The orbits are, as usual in the genus *Coeloma*, very large and deep; they reach from the anterio-lateral margin right to the front. Their top border, the supraorbital border, is mentioned above. Downwards they are bordered by the infra-orbital margin, which from the front spine of the anterior margin curves strongly downwards, and at the same time somewhat forwards, and rather near to the front forms a strong, flat spine which is placed a little lower than the spines of the front, and reaches about as far to the front as the latter ones. Beside this spine is a somewhat smaller, flattened spine or tooth, which forms the end of the infra-orbital margin. This margin also, like the supraorbital margin, is ornamented by a regular row of little nodes. The orbit is indistinctly divided into two parts, separated by the slit between the two infra-orbital teeth; the latter is continued as a very indistinct furrow into the orbit. The inner part of the orbit is much smaller and flatter than the outer part, and served to hold the stalk of the eye, while the outer part held the eye itself. The stalk of the eye is short and rather thick.

The flanks form towards the front (near the anterior-side-spine) a very acute angle with the surface of the carapace; this angle becomes larger farther back until at the last side-spines it is about 90°, and near the posterior margin it gets still larger. The pterygostomial furrow, which is very distinct, starts from the innermost infra-orbital spine, and runs from thence in a slightly S-shaped line towards the posterio-lateral margin which it almost reaches at a point situated a little behind the hindmost spines of the posterio-lateral margin, then it runs parallel with the latter at a short distance from it, down to the posterior margin. The inner margin of the branchiostegites is thickened, and during its whole length accompanied by a furrow.

I have only an imperfect knowledge of the epistoma. It seems to consist of a long cross-beam the ends of which are bent somewhat upwards, and enclose the basal-segments of the inner antennae. From the middle of the epistoma a narrow projection runs at right angles up towards the front; it separates the basal-segments of the two inner antennae.

Nor have I seen the endostoma in a good state of preservation. As far as can be seen it greatly resembles the endostoma of *Coeloma holsaticum* Stolley. Its highest parts are found on each side of the bottom of the deep incision.

The basal-segments of the inner antennae are situated just below the front, they are very large, and are separated by the cross-lamella which unites the front with the epistoma.

The basal-segments of the outer antennae lie close to the inner ones, and are much smaller than these.

Of the oral appendages I have seen the last pair of maxillipeds. They greatly resemble the corresponding pair in the *C. holsaticum* Stolley; only in the Greenland species the furrow on the head-segment generally seems to be somewhat deeper, and the following segment gets somewhat broader towards the outside.

Of the other oral appendages I have seen here and there indistinct remains only.

The *sternal plastron* is broadly elliptical, almost circular; in front it is somewhat pointed; its height only slightly surpasses its breadth. The anterior sternite is the smallest, it has the shape of a low isosceles triangle, its point is bent somewhat upwards. The following sternite is the largest of all. The two together occupy almost half the length of the whole plastron. The whole middle part of this sternite is concave, but especially is this the case with the back part — its object being to contain the end of the abdomen. The two furrows which run in a slanting direction towards the middle are more or less distinct; they are deepest towards the outside of the margin of the plastron; towards the middle of the latter they disappear. The outer margin is somewhat swollen.

The next sternite is much smaller and wedge-shaped; it does not reach the middle of the plastron. Its posterior edge, which is at right angles with the longitudinal axis of the carapace, bends strongly forwards at the point where the sternite lowers itself to help to form the cavity which contains the abdomen. — The next two sternites also get narrower farther in, but both reach the middle line. On the posterior one, a deep furrow is seen which begins right at the outer margin, and runs parallel with the posterior margin of the sternite, and at short distance from the latter, the furrow suddenly disappears before reaching the middle line.

The episternites are generally seen very distinctly. They have a pointed projection at the back which projects in between the basal-segments of the walking feet and the sternites, and sometimes reaches the middle of the next sternite, sometimes still farther.

The front pair of walking feet are strongly developed, and end in large chelæ of which the right one is stronger than the left. The first segment is, like the two next, of small size; on the border turning inwards towards the sternal plastron, there is a small spine which corresponds with an incision in the second sternite. At the back it reaches right up to the third segment, whereby the second segment which is quite small becomes wedge-shaped. The third segment has a furrow which runs parallel with its posterior margin, and at a short distance from the latter. — The upper part of the arm is short, but very strong, and has the shape of a three-sided pyramid with the point turned downwards; in height it reaches the surface of the anterio-lateral margin. The plane which turns inwards towards the flanks is slightly arched, while the two other sides are arched more strongly, the one which turns upwards more so than the one turning downwards. Farthest to the front on the lowest margin a strong round spine is seen, the base of which is bordered by a deep furrow. On the front border of the innerside are two spines, one above the other. — The forearm is short, strong and square. On its two upper front corners two spines are seen whereof the innermost one is long and pointed, while the outer one is rounded, and fits into a cavity in the hand. The upper side is strongly arched, the two back corners rounded. Further details of the structure of the forearm cannot be made out.

The hand is short, strongly built; its shape is longish-triangular. Its outer side is fairly strongly arched, the inner side is arched in the middle, but excavated near the under and upper margin. At the end of the hand there is, on the upper side, a small tubercle with a cavity with which a small projection on the forearm corresponds, and hereby a sort of joint is formed. The hand is separated from the immoveable finger by a cavity.

The fingers are narrow. On their innerside they have a row of large and small oblong teeth, which decrease in size towards the front. Inside the teeth a row of small irregular cavities is seen. In a number of specimens, which all seem to be males, the fingers (especially the immoveable finger) have a distinct furrow on both sides, while in the females there is no furrow at all. In one female however I have seen an indistinct furrow in the immoveable finger.

The other four pairs of walking feet are only partly preserved, having almost always projected beyond the concretions wherein the crabs are found, and have therefore disappeared. They seem to have been comparatively strong, and rather flat.

The abdomen consists of seven segments. It is of a longish-triangular form in the males, more oval in the females. In the males the second segment is the broadest, while the greatest breadth in the females is not reached till the third or fourth segment; whether this rule may be considered universal I am not able to determine with perfect certainty, however it is valid with regard to the specimens whose abdomens are completely preserved. The length of the two last segments is greater than their breadth. In the middle of the abdomen an indistinct, broad, longitudinal keel is seen in most specimens.

Only in rare cases can the nature of the surface be examined, as the shell generally adheres to the stone by its surface, and where this is not the case it is much decayed. Still one sees that it is finely granulated. The granules are generally stronger on the more elevated parts of the shell.

It has already been mentioned that a row of regular little nodes are found here and there on the border of the carapace. In the Greenland species we also find (in casts or decayed shells) marks similar to those which Noetling has declared to be the places where the muscles were joined to the shell. Such marks are found in the shape of short flat curves at the border between the meso- and metagastric lobes, and in the side furrows somewhat behind the latter two, and moreover in the flat furrow between the mesobranchial lobes and the keels on the metabranchial lobes.

Noetling[1]) has divided the species of *Coeloma* into two groups: *Laeves* and *Tuberculati*. To the first group are referred the forms whose carapace is almost perfectly smooth with the exception of a few rather large nodes. To the second group belong those whose carapace is more uneven, and provided with rather large nodes and tubercles. To the *Laeves* he refers *Coeloma vigil* Milne Edwards from the Vicention Eocene, *C. balticum* Schlüter from the Lower Oligocene formation in Samland, *C. granulosum* Milne Edwards from the Upper Nummulitic beds near Biarritz, and *C. Reidemeisteri* Noetling from the Phosphate-beds near Büddenstedt and Helmstedt. Of the second group, *Tuberculati*, he knows only two species, viz. *C. taunicum* v. Meyer *sp.* from the Middle Oligocene Septarian clay near Breckenheim, and *C. Credneri* v. Schloth. *sp.* from the Upper Oligocene in the neighbourhood of Hildesheim. To these Stolley[2]) adds two more species, viz. *C. rupeliense* Stainier from the Middle Oligocene Rupel clay near Rupelmonde in Belgium, and *C. holsaticum* Stolley from the Middle Oligocene Septarian clay near Itzehoe in Holstein.

According to Noetling the group *Laeves* contains chiefly earlier species, while the group *Tuberculati* is characteristic of the younger Eogene.

Coeloma bicarinatum n. sp. is quite in agreement with the group *Laeves*, and if, as Noetling thinks, in the development from the older to the younger species there is an inclination towards a sharper definition of the furrows, and a richer ornamentation of the surface, it must certainly be one of the oldest species. Especially characteristic of this species, and very

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[1]) F. Noetling: Die Fauna des samländischen Tertiärs. I Theil. — Abhandl. zur geol. Specialkarte von Preussen und den Thüringsch. Staaten. Bd. 6, Heft. 3. Berlin 1885. S. 415—17.

[2]) E. Stolley: Ueber zwei Brachyuren aus dem mitteloligocänen Septarienthon Norddeutschlands. — Mitth. aus. dem mineralog. Institut der Univ. Kiel. Bd. I, Heft. 3. Kiel 1890. S. 165.

conspicuous, are the two strong keels or ridges on the carapace. Indications of such keels are also seen in other species, but they are far from reaching the development which they do in the Greenland species. In the following I shall only state the most evident differences between *C. bicarinatum* and the other species of the genus *Coeloma* with which I am acquainted.

C. vigil Milne Edwards. In the museum of Göttingen I saw a specimen of this species from Laverda. It was in a rather bad state of preservation. According to this specimen *C. vigil* seems to differ in the following particulars: Its form is higher, less narrowing towards the posterior region, a little less inflated. The front is narrower in proportion. The anterio-lateral margins are placed somewhat more steeply; they only carry four spines on each side. The two keels on the carapace are much less pronounced, and carry two nodes which are indistinct and placed rather near each other. The surface carries rather coarse tubercles which are placed close together.

C. balticum Schlüter. In addition to Noetling's very detailed description I know this species from a specimen in the museum of Göttingen. The anterio-lateral margins are here comparatively longer, and only carry four spines on each side. The two keels on the metabranchial lobes are missing, or are at any rate only very indistinctly indicated. The granulations on the carapace are considerably coarser than in *C. bicarinatum sp.*

C. granulosum Milne Edwards has a narrower front, and a much longer anterior margin. The anterio-lateral margins run in almost the same direction as the posterio-lateral ones. Only four spines are found on each of the anterio-lateral margins. No keels on the metabranchial lobes.

C. Reidemeisteri Noetling. I only know this species from Noetling's description. It is said to belong to his group *Laeves*, and is different from *C. balticum* Schlüter with which species it was formerly identified. This circumstance presumably permits he conclusion that it is closely related to SCHLÜTER's species, and therefore differs not a little from the Greenland one.

To the group *Laeves*, or perhaps to a new independent group, *C. vareolata* LÖRENTHEY[1]) from the Eocene of Kressenberg must be referred. The carapace of this species is much broader comparatively, and very narrowing towards the posterior region; the anterio-lateral margins carry only three little spines on each side. The surface is punctate, not granulated.

From the *Tuberculati* group *Coeloma bicarinatum n. sp.* differs by its almost perfectly smooth carapace. I have also seen in the few species belonging to this group the following differences.

C. taunicum v. MEYER *sp.* In the museum of Göttingen I have seen a specimen of this species from Breckenheim. The anterio-lateral margin has only four spines. No keels are found on the metabranchial lobes, but two strong nodes on each side. The posterior margin is comparatively broad. The chelæ seem to be more slender than in the Greenland species.

C. rupeliense STAINIER. I have seen no specimen of this species, and as I have not been able to procure STAINIER's description of it, I only know it from STOLLEY's[2]) description and the figure which he has copied from STAINIER. This figure is however drawn from a cast. *C. rupeliense* STAINIER seems to closely resemble the Greenland species in form, but differs from it in the following particulars: The two middle spines of the front margin are longer than the two outer ones, the front is broader, the carapace broader towards the posterior region. The furrows between the different regions and lobes are much

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[1]) E. LÖRENTHEY: Ueber die Brachyuren der palaeontologischen Sammlung des bayerischen Staates. Termiszetrajzi Fürzetek. Bd. 21. Budapest 1898. p. 149; pl. 11. fig. 5.

[2]) E. STOLLEY: l. c. p. 166; pl. 5. fig. 2.

more distinct. On each side of the metabranchial lobes there are two strong nodes, but no keels.

C. holsaticum Stolley. Three specimens of this species are preserved in the Mineralogical Museum of Copenhagen. They have broader, less prominent fronts; the anterio-lateral margins are placed more slantingly; their spines are formed differently to those in *C. bicarinatum n. sp.* No distinct keels are found.

C. bicarinatum n. sp. was found at Kap Dalton in great numbers in the numerous concretions in the shale. In almost every concretion a specimen of this crab was found. On account of this frequent occurrence I have called the bed the Coeloma-bed. The sizes of the specimens are, as a rule, almost the same as the size of the one to which the measurements in the above description refer. There are however specimens the size of which is much less, thus the carapace of the smallest of the specimens present only measures 10,5 mm. in length, and 14 mm. in breadth. A few other specimens are unusually large, the carapace of one being about 41 mm. long, and 50 mm. broad.

The Coeloma-bed: Very common.

D. Insecta.

In one of the concretions of the Coeloma-bed which is quite filled with imprints of fragments of leaves, and other remains of plants, I found a fragment of the wing of a Beetle. On the surface of the wing are seen longitudinal rows of little cavities. A closer determination is impossible.

The fossils from the Coeloma-bed and the Cyrena-bed have here been treated collectively. What the mutual relation in age is between the two beds is not known; the only thing known about the conditions of deposition is what has been stated on pp. 99—100. But I must remark that the bits of shale, which are found in the sandstone of the Cyrena-bed, have some resemblance to the shale of the Coeloma-bed, and that there is therefore some probability of the latter bed being older than the former. Against this the objection cannot be raised, that in addition to the bits of shale, the concretions of the shale ought also be found in the sandstone, because these may have been formed in the shale at a much later period.

Neither would I dare to draw a positive conclusion from the fossils found, regarding the respective ages of the two beds, but as may be seen from the accompanying list of fossils, the two beds seem to have two species in common viz. the species which I have above assigned as *Cryptodon cfr. unicarinatus* Nyst, and *Aporrhais speciosa* v. Schloth. *sp.* We may therefore presumably be right in supposing that the two deposits do not differ much with regard to age. To the question of the age of the Tertiary deposits at Kap Dalton I shall return later on.

	The Coeloma-bed	The Cyrena-bed	Eocene	Oligocene	Miocene
1. *Nucula similis* J. Sow.	+	—	+	—	—
2. *Mytilus affinis* J. Sow.	—	+	+	+	—
3. *Modiola cfr. simplex* J. Sow.	+	—	(+)	—	—
4. *Cyprina sp.*	—	+	—	—	—
5. *Cyprina sp.*	+	—	—	—	—
6. *Astarte cfr. tenera* Morris	—	+	(+)	—	—
7. *Cyrena Gravesii* Desh.	—	+	+	—	—
8. *Cryptodon cfr. unicarinatus* Nyst.	+	+	—	(+)	—
9. *Erycina sp.*	—	+	—	—	—
10. *Tellina sp.*	—	+	—	—	—
11. *Psammobia sp.?*	—	+	—	—	—
12. *Donax sp.*	—	+	—	—	—
13. *Teredo sp.*	+	—	—	—	—
14. *Natica sp.*	—	+	—	—	—
15. *Aporrhais speciosa* v. Schloth. *sp.*	+	+	+	+	+
16. *Fusus sp.*	—	+	—	—	—
17. *Bulimulus sp.?*	—	+	—	—	—
18. *Hoploparia groenlandica n. sp.*	+	—	—	—	—
19. *Coeloma bicarinatum n. sp.*	+	—	—	—	—
20. *Coleopter.*	+	—	—	—	—

If we now look at the fossils which have been found in the Coeloma-bed, we see that with the exception of the single beetle-wing we have here a purely marine fauna. The nature of the rock indicates that the deposition took place in comparatively deep water. However, we also sometimes find in the concretions innumerable well preserved imprints of fragments of leaves and other remains of plants, which presumably together with the beetle-wing were carried by a river into the sea. The number of the land-organisms in the concretions moreover permits the conclusion, that the deposition took place near the mouth of the river.

If we now consider the fauna of the Cyrena-bed it is at once evident that it is of a quite different composition from that of the Coeloma-bed. Beside typical salt-water species, such as those belonging to the genera *Cyprina*, *Astarte, Cryptodon*, *Erycina, Tellina, Natica*, *Fusus*, *Aporrhais* a. s. o. we here find a brackish-water species, namely *Cyrena Gravesii* Desh., and presumably a land-species *Bulimulus sp.* That we have to do with a marine deposit here also is plainly proved by the above named salt-water species, but the deposition here took place in less deep water, and nearer the coast. A material as coarse as that which forms the sandstone, in which the fossils mentioned have been found, could hardly be washed very far out into the sea, but would subside near the coast. That this was the case, the bits of shale which are found deposited in the sandstone, are also signs of. Another argument for the Cyrena-bed being a shallow-water formation is from the fossils, among which is found such a strongly marked littoral form as a species of the genus *Donax*. Species of the genus *Mytilus*, and probably also of the genus *Psammobia*, which are both generally found in shallow water, also occur here. Even if some of the other species belong to genera which are found in somewhat deeper water, there are presumably none of these exclusively found at such great depths, that a transport of them to the shore would be inconceivable. — It is probable that the coast during the formation of the Cyrena-bed consisted of deposits of clay in layers; whether or not this clay belonged to the Coeloma-bed or a like formation is uncertain. The coast was subjected to abrasion, whereby loosened bits of the clay were washed into the sea. The clay must probably already have attained a certain firmness, as the bits would otherwise soon have become macerated in the water, and would then have been deposited as clay again in deeper water. In the sandstone itself none or only very slight traces of clay are found. At the same time as the sea by the denudation of older deposits provided material for the formation of new ones, the rivers washed a lot of material from the mainland. This material consisted in a great part of sand which in a few places was formed of volcanic products, but generally consisted of grains of quartz, produced by the weathering of the Archæan rocks inland. This sand was deposited in the sea near the mouths of the rivers. In the rivers or in the brackish swamps connected with them, near the coast, lived mollusca, and other animals (e. g. *Cyrena Gravesii* Desh.); after the death of the animals a part of their remains were washed into the sea, and were deposited there together with the other material which the rivers brought with them. The negative change of position of the coast-line which probably took place between the formation of the Coeloma-bed and the Cyrena-bed was continued, with the result that the Cyrena-bed was at last raised above the level of the sea. Then volcanic eruptions occurred whereby the Tertiary deposits, at any rate in some places, were covered by thick basalt-deposits.

That the tertiary deposits at Kap Dalton are connected with the ones farther north on the east coast of Greenland may presumably be supposed. Marine-fossils are here, as above mentioned, only known from Hochstetters Vorland. Of the five genera which Lenz and Fuchs mention from this locality (see p. 96) only one, viz. *Astarte*, has been found at Kap Dalton. However too much significance must not be attached to this, as the material from Hochstetters Vorland is very imperfect. Tertiary fossils are said to be very frequent here, and it is therefore to be hoped that we shall some day succeed in getting both more abundant and better preserved material from this part of Greenland, which is unfortunately so difficult of access.

As has been already mentioned by Nathorst[1]) we shall hardly be wrong in supposing that the marine Tertiary of Spitzbergen and Greenland was deposited in the same sea, and yet Fuchs' list of the fauna from Kolbay at Spitzbergen (see p. 97) has very little in common with the one from Kap Dalton, as the only resemblance is that the genus *Psammobia* possibly is common to both localities. As for Spitzbergen the same is the case there as in Hochstetters Vorland, the material of the marine Tertiary fossils is both scarce and in a bad state of preservation.

From the west coast of Greenland marine Tertiary has certainly not been mentioned in literature until now. Whether the very coarse-grained sandstone found by K. J. V. Steenstrup[2]) at Alianaitsunguak is from the Tertiary beds I dare not decide as the only fossils I have seen are a very large and thick-shelled *Dentalium* and some imperfect remains of a snail. But the sandstone however contains concretions derived from older formations; these concretions resemble those which have been found near Niakornat, and in other localities, and, according to V. Madsen[3]), they contain a number of spe-

1) A. G. Nathorst: Marine Conchylien im Tertiär Spitzbergens und Ostgrönlands. — Zeitschr. d. deutsch. geol. Gesellschaft. Bd. 48. Berlin 1896. S. 986.

2) K. J. V. Steenstrup: Om Forekomsten af Forsteninger i de kulførende Dannelser i Nord-Grønland. — Medd. om Grønland. Kjøbenhavn 1883. S. 63.

3) V. Madsen: The genus *Scaphites* in West-Greenland. — Medd. fra Dansk geolog. Foren. Nr. 4. Kjøbenhavn 1897. S. 45.

cimens of *Scaphites Römeri* d.'Orb, though their fauna according to De Loriol[1]) ordinarily consists partly of new species, and partly of such as have been described by Meek and Hayden from the North-American «Fox hills' group». As this group is reckoned to belong to the Upper Senonian of which *Scaphites Römeri* d'Orb. is also characteristic, it does not seem improbable to me that the above mentioned sandstone from Alianaitsunguak might belong to the older Tertiary. If this is the case it would be highly interesting to have this sandstone more closely examined, as there is a possibility that the West-Greenland marine Tertiary may be more closely connected with the American, than with the European Tertiary, a thing which cannot at all be said to be the case with the marine Tertiary from Kap Dalton.

Also marine Tertiary formations are said to be known from Iceland, viz. from the well known locality Halbjarnarstadir, and a few other places. The fauna found here is however quite different from the one from Kap Dalton, and must, according to the opinion of various naturalists, be considered as being much younger[2]).

If we now consider the West-European Tertiary, we find deposits there which have much in common with those at Kap Dalton. This resemblance is so great, that I believe we may draw a parallel between the East-Greenland Tertiary, and

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[1]) P. de Loriol: Om fossile Saltvandsdyr fra Nord-Grønland. Genf 1882. (Meddelt i et Brev til Prof. O. Heer). — Medd. om Grønland. Hefte 5. Kjøbenhavn 1883. S. 205.

[2]) In the archives of the Museum of Mineralogy are found four plates, showing figures of mollusca from this locality; these four plates were composed by O. Mørch, but were not published before his death. Later (1884), C. M. Poulsen undertook the revision of the plates and the composition of a text; this text, however, was never published, but the MS is deposited in the archives of the Museum; it shows that according to Poulsen's opinion the fauna from Halbjarnarstadir may be considered to be still younger than the youngest of the English Crag-faunas.

the Eocene in England and the Paris basin. With a single exception all the species which form the fauna of Kap Dalton seem to be either identical, or at any rate closely connected with species which occur in the English or North-French Eocene. An exception to this is perhaps formed by the species which I have mentioned under the designation of *Cryptodon cfr. unicarinatus* Nyst.; but as will be seen from this designation the specimens in question do not quite agree with the *Cr. unicarinatus* Nyst. However I have not seen any other species described to which they have so great a resemblance as to this Middle Oligocene species. Besides this one all the other determinable species which I have mentioned from Kap Dalton are represented in the West-European Eocene; from this must perhaps be excepted one of the crustaceans viz. *Coeloma bicarinatum n. sp.*

There seems to be some reason for drawing a parallel between the Coeloma-bed, and the *London Clay*, not only on account of these two deposits having a petrographic resemblance (brown or greyish brown clay with calcareous concretions), but also because there seems to be a certain resemblance in their fauna, as far as the material from Kap Dalton, which is so poor with regard to species, will permit of comparison. I do not attach any importance to the fact that wood perforated by Teredos is common in both formations, as this phenomenon is of very frequent occurrence also in other Tertiary deposits. The occurrence of *Hoploparia groenlandica n. sp.* seems to me to be of importance; this species is very closely related to, if not identical with, the *H. gammaroides* Bell from the *London Clay* of Sheppey. Something the same is the case with the *Modiola* found at Kap Dalton, which is certainly closely related to *M. simplex* J. Sow. found in the *Bognor Beds*, that is, in a deposit of the same period as the *London Clay*. To the other crustacean from Kap Dalton, *Coeloma bicarinatum n. sp.*, I have not found any corresponding species in the *London Clay*; yet I must draw the attention to the resemblance it has to the *Portunites incerta* Bell[1]); according to Bell's description the two species cannot be identical, but in the first place the *Portunites incerta* (judging from Bell's figures), seems to vary not a little, and secondly Bell's description is somewhat brief. In spite of all my exertions I have unfortunately not succeeded in procuring any specimen of this species for purposes of comparison with the Greenland one.

If a closer comparison could be drawn between the Cyrena-bed and the West-European Tertiary, it would presumably be between the *Sables de Cuise* or the *Bagshot beds*, which deposits are said to be partly contemporaneous. This supposition is especially supported by the frequent occurrence of *Cyrena Gravesii* Desh. at Kap Dalton. This species is also very common at Cuise-la-Motte, where a like mixed fauna is found as in the Cyrena-bed at Kap Dalton. Of other species which I have found in the latter bed, I have already mentioned *Cryptodon cfr. unicarinatus* Nyst. Like this species *Mytilus affinis* J. Sow. also seems to indicate a higher horizon, while the opposite is the case with *Astarte cfr. tenera* Morris; but the occurrence of these species is not quite certain, and it is not impossible that some species, in such a distant locality, may have a somewhat different vertical extension than usual.

As will be seen by the above description, the East-Greenland Tertiary seems to be closely related to the West-European. The resemblance is so great that we may certainly suppose, that at the time when the above mentioned formations were deposited, there must have been a connection between the two oceans. However this connection presumably need not exclude the possibility of a «land-bridge» between Western-Europe and

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[1]) Bell: A monograph of the fossil malacostracous Crustacea of Great Britain. Part I. Crustacea of the London clay. London 1857. p. 21; pl. 3, figs. 1—5. — The Palaeontogr. Society.

North-America via Iceland and Greenland. But if this bridge was in existence at that period, it must certainly have been broken through by the sea in one or more places, so that it formed no hindrance to the propagation of the same fauna in both oceans. But there is no reason to think, that the strait or straits constituted a hindrance to the propagation of terrestrial animals and plants.

Although by the finding of the marine Tertiary fossils the Danish expedition to East-Greenland in 1900, has greatly advanced the knowledge of the Tertiary formations of the Arctic regions, still much is left of which we have no knowledge, and further new discoveries will be received with the greatest interest.

Plate III.

Figs. 1 a-c. *Nucula similis* J. Sow. 1 c. Posterior view.
- 2, 3 a-b. *Mytilus affinis* J. Sow. Internal moulds. 2. × 2.
- 4 a-b. *Modiola cfr. simplex* J. Sow. Wax mould.
- 5 a-b. *Astarte cfr. tenera* Morris.
- 6 a-b. *Cyrena Gravesii* Desh. Cast.
- 7 a-b. - - - . Wax mould of interior of a specimen from Cuise-la-Motte, France.
- 8-9. *Cyrena Gravesii* Desh.
- 10. *Tellina sp.*
- 11. *Psammobia sp.?*
- 12. *Erycina sp.* Internal mould. × 2.
- 13. *Donax sp.* Internal mould.
- 14 a-b. *Cryptodon cfr. unicarinatus* Nyst *sp.* × 2.

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.

Th. Bloch phot. et del.

Pacht & Crone phototyp.

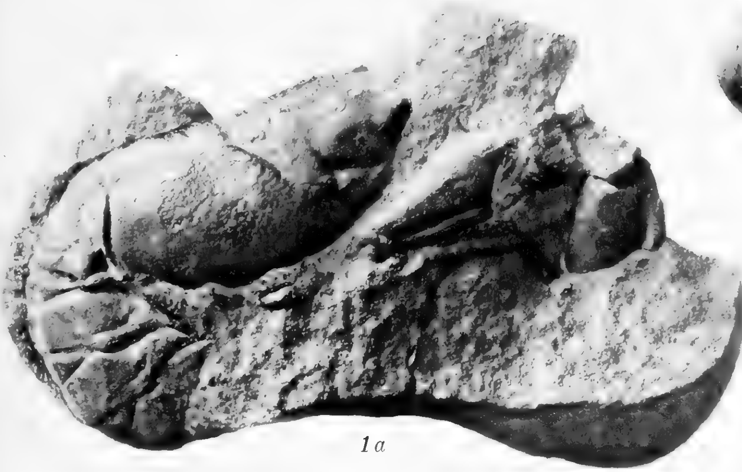
Plate IV.

Figs. 1 a-c.	*Hoploparia groenlandica n. sp.*	1 c. Portion of the carapace; $\times 2$.
- 2.	— — —	Chela of an other specimen.
- 3.	*Natica sp.* Cast.	
- 4-5.	*Aporrhais speciosa* v. SCHLOTH. *sp.*	
- 6.	*Coeloma bicarinatum n. sp.*	

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.

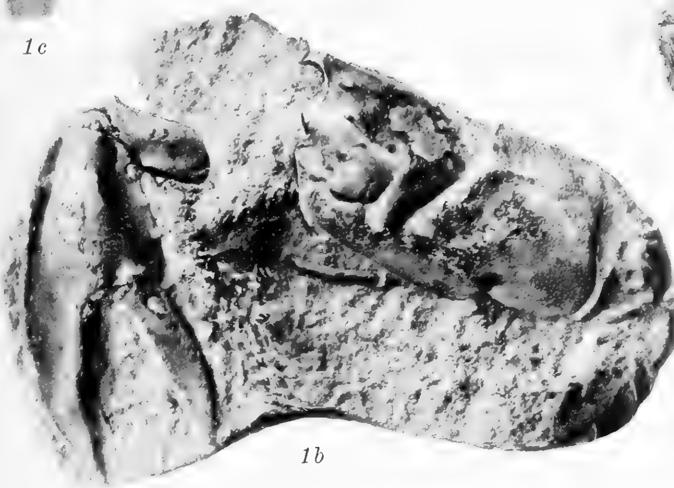
3



1 a

1 c

4



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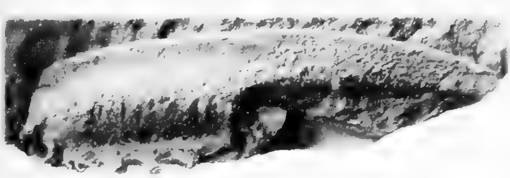

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Th. Bloch phot. et del. Pacht & Crone phototyp.

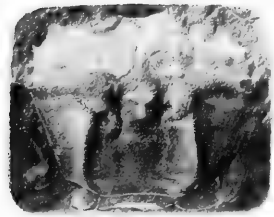
Plate V.

Figs. 1-6. *Coeloma bicarinatum n. sp.* 1 & 3. Females. 4. Male. 6. A young specimen; × 2.

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



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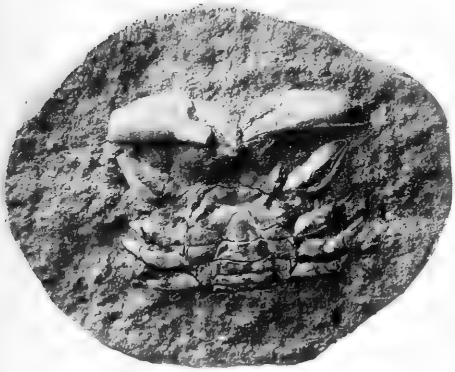

1 b

4

5

6

Th. Bloch phot. et del. Pacht & Crone phototyp.

IV.

Birds of East Greenland.

By

H. Deichmann.

Anas acuta L. 27/6 *).

In Jan Mayen Mr. Hartz found the remains of a Pintail, gnawed by foxes. The wings however were well preserved, so there was no difficulty in identifying the species.

Pagonetta glacialis (L.). 26/6-28/6. 10/7. 13/7. 18/7. 23/7-24/7.

I saw a few Longtailed Ducks in the south lagoon of Jan Mayen; they were male birds in summer dress. At Sabine Ø a single male was observed in open sea. At Kap Borlase Warren a few smaller flocks of these birds — mostly males in summer dress — were swimming in the little lagoon on the south side of the Cape.

As might be expected the Longtailed Duck was also met with in Turner Sund and at Kap Dalton, but, strange to say, not in the inner part of Hurry Inlet.

Somateria mollissima (L.). 25/6. 26/6. 28/6. 11/7. 13/7. 18/7. 24/7. 27/7. 28/7-30/7. 11/8. 14/8. 19/8. 27/8. 29/8.

The Eider-Duck is met with almost everywhere in the northern part of the East-coast of Greenland.

It prefers to breed on little islands and rocks, but as these are very few in number here, it is obliged to be contented with the mainland and the larger islands. Now and again it nests a good bit inland. I thus in Sabine Ø saw a nest about 1000

*) This date and the following refer to the list at the end of this treatise.

yards from the coast and about 200 yards above sea level. Even when nesting on holms or skerries it is subject to the persecutions of the Polar Bear.

On the Dunholm, where a great number of Eider-Ducks were breeding in the last part of July, I saw excrements of bears, containing many bits of shells of Eider-Ducks'-eggs, and a bear I shot here also had the remains of Eider-Ducks'-eggs in the stomach. It is perhaps because the Polar Bear destroys so many nests, that the breeding season stretches over so long a period. — The nest in Sabine Ø was found July 11th, and still on August 11th I found a sitting bird on the Liverpool Kyst. The Eider-Duck is found in East Greenland as well on the outer coast as far up in the bays, when only the circumstances are to its taste. — In a lagoon on the Manby Halvø I saw young ones — bigger and quite small — on the last days of July.

The variety *V. nigrum* was not observed; however only a few Eider-Ducks were killed.

Somateria spectabilis (L.).

Was not observed in this journey, but I think I saw it during Ryder's expedition at Danmarks Ø in June.

Anser torquatus Frisch. $^{28}/_{6}$. $^{14}/_{7}$.

In Jan Mayen I repeatedly saw a Brent Goose in the south lagoon. At Kap Borlase Warren it was found with two quite small and downy goslings.

It was here remarkably confiding and allowed us to approach so near, that it might easily be hit with a stone.

Anser leucopsis Bechst. $^{11}/_{7}$. $^{18}/_{7}$. $^{23}/_{7}$. $^{31}/_{7}$. $^{2}/_{8}$. $^{7}/_{8}$. $^{10}/_{8}$.

In Walrus Ø some geese were observed on the eleventh of July; their resort was a steep rock; they were possibly Barnacle Geese.

In Turner Sund I saw — at some distance — a flock of geese, which certainly were *Anser leucopsis.* On July 31st I saw moulting old geese, and goslings which were still far from being able to fly (Jamson Land). On August 10th Mr. Hartz saw a very large flock of moulting geese in Hurry Inlet.

Lagopus mutus (Mont.).

In Sabine Ø I saw a brood of Ptarmigan chickens on the 10th of July. They were of the size of a newly hatched chicken of a domestic hen. Only the female bird accompanied the brood. The male was not to be seen anywhere near, while another brood, observed the same day was accompanied by both the old birds. Both cases, I think, are seen equally often. The frequent absence of the male might perhaps be due to the fact that his plumage — while the hen is sitting — is still partially white, and he consequently, no snow being on the ground at that time, more liable to be the prey of falcons.

On the 3rd, 4th and 5th of August I saw several broods in Jameson Land. The smallest chickens were quite as big as a quail, while the largest ones scarcely were distinguishable from the old birds. Besides these cases I saw Ptarmigans or their excrements wherever I came ashore in Greenland.

As I had a pointer with me, I had the opportunity a couple of times to see how the Greenland Ptarmigan behaves before a dog. The hen with little chickens would at first crouch before the dog and then fly almost right at his head; then, with hanging wings, partly running partly flying, she would try to draw the attention of the dog upon herself to get him away from the place, where the chickens were hiding.

The chickens of broods consisting of almost grown-up birds would either run before the dog or stand upright on the bare ground gazing at the pointing dog. — A single brood crouched well among knolls. I have also seen a couple of solitary old males crouching flat on the stone, on which they were sitting, when the dog approached.

Colymbus septentrionalis L. $^{26}/_{6}$. $^{28}/_{6}$. $^{13}/_{7}$. $^{24}/_{7}$. $^{25}/_{7}$. $^{7}/_{8}$. $^{11}/_{8}$. $^{18}/_{8}$. $^{28}/_{8}$.

The Red-throated Diver is found commonly in the fjords and fresh water lakes. It is more frequently seen than *Colymbus glacialis*, and seems like this species to be specially fond of the mouths of big mountain streams, where I suppose the fishing is most profitable.

Downy young ones were seen July 25^{th} in a little lagoon at the mouth of Turner Sund.

Colymbus glacialis L. $^{26}/_{6}$. $^{28}/_{6}$. $^{10}/_{7}$. $^{1}/_{8}$. $^{7}/_{8}$. $^{11}/_{8}$. $^{18}/_{8}$.

The great Northern Diver seems to be more frequent in the fjords than at the outer coast-line.

Fulmarus glacialis (L.).

While the expedition was staying outside the East-coast of Greenland the Fulmar was seen every day, in the floating ice around Jan Mayen, in the North-Atlantic and in the northern part of the North-Sea. — It occurs in greatest numbers around the nesting place Jan Mayen, but it is also numerous in the vicinity of the floating ice-belt and in the outskirts of same. Farther into the ice-belt the bird becomes rarer, and at the coast it is only seen singly, still frequently enough so that hardly a day — as said before — passes without its being seen a couple of miles off land. It never goes very far into the fjords.

According to my observations the grey race seemed to become more numerous the farther west and into the ice the expedition came, and most strikingly so west of Jan Mayen. Of twenty specimens shot July 7^{th}, thirteen were grey. Seventeen of these were closely examined and opened; sixteen proved to be males all with bare nesting-patches. The only female was very downy on this spot but without contour feathers.

The contents of their stomachs consisted of rather big crustaceans, *Hyperia* and *Gammarus*; only a single bird was found to contain remains of fish. Besides they all had cuttle-fish beaks in their crops. These horny objects evidently do duty for stones which are very rarely found in the crop.

Once I had the opportunity of seeing the Fulmar catching fish. While it is generally skimming over the waves and frequently takes its spoil on the wing, in this case it settled down upon the water and moved forwards in little jumps with half-spread wings snatching the fish which by whales were driven up to the surface in a compact shoal. It only put its head under the water and did not display any swimming-diver performance, as it sometimes does. However it is probably unable to dive deeper than two or three feet.

During the light summer time it is on the wing through the whole of the night and strange to say I never saw it sleep in the night but on the contrary in daytime. — Later, in Davis Strait, I have observed the Fulmar sleeping on the water during the warmest time of the day.

It skims indefatigably over the waves, at open sea very seldom rising to a greater height than a few yards above the surface. In calm weather it moves the wings rather quickly, but in a breeze or a gale it can rest upon its spread wings, and cruise against the wind by changing the position of the body to the direction of the wind, but without, apparently at least, moving the wings.

It is indeed a splendid sight to see this excellent flier move about in the air during a storm, but this same bird makes a very wretched figure, when caught and placed on the deck of a ship. The legs can hardly support the body and when it wants to get along quickly the wings must be used as assistance. And yet it cannot rise into the air. It is evidently feeling very uncomfortable, it vomits — very likely to make itself lighter — but all in vain, it is utterly helpless. This splendid aeronaut must have an edge to start from or at any rate a level to rise from with room enough to use wings and legs for quite a distance.

The gunwale of the ship is an insurmountable impediment to it unless it is very windy; then perhaps a puff of wind can reach it — and immediately it rises. If it has to rise from the water in calm weather it is obliged to run as far over the surface as a coot. At the nesting-places its mode of flight is quite another. It is constantly seen circling high up in the air and makes an impression upon the observer quite different from the above described.

The Fulmar is a very greedy bird. When the offal of some big catch — whale or seal — is thrown overboard in the arctic Ocean these birds are at once on the spot to get their part of the spoil and they are often so voracious that they may be caught by hand.

At the eyries there is quite a deafening cackling and jabbering ga-ga-ga-ga which is constantly going on whether the birds are disturbed or not. One can't help getting the impression that it must be some everlasting disagreement that accounts for all this jabbering. — When the expedition visited Jan Mayen on the 26th of June young ones were found in the nests, so they seem to breed early.

Some writers mean that a smaller sized race of these birds exists, and there is in fact a slight variation in size between the single specimens, but on the other hand I have not found any specimen varying so much from the type that there is any reason for classifying it as a subspecies.

Here are the measurements of 14 specimens — all males.

Nr.	length (ctm.)	breadth	colour
1	50 -	112	grey
2	50 -	113½	white
3	48 -	103	grey

Nr.	length (ctm.)		breadth	colour
4	51	-	$114^1/_2$	white
5	49	-	113	grey
6	$48^1/_2$	-	113	grey
7	$49^1/_2$	-	113	grey
8	50	-	110	white
9	49	-	114	grey
10	50	-	108	grey
11	48	-	109	grey
12	46	-	111	grey
13	$49^1/_2$	-	113	white
14	49	-	113	grey

Charadrius pluvialis L.

In Jan Mayen I saw two Golden Plovers June 26^{th}. Unfortunately I did not succeed in securing any of them.

Aegialitis hiaticula L. $^{26}/_6$. $^{28}/_6$. $^{13}/_7$. $^{18}/_7$. $^{24}/_7$. $^{26}/_7$. $^{27}/_7$. $^7/_8$.

The Ringed Plover was seen in Jan Mayen and in Greenland in great numbers. It certainly breeds commonly in both places. In Jan Mayen it was mostly seen on the seashore eating washed-up Calanus (and perhaps other crustaceans), whereas in Greenland it is quite as frequently seen on the mountain slopes and in the river valleys. It seems here to feed upon vegetables and insects. (The last specimen was seen August 7^{th}, but this may possibly be accidental.)

Strepsilas interpres (L.).

I saw the Turnstone on a moory mountain slope between Jameson Land and Liverpool Kyst. The bird moved lively about in the twilight of the night.

Numenius phaeopus (L.). $^{20}/_6$. $^{26}/_6$. $^{28}/_6$.

June 20^{th} a Whimbrel came to the ship. Having tried in vain to perch on the top yard it flew away in ESE. direction. In Jan Mayen a few were seen.

Tringa canutus L.

On the 26th of July I saw two old Knots and a young bird running about seeking food on the sandy beach of Deichmann's Fjord. Two old birds were seen in Dunholm July 28th. In both places the birds were comparatively shy. In the Dunholm they were seeking their food among the sea-weeds on the shore. The old ones still had some red feathers on the lower parts.

Tringa alpina L.

On the 10th of July a few Dunlins were seen in Sabine Ø in the fens at the south side of the island, west of Germaniahafen. They were certainly breeding in this place, but I did not find the nests. A single specimen was seen at Kap Dalton on the 18th of July. In August they gather together with *Calidris arenaria* in great numbers on the sands of Hurry Inlet, a regular Eldorado for waders.

Strange to say they were not found in the river valley which separates the Liverpool Kyst from Jameson Land.

Tringa sp.? $^{10}/_{7}$. $^{24}/_{7}$.

In Sabine Ø and in Turner Sund I saw a *Tringa* — both times at the coast — which was neither *canutus* nor *alpina*; I suppose it vas *Tringa maritima*, to which bird it at least had the greatest resemblance. Both times it flew past very quickly.

Calidris arenaria (L.).

In August the Sanderling is found in vast numbers in the inner part of Hurry Inlet, on the sands formed by the river delta. They partly keep in flocks by themselves, partly mingle with the considerable flocks of *Tringa alpina*, so commonly seen at this place.

Up along the banks of this same river they were not seen.

Larus glaucus Brünn. $^{26}/_{6}$-$^{29}/_{6}$. $^{10}/_{7}$. $^{13}/_{7}$. $^{16}/_{7}$. $^{17}/_{7}$. $^{18}/_{7}$. $^{24}/_{7}$. $^{26}/_{7}$. $^{27}/_{7}$.

The Glaucous Gull bred in Jan Mayen.

On a high holm south of Stewart Ø we found young ones, more than half-grown on July 27th.

During the whole journey I paid special attention to the Glaucous Gulls being anxious to distinguish, if possible, the *Larus leucopterus* Faber, but neither in Jan Mayen nor in East Greenland did I see anything but typical specimens of *L. glaucus*. Later on I have seen numbers of *Larus leucopterus* on the West-coast of Greenland, and there is no difficulty at all in distinguishing the two races when the birds are seen alive.

Larus tridactylus L. $^{18}/_{6}$-$^{6}/_{7}$. $^{14}/_{7}$. $^{31}/_{7}$. $^{22}/_{8}$-$^{24}/_{8}$. $^{2}/_{9}$-$^{5}/_{9}$.

The Kittiwake breeds in Jan Mayen and possibly on Kap Brewster. In Jan Mayen the birds were sitting on June 28th. On those bird-cliffs which I had the opportunity to see here, it occupied the upper shelves.

The Kittiwakes are generally seen in flocks and are fond of following the ships, but even during the lightest nights they disappear as a rule for a short time. When one of the flock gets hold of something too big to be swallowed quickly, the rest of them at once, with great squalling and noise attack the lucky one to take the spoil away from it — if *Lestris parasitica* be not at hand to save them the trouble.

The flocks seen at open sea, far from land, during the summer time generally consist of young birds. These offer very little resistance to the robberies of the *Lestris*, while the old birds, especially when they have young ones to provide for, do their utmost to avoid delivering the spoil. When finally the *Lestris* attacks so hard that feathers are torn off the Kittiwake, the poor creature will try as a last scheme to throw itself on the water, where the Skua can't very well press so hard upon it.

The Kittiwake is the bird most commonly met with on a voyage to Greenland; it follows the ship from Skagerak to Greenland. On the East-coast it cannot be said to be very frequent, and I don't think that it goes so far into the fjords here, as on the West-coast, or even so far as *Larus glaucus* does.

Larus eburneus Phipps. $^{29}/_{6}$. $^{30}/_{6}$.

Strange to say the Ivory Gull was seen very rarely during our voyage in the ice. Only at the stated dates and on Jan Mayen; on all three occasions in very small numbers.

Sterna macrura Naum. $^{26}/_{6}$-$^{28}/_{6}$. $^{10}/_{7}$-$^{12}/_{7}$. $^{13}/_{7}$. $^{16}/_{7}$. $^{18}/_{7}$-$^{24}/_{7}$. $^{26}/_{7}$. $^{27}/_{7}$.

The Arctic Tern was seen in Jan Mayen where it probably breeds. Also in Sabine Ø July 10^{th} & 12^{th}.

At Kap Borlase Warren I saw the greatest number of Terns I ever saw at one time on the East-coast of Greenland. They were about thirty birds together in a flock, resting on a little piece of ice.

Lestris parasitica auct. $^{26}/_{6}$-$^{28}/_{6}$. $^{8}/_{7}$. $^{17}/_{7}$. $^{22}/_{8}$.

In Jan Mayen Richardson's Skua was rather common and presumably it bred there.

Outside the East-coast of Greenland I saw it twice and also at the mouth of Scoresby Sund where it chased the Kittiwakes.

Lestris longicauda (Vieill.). $^{26}/_{6}$-$^{28}/_{6}$. $^{10}/_{7}$-$^{12}/_{7}$. $^{15}/_{8}$.

Buffon's Skua was found breeding in Jan Mayen. On the twenty seventh of June there was one egg in the nest, which was placed in a bog almost in the middle of the narrow part of the island.

It also bred in Sabine Ø, but I did not find the nest, although the behaviour of the bird showed plainly enough that it was close by. It tries by every conceivable devise to lead man (and animals) away from the nest. Standing on a little knoll or at least on some conspicuous place it raises its body straight up and flaps the wings violently. Now its tands on one leg now on two, and it looks as if it was going through some kind of dancing performance.

If the intruder in spite of all comes near the nest it will swoop down upon him in the manner of a tern.

It is frequently seen flying about catching insects, but it also catches the little *Salmo alpinus* in the brooks, diving like a tern.

Lestris pomatorhina (Temm.). $^{21}/_{6}$. $^{24}/_{6}$. $^{25}/_{6}$. $^{26}/_{6}$-$^{28}/_{6}$. $^{4}/_{7}$-$^{8}/_{7}$.

The Pomatorhine Skua was seen now and again on our way to Greenland, partly single specimens partly a few together. June 24^{th} two were shot. When the one had been killed, the other one continued to circle around it, without getting scared by a missing shot, fired at it. They both had remains of fish in their stomachs.

Cepphus grylle (L.). $^{25}/_{6}$. $^{26}/_{6}$-$^{28}/_{6}$. $^{7}/_{7}$. $^{10}/_{7}$. $^{13}/_{7}$. $^{14}/_{7}$. $^{26}/_{7}$.

The Black Guillemot may be considered a true coast-bird. When it is seen so far off land as for instance on the seventh of July (S. Jensen), I think it is because sea with pack-ice easily becomes a resort for coast birds living on crustaceans like the Black Guillemot. It is however very seldom that these birds are seen far from land even when there is ice enough.

Cepphus grylle was found nesting in Stewart Ø, on the rocks south of same and in the Dunholm. In this latter place the young ones were rather big and yet downy. A considerable number was breeding here.

Uria arra (Pall.). $^{20}/_{6}$-$^{7}/_{7}$. $^{14}/_{7}$-$^{17}/_{7}$. $^{28}/_{7}$-$^{31}/_{7}$. $^{23}/_{8}$. $^{2}/_{9}$.

Brünnich's Guillemot was seen in the Atlantic, at Jan Mayen and at the East-coast of Greenland. It was absolutely most abundant at Jan Mayen, where it breeds in considerable numbers. There is a smaller colony on Liverpool Kyst and another on Kap Brewster; great numbers again are breeding together with *Mergulus alle* on a rock between Kap Brewster and Stewart Ø.

These birds were sitting on eggs on the rocks of Jan Mayen during the last part of June.

Here I saw a specimen which was «*hringvia*» on one side but not on the other. I was only a few yards from the bird, but it was no use shooting it as it would have fallen down into a strong surf, where it would have been absolutely lost.

Mergulus alle (L.). $^{23}/_{6}$. $^{6}/_{7}$. $^{15}/_{7}$-$^{17}/_{7}$. $^{28}/_{7}$-$^{31}/_{7}$. $^{12}/_{8}$. $^{22}/_{8}$. $^{2}/_{9}$.

The Little Auk was seen in far less numbers in the floating ice this year than in 1891 (Ryder's Exp.). In Jan Mayen it breeds; among other places on — or rather in — some high mountains on the north side of the south Lagoon, rather far off the coast. On Liverpool Kyst I saw three different nesting places where also a number of Guillemots were living: on Kap Brewster and on the bird-cliff between Kap Brewster and Stewart Ø. In the latter place it breeds in numbers. In Scoresby Sund only a few were seen, possibly because the ice did not break up until the end of July.

A specimen was found dead without any visible injury in Jameson Land, about four miles from the coast. It had probably lost its way in the fog.

Fratercula arctica (L.). $^{23}/_{6}$-$^{29}/_{6}$.

The Puffin was only seen about Jan Mayen where it breeds in comparatively small numbers.

Falco gyrfalco L.

At Kap Stewart the Falcons occupied the same nesting place as in 1891—92 when I was here with Ryder's Exp.; besides two other nesting places were seen on Neill's Klipper along the coast of Hurry Inlet.

Both grey (one specimen) and light coloured falcons were seen. Also in the Carlsberg Fjord a few were seen.

Nyctea nivea (Thunb.). $^{27}/_{7}$.

In Stewart Ø was found a wing of the snowy Owl. Otherwise this bird was not seen by the expedition.

Corvus corax L. $^{28}/_{7}$. $^{4}/_{8}$. $^{11}/_{8}$. $^{22}/_{8}$. $^{27}/_{8}$.

In Dunholm, in the surroundings of Scoresby Sund and at Fleming Inlet Ravens were seen now and again, mostly singly or in pairs.

Saxicola oenanthe (L.). $^{2}/_{8}$-$^{6}/_{8}$. $^{12}/_{8}$.

In Jameson Land a few Wheatears were seen. Very likely they are more abundant in the inner part of the fjords.

Cannabina linaria (L.). $^{11}/_{7}$. $^{24}/_{7}$. $^{26}/_{7}$. $^{27}/_{7}$. $^{2}/_{8}$-$^{6}/_{8}$.

The Redpoll was seen in most places where we landed. From August 2^{nd} to 6^{th} it was observed flying about in small flocks of 5 or 6 individuals, very likely young birds just beginning to fly.

Emberiza nivalis L. $^{11}/_{7}$. $^{13}/_{7}$. $^{18}/_{7}$. $^{24}/_{7}$. $^{26}/_{7}$. $^{27}/_{7}$. $^{31}/_{7}$. $^{1}/_{8}$-$^{6}/_{8}$. $^{11}/_{8}$-$^{13}/_{8}$. $^{15}/_{8}$. $^{25}/_{8}$. $^{28}/_{8}$.

The Snow Bunting was seen almost everywhere, where we landed in Greenland. At Kap Dalton young birds were seen flying about.

Thalassidroma sp. $^{19}/_{6}$. $^{20}/_{6}$.

Positions at noon of the «Antarctic».

Date.						
18/6	lat.	59° 24′	N.;	long.	4° 11′	E.
19/6	-	60° 26′	-	—	3° 10′	-
20/6	-	62° 16′	-	—	1° 14′	-
21/6	-	63° 51′	-	—	0° 23′	W.
22/6	-	65° 19′	-	—	2° 00′	-
23/6	-	67° 19′	-	—	4° 21′	-
24/6	-	69° 06′	-	—	6° 12′	-
25/6-29/6		Jan Mayen.				
30/6	lat.	71° 20′	N.;	long.	10° 30′	W.
1/7	-	71° 31′	-	—	7° 43′	-
2/7	-	72° 30′	-	—	6° 41′	-
3/7	-	73° 06′	-	—	4° 43′	-
4/7	-	73° 32′	-	—	3° 30′	-
5/7	-	74° 09′	-	—	4° 36′	-
6/7	-	74° 30′	-	—	5° 30′	-
7/7	-	74° 21′	-	—	8° 18′	-
8/7	-	74° 09′	-	—	11° 31′	-
9/7	-	74° 15′	-	—	12° 21′	-
10/7	-	74° 19′	-	—	17° 10′	-
11/7-13/7		Sabine Ø.				
14/7		Kap Borlase Warren.				
15/7		Kap Broer Ruys.				
16/7	lat.	72° 02′	N.;	long.	21° 20′	W
17/7	-	70° 29′	-	—	21° 21′	
18/7-21/7		Kap Dalton.				
22/7-28/7		Turner Sund.				
29/7	lat.	69° 51′	N.;			
30/7		Dunholm.				
31/7		Scoresby Sund.				
1/8-14/8		Hurry Inlet.				
15/8-16/8		Scoresby Sund.				
17/8-21/8		Hurry Inlet.				
22/8		Scoresby Sund.				
23/8	lat.	70° 59′	N.;			
24/8		Davys Sund.				
25/8-26/8		Fleming Inlet.				
27/8-28/8		Kong Oscars Fjord.				
29/8		Segelsällskapets Fjord.				
30/8-31/8		Forsblads Fjord.				
1/9		Davys Sund.				
2/9	lat.	70° 56′	N.;	long.	18° 54′	W.
2/9	-	68° 42′	-	—	17° 15′	-
4/9	-	67° 17′	-	—	29° 53′	-
5/9		Dyrefjord.				

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 Grønland. 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 Land[1]) and from JAMESON's Appendix to the same[2]), 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 ...

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[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—70[1]), discovered Jurassic beds somewhat further north, on

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[1]) Die zweite deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän 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.

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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. Ryder[1]). 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. Hartz[1]) who referred them to the Rhætic or to the Rhætic-Lias formation.

The animal-remains were examined by B. Lundgren[2]). 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 grönlandica 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.

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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. Buch.
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. Nathorst [1]).

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

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[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, Belemnites 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. HARTZ[1]), while G. AMDRUP, who had the chief command of this expedi-

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[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 Vardeklöft[1])

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[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 Vardeklöft, 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 Kruuse, 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. Koch [1]).

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 LORIOL.

Plate VI, figs. 1—6.

1878. DE LORIOL, 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 LORIOL. Very rarely fragments of stalks occur, in which the suture-line bears centrally a small round depression as in *Pentacrinus crista-galli*, QUENSTEDT[1]) (pl. VI, fig. 6), but the tubercle in the middle of the side of the stem-joints, described by DE LORIOL as characteristic of this species, has not been observed.

[1]) DE LORIOL, 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 Andreæ* quoted by DE LORIOL 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 Vardeklöft 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 Lundgren [1], 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*, Pompeckj [2].

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 Vardeklöft. It resembles

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[1] Lundgren, B. 1895, p. 195, pl. III, fig. 4.

[2] Pompeckj, J. F. 1899, p. 60 and 125—127.

Pecten Stewartianus, Lundgren [1]), 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 46mm long and 45mm 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 Lundgren[1]) 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 Pompeckj[2]) 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.

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[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 Schlippe[1]), 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. Schlosser[2]) quotes it from the «brown Jura δ» (Humphriesianum-zone) of Franken and of Oberpfalz.

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[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 Lundgren[1]) 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.

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[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 Portlandian[1].

Aucella Pallasii is quoted from the Kimeridge Clay of Lincolnshire[2]. It has also been found by Nathorst[3] 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

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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 Lycett [1]) 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

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[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 Lincolnshire [1]).

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. Kjöbenhavn. 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 Vardeklöft 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. Kjöbenhavn 1896. Hefte 19, p. 205, tab. IV, fig. 24.

Two dark-coloured calcareous sandstone casts, with fragments ofshell attached, are identical with Lundgren's description and figures of this species. These specimens were collected in blocks in Vardeklöft 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.

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[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-Strangways [1]) and Woodward [2]) 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.

Schlosser [3]) quotes *Astarte elegans* as occurring in the «brown Jura γ» or Sowerbyi-zone of Franconia.

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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 LORIOL.

Pl VI, fig. 16.

1867. DE LORIOL 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 Collection [1]). 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 ovoides* v. BUCH [2]), 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 ovoides.*

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.

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[1]) SKEAT, E. G., and MADSEN V. 1898. On Jurassic, Neocomian and Gault boulders found in Denmark. Kjöbenhavn. Danmarks geologiske Undersögelse 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 Moscau. 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 donaciformis*, Lyc. *an angulata*, Lyc. in the Munich Collection, which came from the «brown Jura β» (Murchisonæ-zone) of Heininger 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 Woodward[1]) 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.

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[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»; SCHLOSSER [1]) quotes it from the «brown Jura δ» (Humphriesianum-zone) and «brown Jura ε» (Parkinsoni-zone). In England, WOODWARD [2]) gives it as occurring in the Inferior Oolite (Murchisonæ-zone) of Dorsetshire.

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[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-Strangways [1]) gives them as occurring in the Jurense-zone, Millepore Bed and Cornbrash of Yorkshire, and Woodward [2]) 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.

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1) Fox-Strangways, C. 1892, p. 61.
2) Woodward, H. B. 1894, p. 560.

Gresslya peregrina occurs, according to Fox-Strangways[1]), 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. Woodward[2]) 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

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[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-Strangways[1]) gives it as occurring doubtfully in the Grey Limestone, also in the Cornbrash, Lower Calcareous Grit and Lower Limestone of Yorkshire. Woodward[2]) 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. Ufortunately 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 Vardeklöft, 550—880 metres above sea-level. These specimens are, unfortunately, so badly preserved that they cannot be determined.

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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	of last whorl	= 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	of last whorl	= 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 umbilicius 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*, Newton [2]) by their more flat-

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[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. Keysfrling. *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 Vardeklöft. 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 Kœttlitzi*, 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 Vardeklöft, seems to bear a strong resemblance to the species *Macrocephalites compressus*, Quenstedt. 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.

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

Macrocephalites compressus is quoted by Quenstedt from the «brown Jura ε» (Lower Callovian) of Swabia and by Schlosser[1]) 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 Bonarelli[2]) from Chanaz (Savoy).

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[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 Vardeklöft 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 140mm and its dimensions and their proportions to one another are as follows: —

	of about		of about		of about		of about
Diameter	140mm	(= 1)	124mm	(= 1)	57mm	(= 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)	15mm
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.

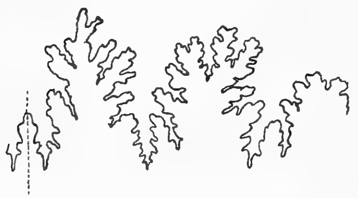

Fig. 2. Suture-line of *Cadoceras crassum nov. sp.*

It has to some extent been possible to develop out the suture-lines on one of the specimens. These are deeply divided, as is shown in the figure. The external saddle is high and narrow; the first superior lateral saddle is broader 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 sublæve*, Desl.[1]) and *Cadoceras Elatmæ*, Nikitin[2]).

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 Vardeklöft, 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. I, 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 possible 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 neigbourhood 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.

Belemnoidea.

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. F o s s i l s 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.

    Belemnoidea-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. F o s s i l s 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.

    Belemnoidea-fragments.

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

5. F o s s i l s, 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. F o s s i l s 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 Jurense-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, *Pholydomya 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. Andreæ, 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.

Belemnoidea-fragments.

Pentacrinus Andreæ 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 Vardeklöft 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 Hartzi, 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 Vardeklöft 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 Vardeklöft.

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 Russia [1]. 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 Land [2], 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 Land [3] are deposits, which have been referred to the Bajocian, to the Lower, Middle and Upper

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[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 palæo-geographical significance. As Pompeckj[3] 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. Andreæ, de Loriol.

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 $^2/_1$).

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 $^2/_1$).

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 $^2/_1$. 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 LORIOL.

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.

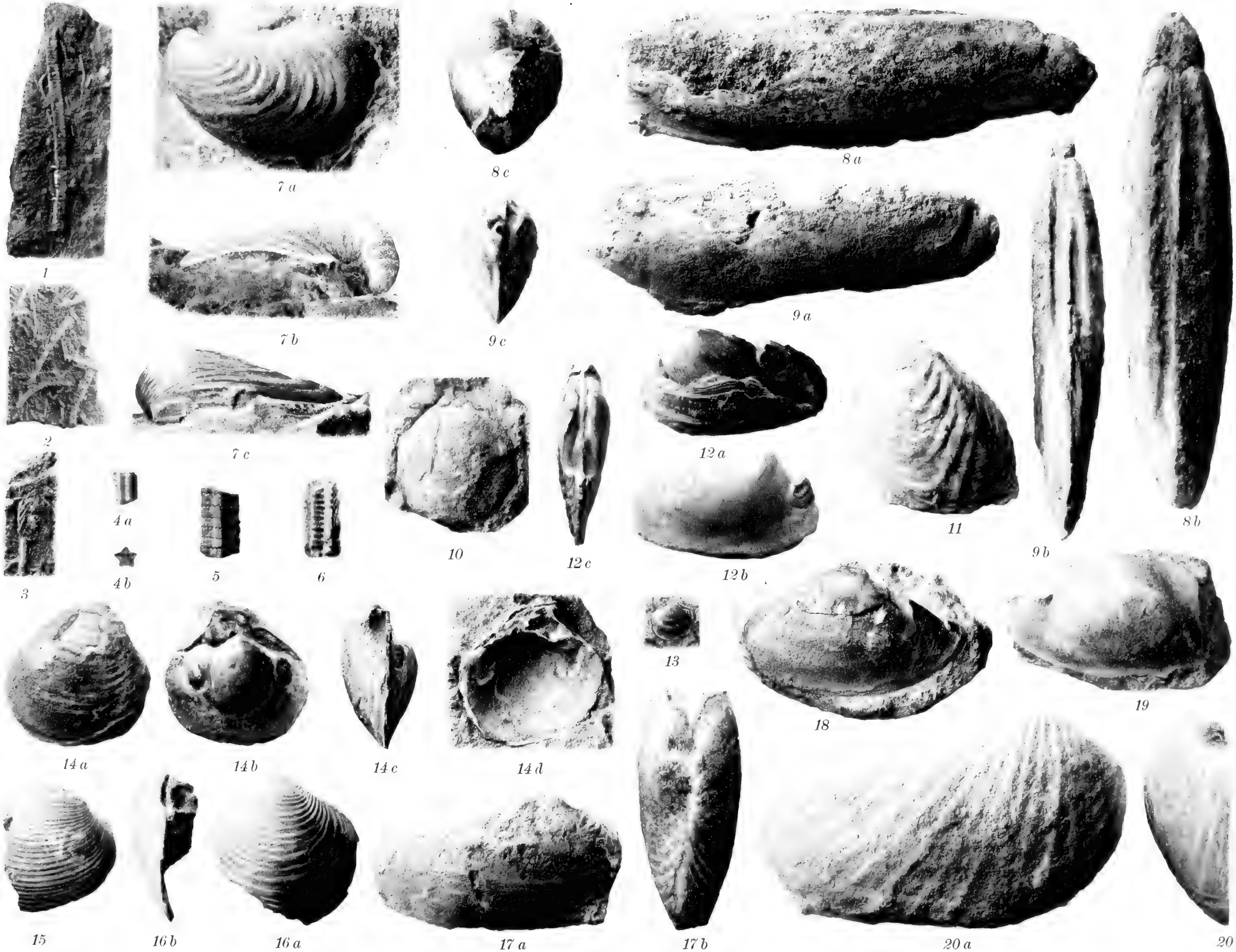
Fig. 3. Left valve: a) interior, b) exterior, c) posterior view.

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.



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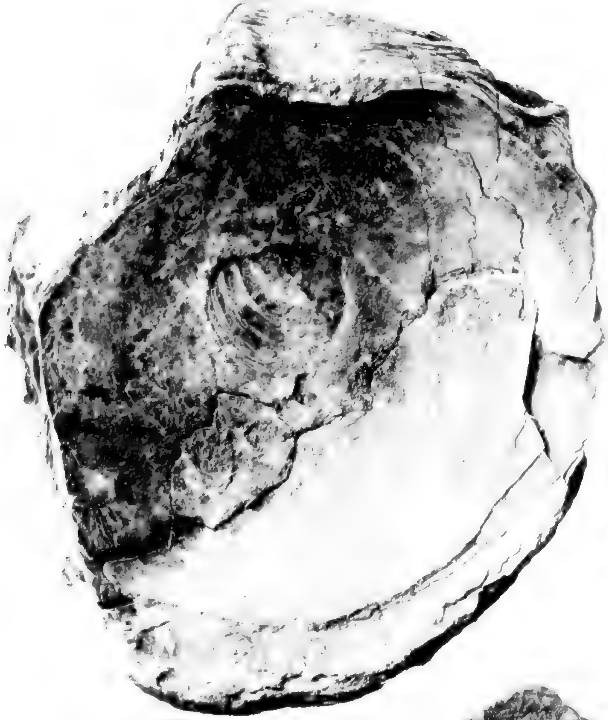

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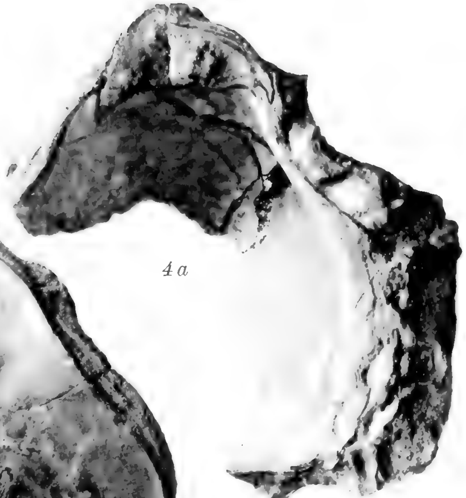
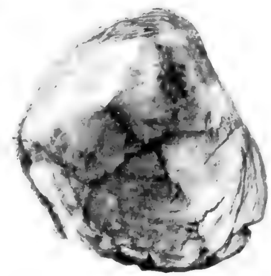


4 a

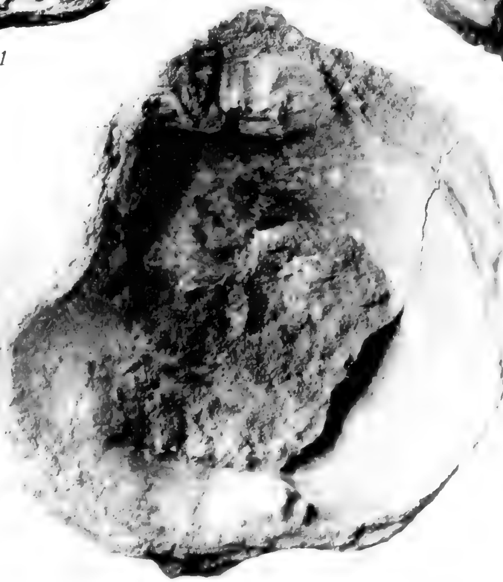
4 b

5 c



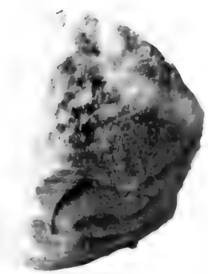
5 a

3 c



3 a

3 b



5 b

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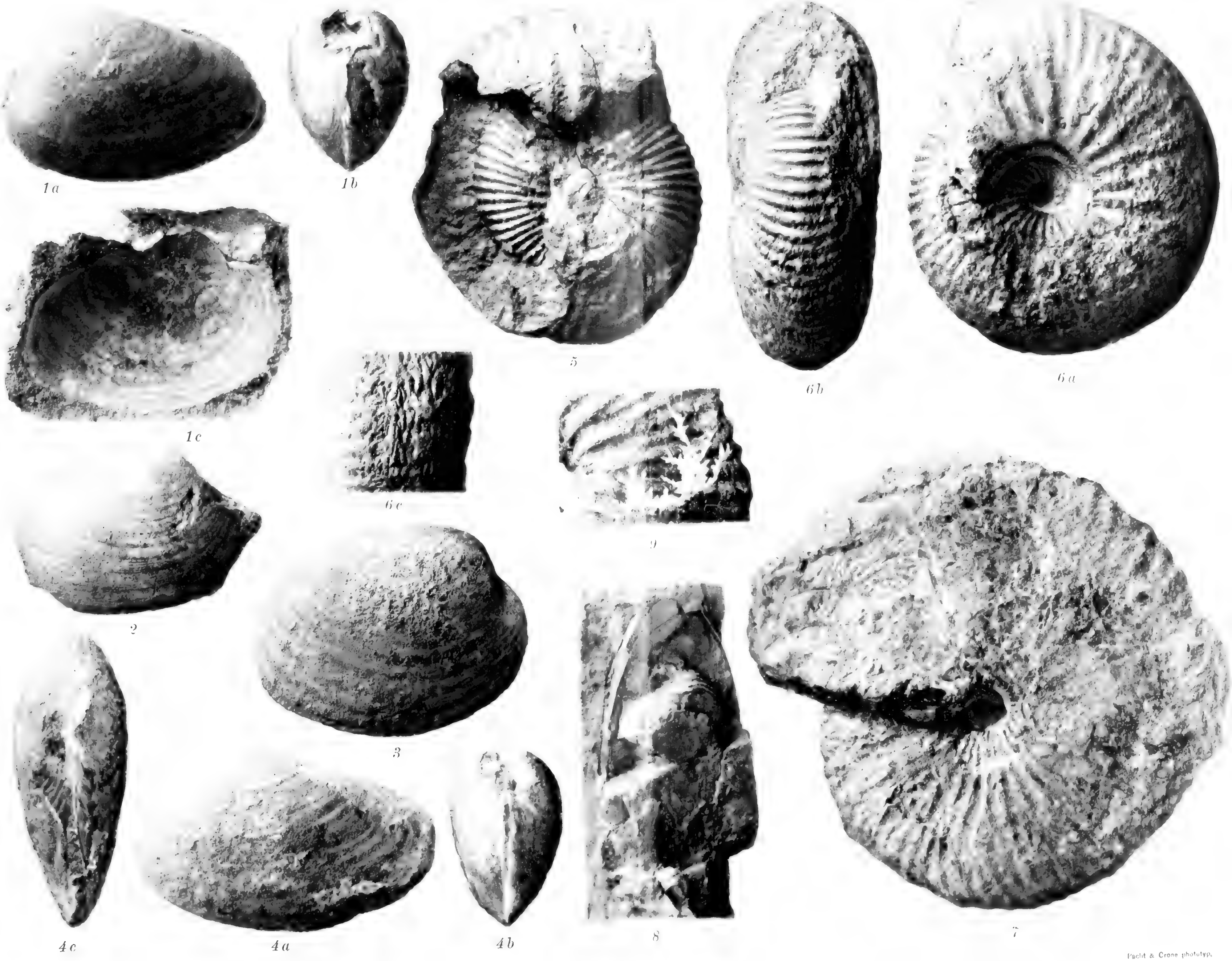

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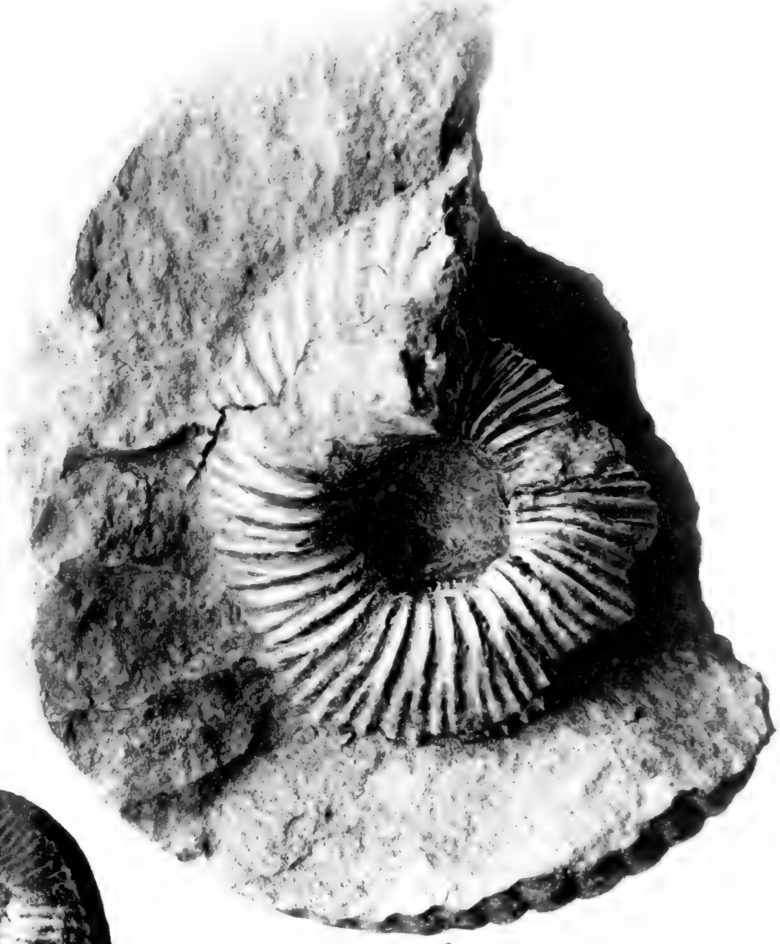

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3

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Pacht & Crone phototyp.

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 sandstoue 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 Vardeklöft.

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.

2 c

2 a

3 b

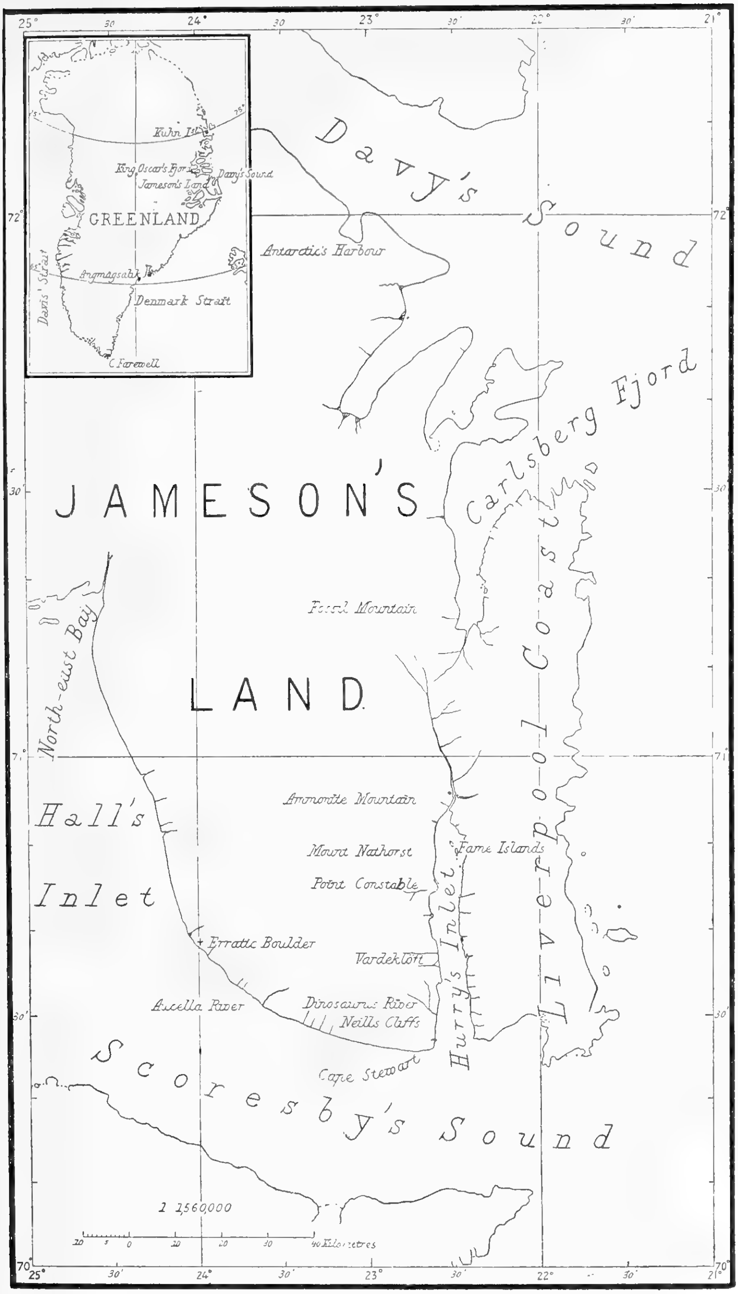
1

2 b

3 a

Th. Bloch phot. et del.

Pacht & Crone phototyp.


Kuhn Id.
King Oscar's Fjord
Davy's Sound
Jameson's Land
GREENLAND
Angmagsalik
Davis' Strait
Denmark Strait
C. Farewell
Davy's Sound
Antarctic's Harbour
JAMESON'S
LAND
Carlsberg Fjord
Liverpool Coast
Fossil Mountain
North-east Bay
Hall's Inlet
Ammonite Mountain
Mount Nathorst
Fame Islands
Point Constable
Erratic Boulder
Vardekløft
Hurry's Inlet
Aucella River
Dinosaurus River
Neills Cliffs
Cape Stewart
Scoresby's Sound
1: 1,560,000
Kilometres

VII.

The Fishes of East-Greenland.

By

Ad. S. Jensen.

When I was requested to give a list of the fishes collected by the Amdrup-expedition of 1898—99 and the Amdrup-Hartz-expedition 1900, I resolved also to take into consideration the material which the Zoological Museum has obtained in other ways up to last autumn, and to compile the notes upon this subject spread in literature or, in other words to give a general survey of the Fish-Fauna of East-Greenland.

My colleagues will perhaps think that the material at hand is not everywhere treated as universally as might be wished. I admit this objection to be justified, but at the same time I must inform them that I am just now preparing a survey of the Fish-Fauna of all Greenland destined for publication in *Conspectus Faunæ Groenlandicæ* and for this reason I have not everywhere entered into minute examinations.

With respect to the position of the localities mentioned in the list, I refer to the splendid maps in volume X and XXVII of „Meddelelser om Grönland“, and to the map in the second volume of Professor Nathorst's book „Två Somrar i Norra Ishafvet“ (1900). In the present treatise p. 224 will moreover be found a list of the localities drawn up for the greater part by Lieut. C. Amdrup. Where more localities have been recorded they are arranged successively from South to North.

I hereby tender my heartiest thanks to Prof. Dr. F. A. Smitt (Stockholm) and Dr. E. Lönnberg (Upsala) who have kindly given me admission to and information with regard to the fishes collected by the Swedish expeditions to East-Greenland.

Copenhagen, Zoological Museum, jan. 1903.

Ad. S. Jensen.

I have tried to include in this list all the fishes from the East-coast of Greenland which are known up till the present time. It embraces the following species which will be more thoroughly treated in the subjoined pages:

Liparis fabricii Kr., p. 252.
Liparis (Careproctus) reinhardti Kr., p. 255.

Blenniidæ.

Lumpenus maculatus Fries, p. 255.
Lumpenus lampetriformis Walb., p. 255.
Lumpenus medius Reinh., p. 256.

Zoarcidæ.

Lycodes pallidus Coll., p. 256.
Lycodes eudipleurostictus Jensen, p. 257.
Lycodes reticulatus Reinh. var. n. *macrocephalus*, p. 258.
Lycodes seminudus Reinh., p. 260.
Lycenchelys kolthoffi n. sp., p. 261.
Gymnelis viridis Fabr., p. 264.

Gadidæ.

Gadus callarias L., p. 265.
Gadus ogac Rich., p. 265.
Gadus saida Lep., p. 266.
Brosmius brosme Ascan., p. 270.
Onus reinhardti (Kr.) Coll., p. 270.

Macruridæ.

Macrurus fabricii Sundev., p. 271.

Pleuronectidæ.

Hippoglossus hippoglossoides Walb., p. 271.
Drepanopsetta (Platysomatichthys) platessoides Fabr., p. 272.

Paralepididæ.

Paralepis kröyeri Lütk., p. 272.

Salmonidæ.

Salmo alpinus L., p. 273.
Mallotus villosus Müll., p. 274.

Plagiostomi.

Somniosus microcephalus Bl. Schn., p. 276.

The number — 36 species altogether — seems small, yet it is not quite inconsiderable when we remember the severe climate of the sea. Moreover we may expect the list to be increased in the course of time. Perhaps not very many «new» species will be added from the north of East-Greenland, as this part of the coast has been visited by several well equipped expeditions, especially of late years. On the other hand a closer examination is still needed with regard to the southern part of the coast from Kap Farewell to the Arctic circle, as only a small part of the latter viz. the neighbourhood of Angmagsalik has been explored, and then only more or less casually, and just here we may as I shall soon explain still expect to make interesting discoveries.

A few universal remarks about the Fish-Fauna of East-Greenland will not be deemed out of place as an introduction to the systematical list.

As will be percieved the deep-sea fishes properly so-called are not mentioned in the list (perhaps with a single exception: *Aphanopus minor* Coll. compare p. 226); very little is indeed as yet known of the abyssal fish-fauna off East-Greenland. I have had the opportunity of seeing at the «Riks-Museum» of Stockholm the ichthyological result of a trawling done by the Kolthoff-expedition in 1900, between Jan Mayen and Greenland (72° 42′ lat. N. 14° 49′ long. W.) at a depth of 2000 metres: *Lycodes frigidus* Coll., *Paraliparis bathybii* Coll. and *Rhodichthys regina* Coll. All three species are characteristic of the deep icy Polar sea, and are not known elsewhere[1]. In Denmark Strait between Iceland and Greenland some trawling was done by the Danish Ingolf-expedition 1895—96, and here from

[1] I have proved in my «Ichthyologiske Studier» (p. 207) (Vidensk. Medd. Naturhist. Foren. Kbhvn. 1901) that the *Lycodes* from the deep Atlantic off the East-coast of North America, which American ichthyologists have identified with the *Lycodes frigidus* Coll. of the Polar sea, is a different species which I have designated *L. atlanticus*.

depths of 568—1300 fathoms (stations 11, 90 and 91) quite different abyssal fishes were brought to light: *Macrurus (Coryphænoides) rupestris* Gunn., *M. ingolfi* Lütk., *M. (Hymenocephalus) goodei* Günth. and *M. (Chalinura) simulus* G. & B. all of them characteristic of the deep warm Atlantic sea. In these hauls we have an indication that the abyssal fish-fauna of East-Greenland belongs to two different deep-sea faunas, one northern with the same species of fishes as the rest of the deep Polar sea (this means a deep-sea which is not bounded by the Arctic-circle, but by the submarine ridges of the sea-bottom between Greenland—Iceland—the Faroe Islands and the Shetland Islands), and one southern with the same species of fishes as the large Atlantic-basin. This is of course due to the hydrographical conditions. The said ridges prevent an exchange of the deeper layers of water so that North of the ridges, from the bottom up to about 300 fathoms under the surface, Polar water is constantly found with a temperature below 0° C., and South of the ridges we have Atlantic water the temperature of which is always positive[1]).

The influence of Atlantic water seems also to be traceable nearer East-Greenland at the southern part of the coast. Now and again especially in July and during the end of the summer off the fjords in the neighbourhood of Angmagsalik (Sermilik a. s. o.) at about 65° 35′ lat. N., the Eskimo harpoon Crested Seals *(Cystophora cristata)* coming to the surface with large fishes in their mouths. In this way the museum has obtained fishes as *Brosmius brosme* Ascan., and *Macrurus rupestris* Sundev., species which live at depths of about 50—300 fathoms, and which as far as I know are not fond of Polar water. I therefore presume that at any rate at some times of the year warm Atlantic water must be found off the coast of

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[1] Compare besides my above mentioned treatise in Vidensk. Medd. Naturhist. Foren. Kbhvn. 1901.

Angmagsalik. Species as Rose-fish (*Sebastes marinus* L.) and the Cod (*Gadus callarias* L.) which are only exceptionally found in Polar water are likewise only known from Angmagsalik, and south of this place. Where trawling has been done farther north at corresponding depths only pure Cold-water species have been caught (as *Lycodes eudipleurostictus* Jensen, and *L. pallidus* Coll.) or species which thrive in sea water of both positive (low) and negative degree (as *Cottunculus microps* Coll., and *Liparis (Careproctus) reinhardti* Kr.).

The shallow-water fish-fauna as far as can be judged at present, is arctic, and as will be seen by the list the same species are for the greater part met with all along the long coast-line. *Cottus quadricornis* L. forms however a remarkable exception. It is plentiful enough from Turner Sund and farther north but is not found at Angmagsalik. The circumstance that this high-arctic fish[1]) is not found at the southern coast is interesting considered f. i. in connection with the fact that an equally strongly marked high-arctic species among the Mollusca viz. *Yoldia (Portlandia) arctica* Gray (which lives together with *C. quadricornis* in Turner Sund and farther north) is also missing at the southern part of the coast. On the other hand there is among the Mollusca a boreo-arctic species which thrives admirably at Angmagsalik, but does not appear farther north, viz. the common Mussel (*Mytilus edulis* L.). I do not therefore consider it quite improbable that when the southern coast gets

[1]) At West-Greenland it does not go farther south than Baffin Bay; else it lives at the Arctic America, in the Icy sea of Siberia, and in the White-Sea (and in the inner part of the Baltic, and some large lakes connected with this sea, where it is considered as a relict-species from the Glacial-period). It has been found farther north than any other fish viz. at $82^1/_2°$ lat. N. (Dumb-bell harbour at Grinnell-Land). — It is not unknown to me that writers as Francis Day maintain its distribution at the British Islands, but I feel convinced that these accounts are based on some mistakes. I also consider as wrongly determined the young ones which have lately been described and figured by English biologists as young ones of «*C. quadricornis*».

rationally explored there may be found also in the littoral region some comparatively southern fish-species. May not also the circumstance that the Capelan (*Mallotus villosus* Müll.) has not been observed to resort to the coast to spawn, farther north than Angmagsalik (compare p. 275—76), point in the same direction? So much may be said with regard to the littoral fauna that though it is arctic on the whole a degree of difference asserts itself between the southmost and the more northerly coast as the latter is inhabited by certain high-arctic species of animals which are not found at the former part[1]).

The pelagic fish life off East-Greenland is hardly known at all. The frequent occurence of the Polar-cod (*Gadus saida* Lep.) (and other shore-forms) among the field-ice is very interesting (compare p. 267—68).

In the fresh waters of East-Greenland only two species of fishes are found viz. the Threespined Stickleback (*Gasterosteus aculeatus* L. var. *gymnurus* C. V.) and the Arctic Charr (*Salmo alpinus* L.); the last named however lives part of the time in fresh, and part of the time in salt water (compare p. 274).

With respect to a judgment of the quantitative composition of the fish-fauna we have only few data to go by, as only few hauls were made with appliances fit for the catching of fish. Yet it seems as if certain coast-fishes are found in rather large numbers. By a sweep with an eel-seine which the Zoologist Sören Jensen made at Angmagsalik in the middle of September 1900, and where the seine was drawn from 9 fathoms to the shore, no less than 120 fishes were thus caught consisting chiefly of: *Gymnacanthus tricuspis, Cottus scorpius, Icelus bicornis, Triglops pingelii* and *Gadus saida*. Another sweep with eel-seine at Jameson Land in Hurry Inlet (at the

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[1]) Where the boundary is situated between the zoo-geographical «southern» and «northern» coast, cannot be determined at the present time, as the coast from Angmagsalik to Kap Dalton zoologically is practically unexplored.

beginning of August 1900) where the seine was drawn from 7—0 fathoms gave 80 fishes altogether, for the greater part *Gymnacanthus tricuspis, Triglops pingelii* and *Gadus saida* (fry) [1]).

List of the Literature in which are found communications about Fishes from East-Greenland.

William Scoresby jr.: Journal of a voyage to Northern Whale-fishery. Edinburgh 1823.

In the report of this voyage where the East-coast of Greenland was navigated from about 70—75° lat. N. 4 species of fishes met with are mentioned (Appendix No. III, p. 423). One was the Greenland Shark (*Somniosus microcephalus* Bl. Schn.) which is here designated «*Squalus borealis*» [2]). The three others were found in the stomachs of Narwhals: «*Raja batis*» is presumably wrongly determined as to species. «*Gadus carbonarius* (?)» and «*Pleuronectes* —?» can only be determined as to genus.

W. A. Graah: Undersøgelsesrejse til Østkysten af Grønland. Kjøbenhavn 1832.

Lieutenant Graah who explored the southern part of the East-coast of Greenland mentions (p. 194) 8 species of fishes which he himself has seen there. He mentions them partly by Danish and Greenland names, partly by systematical names taken from O. Fabricii Fauna Groenlandica or imparted to him by Professor Reinhardt sen. The species are: *Gymnacanthus tricuspis* Reinh. («Ulke» etc), *Sebastes marinus* L. («Rødfisk» etc.), *Salmo alpinus* L. («Ørred» etc.), *Mallotus villosus* Müll. («Lodde» etc.), *Gadus callarias* L. («Torsk» etc.), *Gadus ogac* Rich. («Torsk», «Ogak» etc.), *Hippoglossus hippoglossoides* Walb. («Helleflynder» etc.), *Somniosus microcephalus* Bl. Schn. («Hajfisk» etc.).

Die zweite Deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän Karl Koldeway. 2. Bd. Wissenschaftliche Ergebnisse. Leipzig 1874. II. Zoologie.

At page 169—173 Professor W. C. H. Peters mentions 6 species which the above named expedition («The Germania-expedition») brought home from Kap Broer Ruys, and from Jackson-, Clavering-, Sabine- and Shannon Ø. The species are: *Cottus quadricornis* L. («*C. hexacornis* Rich.»), *Cottus*

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[1]) The expedition also carried with them a large Otter-trawl, but faults in the rigging and manœuvring of it brought about that hardly any catch was got by it wherefore it was quite given up after a few attempts, and hereby the opportunity was unfortunately lost for rational deep-water fishing. The Beam-trawl employed instead of the former only gave a very slight yield of fish.

[2]) Described and figured by Scoresby in: An account of the Arctic Regions. Vol. I, p. 538, table XV, fig. 3—5.

scorpius L. («*C. porosus* C. V.»), *Icelus bicornis* Reinh. («*I. hamatus* Kr. »), *Liparis fabricii* Kr.? («*L. gelatinosus* Pall.»), *Gadus saida* Lep. («*G. glacialis* Peters n. sp.»), *Salmo alpinus* L. («?*S. Hoodii* Rich.»).

Robert Collett: *Aphanopus minor*, en ny Dybvandsfisk af Trichiuridernes Familie fra Grønland. Christiania Videnskabs-Selskabs Forhandlinger 1886. No. 19.

Description of a new species *Aphanopus* taken off the southern part of East-Greenland.

Den østgrønlandske Expedition, udført i Aarene 1883—85 under Ledelse af G. Holm. 2. Del. Meddelelser om Grønland. 10. Hefte. Kjøbenhavn 1888.

Captain G. Holm mentions (p. 54) of the fishes which are found at Angmagsalik at the southern part of East-Greenland: «Angmagsæt'er» (*Mallotus villosus* Müll.), «Hajer» (*Somniosus microcephalus* Bl. Schn.), «Lax» (*Salmo alpinus* L.), «Ulke», «Stenbidere» (*Cyclopterus*), «Rødfisk» (*Sebastes marinus* L.), «Fjordtorsk» (*Gadus ogac* Rich.), «Helleflyndere» (*Hippoglossus hippoglossoides* Walb.). At page 81—82 he gives some interesting information about the food-fishes which are of importance for the Eskimo: Sharks, Salmon and Angmagsæt.

F. A. Smitt: Skandinaviens Fiskar. 1. Del. Stockholm 1892.

At page 159 is mentioned a *Cottunculus microps* Coll., taken off the South-eastern part of Greenland by the Nordenskiöld-expedition 1883.

Den østgrønlandske Expedition, udført i Aarene 1891—92 under Ledelse af C. Ryder. Meddelelser om Grønland. 19. Hefte 1896.

E. Bay, who was the zoologist of this expedition, gives a report, p 52—58, of the fishes caught or observed especially from Scoresby Sund and Angmagsalik. The determinations as to species are by C. F. Lütken. Altogether 15 species are mentioned viz.: *Cottus quadricornis* L., *Cottus scorpius* L., *Gymnacanthus tricuspis* Reinh. («*Phobetor ventralis* C. V.»), *Artediellus* («*Centridermichthys*») *uncinatus* Reinh., *Icelus bicornis* Reinh. («*I. hamatus* Kr.»), *Cyclopterus spinosus* Fabr., *Liparis fabricii* («*L.* sp.»), *Lumpenus lampetriformis* Walb., *Gymnelis viridis* Fabr., *Gasterosteus aculeatus* L., *Gadus saida* Lep., *Salmo alpinus* L., *Mallotus villosus* Müll., *Paralepis kröyeri* Lütk., *Somniosus microcephalus* Bl. Schn. — It moreover contains biological observations of some of the species.

F. A. Smitt: On the genus *Lycodes*. Bihang till K. Svenska Vet. Akad. Handlingar. Bd. 27. Afd. IV. No. 4. Stockholm 1901.

This treatise contains among other things descriptions of the *Lycodinæ* caught by the Nathorst-expedition 1899, and the Kolthoff-expedition 1900, at the northern part of East-Greenland (Franz Joseph's Fjord and farther north). Through the kindness of Professor Smitt, I have had the opportunity of examining this material and have thereby arrived at the result that it contains the following species from East-Greenland: *Lycodes pallidus* Coll., *L. eudipleurostictus* Jensen, *L. reticulatus* Reinh. var. n. *macrocephalus*, *L. seminudus* Reinh. and *Lycenchelys kolthoffi* n. sp.

E. Lønnberg: The fishes of the Swedish zoological polar expedition of 1900. Revue internationale de pêche et de pisciculture. Vol. II, No. 4. St.-Pétersbourg 1900.

Gives a list of the fishes which were caught by the Kolthoff-expedition 1900, at the North-eastern part of Greenland, containing, besides the above mentioned *Lycodinæ* which are partly designated by other names, 12 species whereof *Triglops pingelii* Reinh., *Liparis (Careproctus) reinhardti* Kr. («*Cyclogaster gelatinosus*») and *Drepanopsetta platessoides* Fabr. were new to the fauna of East-Greenland. Dr. Lønnberg kindly imparted to me, for use in this treatise, information with regard to some of the rarer species.

During the last years some rather considerable collections have moreover been made by Danes at East-Greenland. The ichthyological results of these collections will be mentioned for the first time in this treatise. We are indebted for new contributions to the following gentlemen:

Cand. med. & chir. K. Poulsen who was a member of Lieutenant Amdrup's expedition 1898—99, brought home from Angmagsalik and some places north of it 10 species of fishes of which *Liparis liparis* L. was new to the fauna.

The late Mag. sc. Sören Jensen who was the zoologist of the Amdrup-Hartz-expedition 1900 brought home a very considerable material of fishes, from a quantitative point of view, taken at the tract from Sabine Ø to Angmagsalik[1]). The collection contained 15 species of which *Lumpenus medius* Reinh. was new to the fauna. This collection is of great importance because we can thereby judge of the relative frequency of some species (compare p. 214—15). A diary left by Jensen contained among other things some biological notes about fishes from which some extracts are found in this treatise.

Johan Petersen, commercial manager, and Søren Nielsen, assistant, at Angmagsalik, sent us respectively in 1900 and 1901 7 species of fishes whereof *Brosmius brosme* Ascan. was new to the fauna.

Mag. sc. Chr. Kruuse, who stayed at Angmagsalik 1901—02, for the purpose of botanical studies, took the opportunity at my request of collecting zoologically as well. He brought home 16 species of fishes, whereof no less than 3 were unknown to the fauna of East-Greenland viz.: *Lumpenus maculatus* B. Fries, *Onus reinhardti* (Kr.) Coll. and *Macrurus fabricii* Sundev., and about others we had up till then only verbal records. I am moreover indebted to Kruuse for much information about the fish life at Angmagsalik.

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[1]) On the way the expedition called at **Jan Mayen**, where however only the following fishes were taken (June 25—28): *Cottus scorpius* L., 1 specimen (depth: 15 fathoms); *Icelus bicornis* Reinh., 9 specimens (depth: 50—60 fathoms); *Lumpenus maculatus* B. Fries, 1 specimen (depth: 50—60 fathoms).

The position of the localities mentioned in the treatise.

	Lat. N.	Long. W.
Amitsuarsik	65° 37′	37° 22′
Angmagsalik	65° 30′—65° 40′	37° 30′—37° 40′
Angmagsalik, off (140 fms.)	65° 30′	37° 20′
Angmagsivik (Kingak)	65° 58′	37° 2′
Danmark Ö	70° 27′	26° 12′
Fleming Inlet (118 fms.)	71° 51′	22° 27′
Forsblads Fjord (3—14 fms.)	72° 28′	25° 23′
Forsblads Fjord (50 fms.)	72° 27′	25° 10′
Forsblads Fjord (90—50 fms.)	72° 27′	25° 28′
Gaaseland	70° 5′—70° 30′	
Hekla Havn	70° 27′	26° 12′
Henry Land, off (20 fms.)	69° 34′	23° 35′
Hurry Inlet (0—3 fms.)	70° 50′.2	22° 31′
Hurry Inlet (0—7 fms.)	70° 50′.2	22° 31′
Hurry Inlet (50 fms.)	70° 36′	22° 31′
Ikerasausak	65° 58′.5	37° 27′
Kangerdlugsuatsiak	66° 18′	35° 28′
Kap Borlase Warren	74° 20′	19°
Kap Broer Ruys	73° 30′	20° 20′
Kap Dan	65° 32′	37°
Kap Hope (120 fms.)	70° 26′	22° 29′
Kap Stewart (6—3 fms.)	70° 25′	22° 37′
Kap Tobin (57 fms.)	70° 23′	22°
Kingorsuak	66° 8′	37° 10′
Römers Fjord (120 fms.)	69° 38′	23° 31′
Sabine Ö (12. 7. 1900)	74° 30′	19° 45′
Sabine Ö, off (18. 7. 1891)	74° 17′	15° 20′
Sabine Ö, SE. of (10. 7. 1900)	74° 25′	18° 30′
Sierak	65° 57′	37° 5′
Tasiusak	65° 37′	37° 34′
Tiningnekelak	65° 56′	37° 40′
Turner Sund (0—2 fms.)	69° 44′	23° 29′.5
Turner Sund (3 fms.)	69° 44′	23° 30′
Turner Sund (8 fms.)	69° 43′.5	23° 33′
Ödesund	66° 15′	35° 25′

Scorpænidæ.

Sebastes marinus Linné.

Off Tasiusak. Drifting among the ice. 26. 8. 1899. 1 specim. 91 mm.

Off Angmagsalik. 140 fms. 18. 9. 1900. Trawl. 1 specim. About 190 mm.

Sermilik at Angmagsalik. 1901. 1 specim. About 200 mm.

The numbers of the rays in the fins of these three specimens are: D. 15 + 14 — 15. A. 3 + 8 — 9. P. 19. V. 1 + 5.

G. Holm (l. c. p. 54) mentions the Rose-fish among the fish eaten by the inhabitants of Angmagsalik, but they only get it when the Crested-Seal (*Cystophora cristata* Erxl.) brings it to the surface, they do not catch it themselves, of course because they are not acquainted with hook-fishing, and the rose-fish is, as is well known, a deep-sea fish.

Sören Jensen brought home a lot of young ones about 25—30 mm. long, caught by the Greenlanders at the «Angmagsæt»-station at Angmagsalik. They were arranged in a long row, with heads alternating, drawn on a string, and rolled up into a bundle with a string tied round it. Jensen told me that such bundles serve as toys for the Greenland-children. Holm therefore presumably refers to the young ones of *S. marinus* when he writes (l. c. p. 82): «Some quite small fishes called *iterdlarnat* are treated in the same way (viz. as the Angmagsæt [*Mallotus villosus* Müll.]), but presumably only for diversion.» [1])

[1]) During the printing of this, I was informed by Commander G. Holm that a roll of «iterdlarnat» had been presented by him to our Ethnographical Museum. The director of the said Museum allowed me kindly to examine this roll, and it turned out to be made up just of the *Sebastes marinus*-fry, of the same size, and handled in the same way as that already mentioned.

Fry of *S. marinus* is thus found in great numbers at Angmagsalik, at any rate at the time (last part of May and June), when the «Angmagsæt» seek in to deposit their spawn.

Trichiuridæ.

Aphanopus minor Collett.

1886. *Aphanopus minor* Collett, Christiania Vidensk.-Selsk. Forhandl. 1886, No. 19.

One specimen of this Trichiurid — the only one known up till this time — was got July 4th 1886 off the southern East-coast of Greenland (65° lat. N., 31° long. W.). It was still alive when it was taken out of the water, washed or forced up to the surface by submarine currents together with some *Sebastes marinus* which were likewise in a half dead condition. — It is described by Collett in the place stated, and is kept at the University-Museum of Christiania.

Cottidæ.

Cottunculus microps Collett.

A male specimen, the length of which was 157 mm., was taken on September 6th 1883, by the Nordenskiöld-expedition off the South-eastern Greenland (65° 30′ lat. N.), where the depth was 130 fathoms (F. A. Smitt l. c. p. 159).

E. Lönnberg (l. c. p. 13) mentions it amongst the fishes which were taken by the Kolthoff-expedition 1900 at the North-eastern Greenland, and he communicated to me by letter that it was taken at the mouth of Franz Joseph's Fjord, at a depth of 200—300 metres, and that only one specimen was caught.

Gymnacanthus tricuspis Reinhardt.

Tasiusak. In the harbour in quite shallow water. 1901—1902. 13 specim.

Angmagsalik. At the ice-foot. 1 fm. 31. 5. 1899. 3 specim.

Angmagsalik. July 1899. 2 specim.

Angmagsalik. 10—0 fms. 15—16. 9. 1900. Eel-seine. 13 specim.

Tiningnekelak. 5—10 fms. 18. 9. 1901. 7 specim.

Hekla Havn. About 6 fms. Aug. 1891. Line. 2 specim.

Kap Stewart. 6—3 fms. 21. 8. 1900. Eel-seine. 13 specim.

Hurry Inlet. 7—0 fms. 7—8. 8. 1900. Eel-seine. 55 specim.

Forsblads Fjord, the mouth. 14—3 fms. 28. 8. 1900. Eel-seine. 5 specim.

Kap Broer Ruys. Very shallow water near the beach. 20. 7. 1891. 1 specim.

Sabine Ö. 5—3 fms. 12. 7. 1900. Dredge. 1 specim.

Lönnberg (l. c. p. 13) mentions it amongst the fishes which the Kolthoff-expedition took 1900, by the North-eastern Greenland.

The females are as usual more numerously represented than the males, though not very strikingly so, thus out of the 55 specimens from Hurry Inlet 31 are females, 24 males. The largest female measures 217 mm., the largest male 185 mm.

A young one of this fish is mentioned p. 238—39 and illustrated fig. 6, pl. XI.

Note. The here mentioned species is generally designated *Gymnacanthus (Phobetor) ventralis* Cuv. Val.; but that the last named is identical with *Gymnacanthus pistilliger* Pallas, is suggested both by text and figure of Cuvier-Valenciennes (Hist. Nat. Poiss. IV, 1829, p. 194; Pl. 79, Fig. 1) as well as by its habitat (Kamtschatka); therefore Reinhardt's designation *G. tricuspis* must have the preference. The honour of having restored *G. pistilliger* Pall. as an independent species after Lütken had tried to prove that it was founded on a mistake, is due to F. A. Smitt (Skandinaviens Fiskar I, 1892, p. 161).

Cottus quadricornis Linné.

Turner Sund. 2—0 fms. 25. 7. 1900. Eel-seine. 3 specim.

Hekla Havn. 3—6 fms. 20. 8. 1891. Dredge. 1 specim.

Hurry Inlet, the south coast of Jameson Land. Just near the beach, in very shallow water. 3. 8. 1891. 4 specim. (Fry).

Hurry Inlet. Near the inmost part of the fjord. 3—0 fms. 3. 8. 1900. Eel-seine. 7 specim.

Hurry Inlet. In pools on the beach. 7. 8. 1900. 7 specim. (Fry).

Hurry Inlet. Near the coast. 1. 8. 1900. Eel-seine. 1 specim.

Hurry Inlet. 7—0 fms. 7—8. 8. 1900. Seine. 3 specim.

Sabine Ö. 5—3 fms. 12. 7. 1900. Dredge. 1 specim.

Three specimens were taken by the second German polar-expedition at Kap Broer Ruys, on July 15th 1870.

Lönnberg (l. c. p. 13) mentions it amongst the fishes taken by the Kolthoff-expedition 1900 at the North-eastern Greenland.

Prof. W. Peters, who examined the specimens of the Germania-expedition classed them among *Cottus hexacornis* Richardson [1]) which he however regards as being closely related to *C. quadricornis* L. of the Baltic [2]). He says about this matter: «Verglichen mit einem Exemplar von *C. quadricornis* L. haben die vorliegenden Exemplare etwas kürzere Oberkiefer und die Interorbitalgegend mehr vertieft. Auch ist die Flossenstrahlenzahl eine verschiedene, indem das grösste

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[1]) The name is as is well known confusing; Richardson had misunderstood his first notes, and ascribed to the «Bull-head» he had caught at Coppermine, but lost later on, nasal spines of the same nature as the characteristic horns on the front and occiput. Later on he again got some specimens from the same part, and he then found out that they were only *C. quadricornis*.

[2]) Die zweite deutsche Nordpolarfahrt, 2. Bd., 1874, Zoologie, p. 169.

Exemplar von 27 cm. Länge, ganz wie Richardson es von seiner Art angiebt, in der ersten Rückenflosse 7 Stacheln und in der zweiten 13 Strahlen hat. Indessen variirt diese Zahl, indem die beiden andern Exemplare D. 8—14 zeigen, ebenso wie alle drei in der Strahlenzahl der Analflosse von einander abweichen, da dieselbe bei dem grössten Exemplare 14, und bei den andern beiden 13 und 15 beträgt.»

Professor Lütken again brought up the question in the first part of his meritorious «Korte Bidrag til nordisk Ichthyographi» [1]. *C. hexacornis* Rich. from the arctic America he considers to be no other than *C. quadricornis* L., and after having examined one of the specimens from the Germania-expedition and having compared it with specimens of *C. quadricornis* from the Baltic, he could find no difference except that the front of the East-Greenland Fourhorned Bullhead is more concave than the front of the Baltic one [2], but this difference L. does not consider to be of any great importance: «*C. hexacornis* Peters» from East-Greenland is the very same species as the genuine *C. quadricornis* L.

The abundant material brought home by the Amdrup-expedition invites us to a renewed comparison. I have therefore taken a series of measurements of the 16 specimens at hand together with 6 specimens in our Museum from the Baltic (and the lake Vettern) [3].

From these measurements we see that the head in the Baltic form is comparatively a little larger and has longer jaws. The length of the head amounts indeed

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[1]) Foreløbige Meddelelser om nordiske Ulkefiske. Vidensk. Medd. Naturhist. Foren. Kbhvn. 1876 (p. 375).

[2]) Jordan and Evermann have been so unfortunate as to quote Lütken's words in such a manner that the fact is reversed (Fishes of North and Middle America II, 1898, p. 2001).

[3]) Vettern, 1 specim. (138 mm.); «Central-Sweden» 2 specim. (♀ 178 mm.; ♂ 246 mm.); the gulf of Bothnia, 2 specim. (♂ 208 mm., ♀ 242 mm.); the Baltic by Stockholm (♀ 230 mm.).

in the East-Greenland specimens to 26.6—28.8 % of the total length, the length of the upper jaw to 9.7—11.7 %, and the length of the lower jaw to 12.5—14.6 %; in the specimens from the Baltic the length of the head amounts to 29—33.5 %, the length of the upper jaw to 11.7—14.3 %, and the length of the lower jaw to 15.6—16.9 %. Professor F. A. Smitt has in his work: Skandinaviens Fiskar (I, 1892, p. 177) given some measurements of 11 *C. quadricornis* from the Baltic and Vettern, whereby the limits for variation are certainly somewhat extended, but the total impression remains about the same. In these 11 specimens (total length 73—274 mm.) the length of the head amounts namely to 28.2—33.2 %, the length of the upper jaw to 10.9—15.3 % and the length of the lower jaw to 14.8—17.5 %. Moreover I find that the tail in the specimens at my disposal from the Baltic is a little less slender; of the total length the minimum height of the tail in 8 adult specimens (179—249 mm.) from East-Greenland amounts namely to 3.3—3.9 %, but in 5 adult specimens (178—246 mm.) from the Baltic to 4—4.2 %[1]).

Thus the East-Greenland form has not only a shorter upper jaw than the Baltic form, as pointed out by Professor Peters, but also the lower jaw and the whole head are shorter, and moreover the caudal peduncle is lower, at any rate judged by the material at my disposal. But in all other ways they are perfectly in accordance as far as I can see. Also the numbers of rays which Peters considers to be of some importance nearly

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[1]) According to the measurements of Professor Smitt, the minimum height of the tail amounts, in 6 adult specimens (173—272 mm.) from the Baltic and Vettern, to 3.8—4.1 % of the total length, a fact which substantially confirms the correctness of the above stated. On the contrary in a seventh specimen (274 mm.) the percentage was stated to be only 3.6 %, but I almost imagine this to be due to a misprint, as S. remarks that in two specimens from the Arctic Sea of Siberia the percentages for the minimum height of the tail, stated to be 3.5—3.6 % of the total length, are low compared with the ones in the specimens from the Baltic.

coincide. According to Lilljeborg[1]) the numbers in Swedish specimens are: D.[1] 7—9; D.[2] 13—15; A. 14—15; P. 16—17; V. 1 + 3; in the 16 specimens at my disposal from East-Greenland the numbers are: D.[1] 7—9; D.[2] 13—15; A. 13—15; P. (15) 16; V. 1 + 3; in the 3 specimens from the Germania-expedition: D.[1] 7—8; D.[2] 13—14; A. 13—15. I do not think either that the front between the eyes is more concave than in the East-Greenland form; the difference is at any rate slight and by no means invariable.

According to my opinion we are not justified in regarding the Fourhorned Bullhead from East-Greenland and the Baltic one as two different species. I do not wish at present to answer the question if we should regard them as special varieties on account of the above named dissimilarities. For in order to decide the question of formation of race, within the present species, it would be necessary to have for comparison specimens from the other places of the habitat of the species, namely from the White-Sea, the Icy Sea of Siberia, and Arctic America, but from these seas I have no material.

I must here however mention that Jordan and Evermann still maintain the species *Cottus (Oncocottus) hexacornis* Richardson, with a western (American-West-Greenland) distribution against *C. (O.) quadricornis* L., with an eastern (European-East-Greenland) distribution, yet remarking that the distinguishing characters between them are of doubtful value, and that they must probably be reduced to one species[2]). In their analytical table the two species are distinguished in the following way:

a. Atlantic species; maxillary short; pectoral moderate; caudal rounded .... *Quadricornis*

aa. Arctic American species; maxillary longer; pectoral longer; caudal truncate .... *Hexacornis*

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[1]) Sveriges och Norges Fiskar, I, 1891, p. 144.

[2]) Fishes of North and Middle America, Part II, 1898, p. 2001—2004.

The here indicated variations are partly more precisely defined in the diagnosis. It is thus said about *C. quadricornis*· «Maxillary reaching to below posterior margin of eye», and about *C. hexacornis*: «Maxillary reaching past the orbit». But in the specimens of *C. quadricornis* I have before me from the Baltic the maxillary just reaches past the orbit, and Lilljeborg[1]) likewise says: «Maxillary reaches slightly behind the posterior border of the orbit», so here some mistake must have occurred with regard to the American writers' judgment of the European form. But as J. and E. associate the European and the East-Greenland form probably initiated by Lütken (compare p. 229), there is perhaps some truth in their statement; for as the upper jaw is shorter in the East-Greenland form than in the Baltic one, and as a rule only reaches to below the posterior margin of the eye, its upper jaw is probably also shorter than in the American form. — Moreover is said about the pectoral fins with regard to *C. quadricornis*: «reaching anal», and with regard to *C. hexacornis*: «scarcely reaching front of second dorsal». I cannot however find any distinct difference in these expressions, as the mentioned points in the Cottoid in question lie very near each other in the same perpendicular line. It must besides be taken into consideration that the length of the pectoral fins varies according to sex, and can consequently only with reservation be employed as specific character. In 5 specimens of *C. quadricornis* from the Baltic, which are at my disposal, the pectoral fins of the females reach the anus, or at the utmost to the beginning of the anal fin, but in the males to the beginning of the anal fin or somewhat past it. The variation is still greater in 8 specimens from East-Greenland, as in 3 females the pectoral fins scarcely reach to the end of the first dorsal fin and to the anus, while in 5 males it reaches from the anus and a little past the front part of the anal fin. — Finally with

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[1]) l. c.

respect to the third character that the caudal fin should be «rounded» in *C. quadricornis*, and «truncated with rather sharp corners» in *C. hexacornis*, this does not hold good with regard to *C. quadricornis*. In the specimens before me from the Baltic, the upper and, or, lower rays reach farthest when the caudal fin is folded together, and when it is distended it is truncate, or at any rate only very slightly rounded, the upper corner generally pointed, the lower rounded; this also agrees with Lilljeborg's description: «The caudal fin which is cut off straightly, or flatly curved, sometimes with pointed, sometimes with rounded corners» [1]. There is also some variation in the East-Greenland specimens, as the caudal fin generally is slightly rounded [2], but often very insignificantly so, nay in one specimen it is even truncate. The posterior margin of the caudal fin is thus subject to an individual variation with regard to contour, and cannot consequently be employed as specific character.

It will hereof be seen that the American «*C. hexacornis*» cannot be distinguished from the European *C. quadricornis* by the characters which Jordan and Evermann state, and about whose value they are themselves doubtful.

In the subjoint table (p. 234) I give a survey of some measurements of the 16 specimens in question from East-Greenland, partly for use for further comparison with Fourhorned Cottus of other seas, partly for the elucidation of the more important differences with regard to sex and age.

The relative length of the head, the upper and lower jaw, the distance of the first dorsal fin from the end of the snout, the distance between the dorsal fins and the length along the

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[1]) l. c. p. 147.

[2]) In one 236 mm. long male, we see the peculiar circumstance that the posterior margin of the caudal fin is sinuate, the middle ray is the longest, two rays above and underneath it are somewhat shorter, the two rays at each corner again are a little longer than these.

	Hurry Inlet 3. 8. 1900	Hurry Inlet 7.-8. 8. 1900.	Hurry Inlet 3. 8. 1900.	Hurry Inlet 3. 8. 1900.	Turner Sund 25. 7. 1900.	Sabine Ö 12. 7. 1900.	Hurry Inlet 7.—8. 8. 1900.	Hurry Inlet 7.—8. 8. 1900.	Turner Sund 25. 7. 1900.	Turner Sund 25. 7. 1900.	Hekla Havn 20. 8. 1891.	Hurry Inlet 1. 8. 1900.	Hurry Inlet 3. 8. 1900.	Hurry Inlet 3. 8. 1900.	Hurry Inlet 3. 8. 1900.	Hurry Inlet 3. 8. 1900.
									♂	♀	♂	♂	♀	♀	♂	♂
Total length in mm	68	74	76	93	113	116	122	157	179	181	203	210	219	234	236	249
in % of total length:																
Length of head	28.7	27	28.3	27.6	26.6	27.6	28.7	27.7	28.5	28.7	28.8	28.6	28.8	27.6	27.5	27.1
» » upper jaw	10.3	10.1	10.2	9.7	9.7	10.3	11.1	10.8	11.3	11.7	11.1	11.1	11	11.2	11	10.8
» » lower »	13.2	12.5	13.2	14	13.3	13.8	14.3	13.7	14.2	14.5	14.3	14	14.6	13.9	14.2	14.1
Horizontal diameter of eye	5.5	5.1	4.9	4.5	4.9	5.2	4.9	4.1	4.2	4.3	4.4	4.3	4	4.1	4	4
Minimum interorbital width of front	3.3	4.1	4.3	3.8	4.4	4.5	4.1	4.1	4.2	4.4	4.4	4.4	4.1	4.3	4.7	4.6
Minimum height of tail	4.4	4.3	4.2	3.8	3.5	3.9	3.7	3.5	3.9	3.6	3.8	3.3	3.3	3.5	3.6	3.6
Length of pectoral fins	22.8	21.6	23	23.7	22.1	22	21.3	22.3	25.2	24.6	26.8	24.3	23.7	21.8	24.6	24.5
Length of ventral fins	10.3	11.1	11.2	12.9	11.5	12.9	13 9	15	16.8	15.5	16.5	17.6	14.2	12.9	18.2	16.7
Distance of 1st dorsal from end of snout	28.4	28	28.3	28.7	28.5	29.5	30.3	28.3	28.5	29.3	29.1	28.6	29.5	30.6	29.2	28.1
Length of 1st dorsal along base	14	15.1	15.8	15.6	13.4	16.4	16.4	16.6	18.3	16.6	17.2	17.1	18.7	16.9	14.8	16.1
Maximum height of 1st dorsal	9.1	8.8	9.2	8.9	8.6	8.2	9	9.6	10.9	8.6	11.3	10.5	8	7.3	10.2	8.8
Distance between the dorsals	5.1	4.7	4.6	3.8	4.9	6.5	5.1	4.1	5.6	6.4	4	4.5	4.7	5.6	4.2	4
Length of 2nd dorsal along base	20.6	18.9	22.4	22.6	19.2	22.4	22.1	23.6	21.8	21	20.5	21.9	21.7	21.6	21.8	20.9
Maximum height of 2nd dorsal	11.8	11.5	15.1	15.6	13.3	17.2	13.3	19.1	25.1	14.9	27.1	23.6	16.4	14.1	24.2	23.5
Distance of anal fin from end of snout	47.4	46.9	47.4	47.8	46.9	49.1	48	47.1	50.6	50.3	52.2	51	52.5	54.2	50	49.4
Length of anal fin along base	22.5	22.3	23.7	23.9	21.2	23	22.3	24.2	23.2	21.3	21.2	23.3	20.1	21.6	21.6	21.7
Maximum height of anal fin	8.5	8.1	8.6	10.2	9.3	9.5	9	10.8	14	9.9	14.5	11.2	9.1	9.8	15.7	12.4

base of the two dorsal fins and the anal fin prove to be uninfluenced by differences in age and sex, but are subject to greater or less individual variation.

The horizontal diameter of the eye is larger in the young ones than the minimum interorbital width of the front; in middle sized specimens the two measurements are about equal; in adult specimens the interorbital width is a little larger than the horizontal diameter of the eye.

The anal fin starts farther to the front in the young ones and young specimens than in the adults, its distance from the end of the snout being in the former ones 46.9—49.1 %, in the latter ones 49.4—54.2 % of the total length.

The tail is in quite little young ones (68—76 mm. long) less slender than in larger young ones and the adults, as its minimum height in the former ones is 4.4—4.2 %, in the latter ones 3.9—3.3 % of the total length.

The length of the pectoral fins amounts in the young ones and young specimens to 21.3—23.7 % of the total length, in the females to 24.6—21.8 % (decreasing with age), in the males to 24.3—26.8 %. The length of the ventral fins amounts in the young ones and young specimens to 10.3—15 %, in the females to 15.5—12.9 %, in the males to 16.5—18.2 %. The height of the 1st dorsal fin amounts in the young ones and young specimens to 8.2—9.2 % [1]), in the females to 8.6—7.3 %, in the males to 11.3—8.8 %. The height of the 2nd dorsal fin in young ones and young specimens amounts to 11.5—17.2 [1]), in the females to 14.1—16.9 %, in the males to 23.5—27.1 %; the height of the anal fin in young ones and young specimens amounts to 8.1—10.2 % [1]) in the females to 9.1—9.9 %, in the males to 11.2—15.7 %. Thus it holds good with regard to all

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[1]) Here we do not take into consideration the specimen of 157 mm. which already distinctly shows male characters, as the height of the 1st dorsal fin amounts to 9.6 %, the height of the 2nd dorsal fin to 19.1 %, and the height of the anal fin to 10.8 % of the total length.

the fins that their relative length and height in the females are about the same as they are in the young ones and young specimens, but in the males they are considerably larger; this is especially the case with regard to the height of the 2nd dorsal fin.

The difference of sex is also shown by the rays of 2nd dorsal fin projecting with naked points a good deal beyond the membrane of the fin in the male specimens; the same is also the case though to a less degree with the upper rays of the pectoral fins; but such is not the case in the females. Moreover it shows itself in the greater supply of dermal spines in the fins of the males than in the females. In the males 3—8 of the upper rays of the pectoral fins on the inner-side, 8—11 on the outer side are more or less rough to the touch, in the females only relatively 2—4 and 5—7; in the females only the upper rays of the caudal fin are more or less rough, in the males on the contrary, the lower ones are also often rough; almost all the rays of 2nd dorsal fin are rough (with the exception of the posterior ones of young specimens) yet the roughness generally extends farther in the males than in the females. In the young ones the rays are smooth or only show an intimation of roughness.

In the young ones (68—122 mm. long) the horns on front and occiput are very small, low and smooth. In larger specimens there is a great individual variation. In one female of of 234 mm. they are comparatively not much larger than in the young ones, at any rate not the posterior ones, and their surface is smooth, covered by the skin, only, at the distal end of the ones farthest back we can, by the aid of a pocket lens, see some small asperities projecting. In one female of 219 mm. they are considerably larger, the front ones almost smooth, the posterior ones on the contrary spiny along the upper margin; and finally in one female of only 181 mm. they are comparatively still larger, especially the anterior ones, and both pair spiny-tubercular on the upper side. In one of the males of 179 mm. the horns on front and occiput are rather slightly developed and smooth; in one male of only 157 mm. they are on the contrary somewhat larger with an intimation of asperities; in two males of 203 and 236 mm. they are rather small, but spiny on the upper margin; and finally in two males of 210 and 249 mm. they are very large, either compressed and rough on the upper margin or formed like tubercles, and spiny almost all over the surface. — The rest of the spines on the head are developed in the ordinary way.

The supply of rough osseous tubercles of the skin is rather similar; above the lateral line there is on the posterior part of the tail one row, but on the anterior part of the tail and on the trunk there are two, more or less irregular rows; below the lateral line on the anterior part of the tail is moreover found an area, pointed behind, of similar dermal ossicles.

The genital papilla is very short in both sexes.

Fry of *Cottus quadricornis* has been taken twice in Hurry Inlet (a northern inlet of Scoresby Sund) namely:

3. 8. 1891. Hurry Inlet, the south coast of Jameson Land, just near the beach, in very shallow water. 4 specim. 21.5—26.5 mm.[1]).

7. 8. 1900. Hurry Inlet, in pools on the beach. 7 specim. 23—27.5 mm.

The fins and likewise the rays are perfectly formed at a length of about 21.5 mm. (fig. 2, plate XI), yet the caudal fin is still continuous with the dorsal and the anal fin by a remnant of the larval fin. Occipital crests and snout spines are distinct,

[1]) In Bay's treatise they are mentioned (l. c. p. 52) as young ones of *Cottus scorpius*.

likewise the spines of the preopercular. Fine pigment-specks have begun to amass in the places where distinct dark spots will appear later on.

At a length of 27.5 mm. (fig. 3 a & b, plate XI) the last remnant of the larval fin has disappeared. On the caudal peduncle and below the dorsal fins the pigment forms such dark spots or short transverse bands as are also seen in the adult fishes. The osseous tubercles of the skin have also begun to appear.

In fig. 4, plate XI, a 25 mm. long young one of *Cottus scorpius* L. is represented for comparison with the above described young ones of *Cottus quadricornis*, which as before mentioned (p. 237, the note) were formerly mistaken for the young ones of *C. scorpius*. The great difference between them will easily be perceived. The body is much shorter, more squat. But especially the pigmentation is quite different, and so characteristic that we can thereby immediately distinguish the fry of *C. scorpius*: Across the tail, about between 2nd dorsal fin and the anal fin, is a dark band formed by closely placed stellated chromatophores; this transverse band broadens out somewhat towards the back, and reaches the occiput as a narrow stripe along the base of the foremost dorsal fin. The margin of the preopercular with 4 spines; on the occiput a spine which is bifurcate at the end, behind the eye a smaller spine.

In connection with this I give the representations of young ones of two other arctic and littoral Cottoids viz. *Gymnacanthus tricuspis*, and *Icelus bicornis*.

Fig. 6, plate XI, represents an 18 mm. long young one of *Gymnacanthus tricuspis* Reinh. taken in the harbour of Pröven, West-Greenland[1]. A continuous larval fin is still present, but

[1] The date is not given, but a young one of nearly the same size (19 mm.) was taken July 25th 1898 (at the island Disko, off Assuk).

rays are developed ($D.^1$ 12; $D.^2$ 16; A. 18), in the caudal fin yet only on the under side of the urostyle. Dark pigment is deposited along the upper and lower margin of the caudal peduncle and a good way along the base of the anal fin and the posterior dorsal fin, partly also under the anterior dorsal fin; moreover part of the dorsal and anal fins is pigmented, and chromatophores are also found along the middle line of the side, on the base of the pectoral fins, and on front and parietal region. The preopercular spines are visible; on the occiput neither spines nor keels are found (as is well known they are also missing in the adults).

A young one of *Icelus bicornis* Reinh. (about 21 mm. long) is represented in fig. 5, plate XI. The species will immediately be recognized by the large head with two large protuberances, a smaller one in front, a larger one behind, in which the occipital crests end. The spines on the preoperculum are distinct; among the snout-spines is seen a blunt protuberance produced by the upper prolongation of the intermaxillaries. Fin rays are developed as follows: $D.^1$ 9; $D.^2$ 18; A. 14; in front of the caudal fin is still found a remnant of the larval fin. Fine pigment-specks have begun to amass in some places as forerunners for the marble-banded colour pattern which appears later on.

Cottus scorpius Linné.

Tasiusak. 5—19 fms. 14. 5. 1899. 1 specim. (Young, 37.25 mm.).

Tasiusak. 6—10 fms. 27. 5. 1899. 2 specim.

Tasiusak. July 1899. 1 specim.

Tasiusak. In the harbour in quite shallow water. 1901—02. 5 specim.

Tasiusak. Shallow water. 22. 8. 1902. 3 specim.

Tasiusak. 10. 3. 1901. 1 specim.

Angmagsalik. 1892. 5 specim.

Angmagsalik. 10—0 fms. 14—16. 9. 1900. Eel-seine. Numerous specim.

Tiningnekelak. 5—10 fms. 18. 9. 1901. 5 specim. (Young ones, 30—41.5 mm.).

Angmagsivik. 1/2—ca. 5 fms. 19. 6. 1902. 3 specim. (Young ones, 39—42.5 mm.).

Kangerdlugsuatsiak. 5. 8. 1899. 4 specim. (Fry, 22—25.5 mm.)[1]).

Turner Sund. 2—0 fms. 25. 7. 1900. Eel-seine. 1 specim.

Hekla Havn. 1891—92. 2 specim.

Hekla Havn. 3—4 fms. 1891—92. 3 specim.

Kap Stewart. 6—3 fms. 21. 8. 1900. Seine. 1 specim. (44.5 mm.).

Hurry Inlet. 7—0 fms. 7—8. 8. 1900. Seine. 1 specim.

Hurry Inlet, near the inmost part of the fjord. 3—0 fms. Eel-seine. 3. 8. 1900. 1 specim.

Hurry Inlet, at the mouth. 50 fms. Beam-trawl. 11. 8. 1900. 1 specim. (44 mm.).

Sabine Ö. 5—3 fms. 12. 7. 1900. Dredge. 2 specim.

In July 1870 it was taken by the Germania-expedition in Clavering Strait (Peters l. c. p. 170, sub nom. *Cottus porosus* C. V.).

According to E. Bay (l. c. p. 52) it was very common in Hekla Havn, both in the harbour itself where it stayed all the year round, and outside it.

C. Kruuse tells me that it is common all the year round in the whole of the Angmagsalik district.

The largest of the specimens before me is a female measuring 284 mm.; the largest male is 232 mm. long.

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[1]) One of these fry-specimens is mentioned p. 238 and represented in fig. 4, plate XI.

As I intend to give a detailed account of the Greenland Sea-Scorpion in «*Conspectus Faunæ Groenlandicæ*», I shall here only state that the specimens at my disposal by the great number of rays in the fins prove to belong to the arctic form (var. *groenlandica* Lütk.):

	D.[1]	D.[2]	A.	P.
Angmagsalik	10	17	14	18
»	9	17	14	17
»	10	17	14	18
»	10	16	13	16
Tasiusak	10	16	14	17
Turner Sund ...	10	16	13	18
Hurry Inlet	10	17	14	17
Sabine Ö	10	16	13	17
»	10	17	13	17

Artediellus uncinatus Reinhardt.

Pl. XII, fig. 2 a (♂) & fig. 2 b (♀).

Cottus uncinatus Reinhardt, K. D. Vidensk. Selsk. Skr. VI, 1837, p. XLIIII.

Centridermichthys uncinatus Lütken, Vidensk. Meddel. Naturh. Foren. Kbhvn., 1876, p. 379; Collett, The Norwegian North-Atlantic Expedition, Fishes, 1880, p. 29.

Artediellus uncinatus Goode & Bean, Oceanic Ichthyology, 1895, p. 267, fig. 255; Jordan & Evermann, Fishes of North-America, II, 1898, p. 1905.

Artediellus atlanticus Jordan & Evermann, ibid., p. 1906.

Angmagsalik. 10—0 fms. 14—16. 9. 1900. Eel-seine. 1 specim. (57.5 mm.)

Off Sabine Ö. 127 fms. 18. 7. 1891. Swab. 1 specim. (68 mm.).

E. Lönnberg (l. c. p. 13) mentions it among the fishes taken by the Kolthoff-expedition 1900, at the North-eastern Greenland. Dr. L. has by letter communicated to me that it was at 72° 25′ lat. N. 17° 56′ long. W., 300 metres deep, and that numerous specimens were caught.

Professor R. Collett has in the stated place given a detailed and careful description of this Cottoid. I shall however add some remarks about some peculiarities which Collett does not mention, probably because the specimens at his disposal were too young to show them in their full development[1]).

It is well known that in Cottoids the difference of sex will often show itself in the exterior of the fish, now in one way, now in another, or at the same time in several ways (compare Lütken, Vidensk. Medd. Naturh. Foren. Kbhvn. 1876, p. 387). In *Artediellus uncinatus* I have observed a hitherto unknown form for secondary difference of sex[2]). When I examined the numerous specimens which were brought home by the Ingolf-expedition from a trawling in Davis Strait, it caught my attention that while nothing unusual was to be observed in the foremost dorsal fin of some specimens, this fin was in other specimens very high. By the dissection of several specimens I was convinced that the specimens with the high dorsal fin are males, those with the low one females. The smaller the specimens are the less is the difference, but yet it is still perceptible in specimens of 57 mm. Also second dorsal fin is higher in the males than in the females, but the difference is not so conspicuous in large specimens as it is with regard to the foremost dorsal fin. The anal fin is about equally high in both sexes. The two figures in plate XII will illustrate the difference of sex between the largest male (fig. 2 a) and female (fig. 2 b) from the «station» in question. For special comparison I give the following measurements:

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[1]) It is however remarkable that these circumstances have not been mentioned by other writers who have had adult specimens for examination. From West-Greenland there has f. i. been specimens of up to 100 mm., from the Barents Sea even up to 112 mm.

[2]) [Later addition]. Compare however the description of *Artediellus pacificus* Gilb. in Jordan & Evermann: Fishes of North-America, II, 1898, p. 1907.

	♂	♂	♀	♂	♀	♂	♀
Total length in mm.	100	77	78	69	69	57	57
The longest ray of 1st dorsal fin in mm.	24	14	6	10	5.5	6.5	5
» » » » 2nd » » » »	20	14.5	9.5	12	9	9.5	7

It will be seen from this that the first dorsal fin is always somewhat lower in the females than the 2nd dorsal fin; its height is equal to the length of the snout (reckoned to the anterior margin of the eye). In the males on the contrary the difference between the height of the two fins diminishes as they get older (in the three smallest ones from 3—2—0.5 mm.), and in the largest male D.^{1} is even 4 mm. higher than D.^{2}, though D.^{2} at the same time has increased proportionately more in height than in the females. The length of the longest ray in D.^{1} is in the male of 100 mm. equal to the distance between the end of the snout and the upper incision of the gill-opening; in the male of 77 mm. equal to the distance between the same point and the posterior border of the orbit; in the male of 69 mm. and of 57 mm. equal to the distance between the end of the snout and respectively the posterior margin of the pupil and the anterior margin of the eye.

There is also a great difference with regard to colour pattern between males and females, especially in large specimens. The before mentioned 100 mm. long male may serve as type for the final colour of the male sex. The trunk is very dark, chocolate coloured, with the exception of the belly which has kept a yellowish colour though with a dark tinge here and there. On this dark back-ground small white spots appear especially along and below the lateral line; also on gill cover and cheek a few white spots are seen. The fins have likewise turned dark almost soot-coloured with light stripes and spots. Along the rays the dorsal fins are ornamented with eye-like spots formed by a white centre and a dark ring; the anal fin has slanting stripes of a pure white colour; the light transverse stripes of the caudal fin and the pectoral fins are partly broken up into little spots which at the base of the fins are of a pure white colour, but become darker farther out; even on the ventral fins a single or a few white spots are seen [1]). The smaller the males are, the more they resemble the females with regard to colour. The brown colour which by aid of a pocket-lens is seen to arise from a compact crowding of chromatophores is paler, so that the three characteristic dark transverse bands can appear, and the white spots are less shiny; still at a total length of 57 mm. the white pattern of the fins is yet purer in the males than in the females and is partly broken up into rounded spots.

The full grown male is not inferior to the males of the *Callionymus*-species with regard to height and splendid pattern of dorsal fins.

The urogenital papilla is not on the whole very conspicuous in this Cottoid, but yet perceptibly longer in the male than in the female; in the two specimens of 77 and 78 mm. the length of the papilla is respectively 1.5 (♂) and 0.75 mm. (♀).

The males seem contrary to other Cottoids to be a little larger than the females; from the above mentioned trawling of the Ingolf-expedition we have 4 males of respectively 100, 94, 90 and 89 mm. while the largest female only measured 78 mm. The largest female that I have seen is 85 mm.

As will be seen by the synonymy-list I have included in this species the *Artediellus atlanticus*, classified as a separate species by Jordan & Evermann. After an examination of one single American specimen these writers find that it has: «A blunt occipital ridge or spine» while Collett's figure shows: «Occiput with a bony protuberance on each side provided

[1]) This description is given from the specimen preserved in spirits. Fig. 9 in plate IV in the account of the ichthyological results of the Ingolf-expedition will give a notion with regard to the colours of the live specimen, with respect to an exact representation of the mutual proportions of the parts of the body this figure leaves not a little to be sired.

with radiating ridges», and consequently the American form which had hitherto been identified with *A. uncinatus* should be «apparently distinct». If however J. & E. had extended their examination to a few more specimens they would have discovered that the specimens vary greatly with respect to the appearance of the occipital spines, a fact of which I have been made certain from the European-Greenland material at my disposal. The occipital protuberances are sometimes comparatively high with rather upright or backwards bent points, sometimes they are lower and more stubby, sometimes quite disappearing so that no separation of species can reasonably be based on this «character». I have not seen any specimen provided with radiating ridges on the occipital protuberance, nor does Collett mention such a sculpture, but mentions them in just the same expressions as J. & E. viz: «two blunt obtuse protuberances on the occiput». I suppose the artist has represented in a somewhat exaggerated way the indistinct folds which are sometimes seen in the skin covering the spine, so that it looks as if the spine itself were provided with keels. Finally I shall here state that in two American specimens which our museum has obtained from the «Smithsonian Institution» the occipital protuberances are not less projecting than in many European-Greenland specimens.

Icelus bicornis Reinhardt.

Cottus bicornis Reinhardt, Overs. Kgl. D. Vidensk. Selsk. Forh. 1839, p. 9. *Icelus hamatus* Kröyer, Naturh. Tidsskr. II, 1, 1845, p. 253; Lütken, Vidensk. Meddel. Naturh. Foren. Kbhvn. 1876, p. 380; Collett, The Norwegian North-Atlantic Expedition, Fishes, 1880, p. 34, Pl. I, Fig. 8; Smitt, Skandinaviens Fiskar, I, 1892, p. 167, Fig. 51.

Tasiusak. 30—50 fms. 22. 8. 1902. 1 specim.

Angmagsalik. 10—0 fms. 14—16. 9. 1900. Eel-seine. 25 specim.

Hekla Havn. 5—10 fms. 1891—92. Dredge. 3 specim.

The coast of Gaaseland. 5—10 fms. 1891—92. Dredge. 1 specim.

Kap Tobin. 57 fms. 21. 8. 1900. Beam-trawl. 2 specim.

Hurry Inlet, at the mouth. 50 fms. 11. 8. 1900. Beam-trawl. 3 specim.

Forsblads Fjord, at the mouth. 14—3 fms. 28. 8. 1900. Eel-seine. 1 specim.

Forsblads Fjord. 90—50 fms. 30. 8. 1900. Beam-trawl. 5 specim.

Forsblads Fjord. About 50 fms. 28. 8. 1900. Dredge. 1 specim.

Two specimens were taken by the German Germania-expedition in Germania Havn in Sabine Ö, October 29th 1869, at about 2 fathoms (Peters l. c. p. 171). Lönnberg (l. c. p. 13) mentions it among the fishes taken by the Kolthoff-expedition 1900, at the North-eastern Greenland.

In the specimens before me the scale-spines of the lateral line vary with regard to extension; in some specimens they stop on a level with the posterior end of the dorsal fin (or a little before), in others they reach more or less near to the base of the caudal fin. Osseous tubercles are not found in any specimen at the base of the anal fin. The numbers of rays are: $D.^1$ 8—9; $D.^2$ 18—20; A. 13—16; P. 17—19. The largest female measures 75 mm., the largest male 60 mm.

A female 75 mm. long caught at Kap Tobin, Aug. 21st, has in its ovaries about 130 immature eggs, measuring 2 mm. in diameter.

As is well known the male of this species has a highly developed urogenital papilla. Professor F. A. Smitt (l. c.) thinks moreover to have observed this secondary difference in sex that while the females have only one pair of occipital spines, namely the ones in which the parietal crests end, a protuberance or jag is moreover generally developed on the front of these crests in the males. In all the specimens I have examined from Greenland to the Kara-Sea, a small protuberance is found on the parietal-crest in front of the large one, whether the specimen is a female or a male; the smaller protuberance displays (as is also the case with the larger one) a different degree of development, but it cannot on the whole be said to be stronger in the males than in the females.

A young one of this fish is represented in fig. 5, plate XI, and mentioned p. 239.

Note to the Synonymy. I have adopted the less current specific name: *bicornis* for the following reason. In the above mentioned place Lütken writes that though he himself does not doubt that Reinhardt's insufficiently described *Cottus bicornis* is the same species as Kröyer's *Icelus hamatus*, the former specific name ought not to have the preference because it has not been possible to find Reinhardt's original specimen in the museum here. With regard to this L. is right in so far as the specimen from 1838 can no longer be pointed out. But in Reinhardt's notes from the year 1841, kept at the museum, I find mentioned still 3 specimens of *Cottus bicornis* sent here from the missionary Jörgensen at Julianehaab; these specimens are still kept in the museum, and have in the course of time been relabelled *Icelus hamatus* Kr. As there is now no more room for doubt, we ought to return to Reinhardt's specific name as being the older one.

Triglops pingelii Reinhardt.

Angmagsalik. 10—0 fms. 14—16. 9. 1900. Eel-seine. 63 specim.

Turner Sund. 2—0 fms. 25. 7. 1900. Eel-seine. 6 specim.

Hurry Inlet. 7—0 fms. 7—8. 8. 1900. Eel-seine. 8 specim.

Forsblads Fjord, at the mouth. 14—3 fms. 28. 8. 1900. Eel-seine. 5 specim.

S. E. of Sabine Ö. 110 fms. 10.7.1900. Dredge. 1 specim.

Lönnberg (l. c. p. 13) mentions it among the fishes, caught by the Kolthoff-expedition at the North-eastern Greenland.

The species attains a considerable size at East-Greenland, the largest female measuring 152 mm., the largest male 105 mm.

The spawning-season is late, for adult females caught on Sept. 15th at Angmagsalik, still carried immature eggs measuring 2—2.8 mm. in diameter; the total number of eggs in a spawner amounts to about 400.

The numbers of fin-rays in 10 specimens are: D. 34—37 ($D.^1$ 11—12; $D.^2$ 23—26); A. 23—27; P. 17—18; V. 1 + 3.

Gasterosteidæ.

Gasterosteus aculeatus Linné.

Tasiusak. In a pond near Nord Fjord. 10. 7. 1902. 7 specim.

Angmagsalik. In a fresh-water lake. 1892. 2 specim.

Kap Dan Öer (by Angmagsalik). In a lake. 18. 6. 1899. 10 specim.

Danmark Ö. In a fresh-water lake. 24. 8. 1891 & 31. 7. 1892. 11 specim.

C. Kruuse saw on Aug. 13th 1902 numerous specimens in a pool at Kordlortok (near Tasiusak).

On July 31st 1892 it was seen by Bay (l. c. p. 54) in large shoals in Danmark Ö, in quite shallow water.

All the specimens before me belong to the variety *gymnurus* («*Gasterosteus gymnurus*» Cuv. Val. = «*G. dimidiatus*» Reinhardt), as they have only a few laminæ behind the ascending osseous plates of the pelvis, generally 2, sometimes 1, rarely 3 or 4. It is also proved here that the almost naked Stickleback is a fresh-water form. — One specimen has 4 dorsal spines.

Of the 19 specimens from the neighbourhood of Angmagsalik none is longer than 59 mm.; of the 11 specimens from Danmark Ö the largest is only 47 mm. Thus the Three-spined Stickleback does not seem to become nearly so large on the East-coast of Greenland as on the West-coast where the average length for adult specimens is 60—70 mm., and the maximum length 98 mm.

Discoboli.

Cyclopterus lumpus Linné.

G. Holm mentions «Lump-sucker» among the fishes which are found at Angmagsalik (l. c. p. 54), and the same thing was told Søren Jensen during his stay at Angmagsalik 1900. Moreover mag. sc. C. Kruuse who has lately returned after a year's stay at Angmagsalik, tells me that our ordinary Lump-sucker is found there, though very rarely; he had however not seen it himself, but both Mr. J. Petersen (Commercial-manager), and the natives had described it so minutely that no doubt was possible. They stated that the length of it is somewhat over one foot.

Dr. O. Nordenskiöld, who was the geologist of the Amdrup-Hartz expedition, found on August 26th 1900 by Fleming Inlet a well preserved skin of a Lump-sucker about 270 mm. long which had drifted ashore. The specimen has not been dried, as skin and fins are perfectly fresh. Eyes and jaws are taken away, likewise the contents of the head, and of the front part of the body both the soft parts and skeleton are missing. It looks as if a bird had pecked out eyes and jaws, and drawn out the contents through the holes produced in this way. This specimen has been a perfectly typical one, with the following numbers of rays: D.[2] 1 + 10; A. 1 + 10; P. 20.

The Kolthoff-expedition found a dead *C. lumpus* on the shore of Mackenzie Bay (north of Franz Joseph's Fjord) on Aug. 9th 1900 (Kolthoff: Till Spetsbergen och Nordöstra Grönland, Stockholm 1901, p. 163)[1].

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[1]) Kolthoff adds: «another specimen is said to have been seen swimming round the ship», but as a certain identification is wanting I do not take this into consideration.

According to Lönnberg (l. c. p. 13) it was the skin of a comparatively large specimen.

The finding of the two last named fishes seems to me to be very strange, nay almost inexplicable, as *C. lumpus* has not been known by any high-arctic coast up till the present time. As in both cases we have to do with dead specimens, the most cautious proceeding will be for the present time to suppose that the animals have been carried hither by transport, f. i. by currents or in other ways.

On the contrary it is a fact that *C. lumpus* lives at the South-eastern Greenland.

Cyclopterus (Eumicrotremus) spinosus O. F. Müller.

Tasiusak. From the stomach of a Seal. July 1902. 1 specim. 86 mm.

Tasiusak. Shallow-water. 22. 8. 1902. 1 specim. 90 mm.

Angmagsalik. 10—0 fms. 16. 9. 1900. Eel-seine. 2 specim. 96.5—103 mm.

Angmagsalik. On the ice near a current. 5. 2. 1901. 1 specim. 96 mm.

Sermilik Fjord by Angmagsalik. 1901. 1 specim. 57 mm.

Amitsuarsik. 14. 8. 1902. 1 specim. 56 mm.

Fry:

Tasiusak. 5—19 fms. 14. 5. 1899. 6 specim. 11.25, 13, 17.25, 18, 20, 25 mm.

Angmagsalik. 9—0 fms. 14. 9. 1900. Eel-seine. 2 specim. 18, 18.25 mm.

Kap Dan. 10—15 fms. 17. 6. 1898. 1 specim. 22.5 mm.

Hekla Havn. 10 fms. 13. 5. 1892. Dredge. 1 specim. 15.5 mm.

Danmark O, at the station. 26—28. 7. 1892. Dredge. 2 specim. 10.75, 13.5 mm.

«East-Greenland». 1891—92. 2 specim. 12.75, 20 mm.

Lönnberg (l. c. p. 13) mentions it among the fishes caught by the Kolthoff-expedition 1900 at the North-eastern Greenland.

According to verbal information of C. Kruuse, it is not uncommon in the Laminaria region in the Angmagsalik district.

In the two adult well preserved specimens from Angmagsalik the fins contain the following numbers of rays: $D.^1$ 6; $D.^2$ 11; A. 11; C. 11; P. 24.

No great irregularity is observed in the 14 fry-specimens before me with regard to the appearance of the spines: In the smallest specimen (10.75 mm. long) we can scarcely even by the aid of a strong pocket-lens discover any trace of spines, in the specimen of 11.25 mm. length we see on the contrary on the occiput and the foremost part of the back indistinct traces of spines; the number and size of the spines now increase somewhat proportionally to the age, and at a total length of 20—22.5 mm. many spines are visible both on head, trunk and tail.

Liparis liparis Linné.

Cyclopterus liparis Linné, Syst. Nat. ed. 12, T. I, 1766, p. 414; Fabricius, Fauna groenl., 1780, p. 95.

Liparis tunicata Reinhardt, Overs. K. D. Vidensk. Selsk. Forh. 1835—36, p. 111.

Liparis lineatus Collett, Chria. Vidensk. Selsk. Forhandl. 1879, No. 1, p. 41.

Tasiusak. 10. 3. 1901. 2 specim.

Tasiusak. Shallow water. 22. 8. 1902. 1 specim.

The largest of these specimens is 107 mm. long.

By comparison with a specimen of *Lip. liparis* L. (*L. lineatus* Lepechin) from the northern Norway, which I have been able to examine through the kindness of Prof. R. Collett, I have been able to make sure that the Greenland species *Lip. tunicata* Reinh. is identical with this European species. On the other hand I do not feel sure that the Baltic form «*L. barbatus* Ekström» can without hesitation be classified as belonging to the same species.

About the relationship between *Lip. liparis* L. and *L. fabricii* Kr. see the latter species.

Liparis fabricii Kröyer.

Liparis fabricii Kröyer, in Gaimard: Voyages en Scandinavie etc., Zoologie, Atlas, Poissons, Pl. 8, fig. 2 (1845); Naturh. Tidsskr. 2 R., II, 1849, p. 274; Lütken, Dijmphna-Togtets zool.-bot. Udbytte, 1886, p. 146, Tab. 15, Fig. 4—5.

Tasiusak. From the stomach of a Seal. Aug. 1902. 1 specim.

Tasiusak. 10—25 fms. 30. 9. 1899. 1 specim.

Tasiusak. 10. 3. 1901. 1 specim.

Angmagsalik. 9—0 fms. 14. 9. 1900. Eel-seine. 1 specim.

Ödesund. 5—15 fms. 6. 8. 1899. 1 specim.

Turner Sund. 2—0 fms. 25—26. 7. 1900. Eel-seine. 3 specim.

Turner Sund. 3 fms. 23. 7. 1900. 1 specim.

Turner Sund. 8 fms. 22. 7. 1900. 1 specim.

Römers Fjord. 120 fms. 26. 7. 1900. Beam-trawl. 2 specim.

Hekla Havn. 1. 3. 1892. 1 specim.

Hurry Inlet, the coast of Jameson Land. 7—0 fms. 7. 8. 1900. Eel-seine. 3 specim.

Hurry Inlet, the mouth. 50 fms. 11. 8. 1900. Beam-trawl. 7 specim.

Kap Hope. 120 fms. 21. 8. 1900. Beam-trawl. 1 specim.

Kap Borlase Warren. 10 fms. 14. 7. 1900. 1 specim.

The largest of the specimens in question is 155 mm. long[1]).

E. Lönnberg mentions (l. c p. 13) *L. fabricii* amongst the fishes which were caught by the Kolthoff-expedition 1900, at the North-eastern Greenland. I suppose it is also this species which was caught by the Germania-expedition 1869, at Jackson-, Sabine- and Shannon Ö, and which is mentioned by Peters (l. c. p. 171) under the name «*Liparis gelatinosus* Pallas».

About ten years ago Professor F. A. Smitt united into one species the hitherto as two species considered *L. lineatus* Lep. and *L. fabricii* Kr., and designated them respectively *L. (Cyclogaster) liparis* L. forma *microps.* and *L. (C.) liparis* L. forma *megalops*[2]). Dr. E. Lönnberg and Prof. N. Knipowitsch who know the arctic fishes so very well have later on adopted this view as they enter *L. fabricii* as *L. (C.) liparis* L. subsp. *fabricii*[3]) or *L. (C.) liparis* L. var. *fabricii* Kr.[4]). And lately an undisputed authority with regard to the northern Ichthyology, Prof. R. Collett, concurs in Smitt's view[5]).

When I have nevertheless retained *L. liparis* L. (= *L. lineatus* Lep. = *L. tunicata* Reinh.) and *L. fabricii* Kr. in the present list as separate species, the reason is that during the examination of a great number of specimens I have in no case

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[1]) Besides the here mentioned specimens we have moreover a number of young ones, which I, though with some doubt, classify as belonging to *Liparis fabricii*, from the following localities in East-Greenland: Angmagsalik, 10—0 fms., 16. 9. 1900. (3 specim., length 42—43.5 mm.); Kap Dan, 10—15 fms., 4. 6. 1899 (1 specim., length ca. 32.5 mm.); Turner Sund, 22. 7. 1900 (8 specim., 6—17 mm. long, in Plankton, rapid current).

[2]) F. A. Smitt: Skandinaviens Fiskar, 2 Uppl., 1. D., 1892, p. 287.

[3]) Lönnberg: Fishes from Spitzbergen and King Charles Land; Bih. K. Sv. Vet.-Akad. Handl. Bd. 24, Afd. IV, No. 9, 1899, p. 15.

[4]) Knipowitsch: Zool. Ergebn. d. Russischen Exped. nach Spitzbergen, Fische; Ann. Musée Zool. de l'Acad. Imp. d. sciences St. Pétersbourg, T. VI, 1901, p. 16.

[5]) Collett: Meddelelser om Norges Fiske i Aarene 1884—1901; Chria. Vidensk. Selsk. Forhandl. No. 1, 1902, p. 83.

been doubtful with regard to species if the specimens in question were not quite small.

Of distinguishing characters two at any rate prove to be «good»: *L. liparis* has a much more lengthened form of body, and a larger head than *L. fabricii*. I have taken 12 specimens [1]), 78—207 mm. long, of *L. liparis* for purposes of measurements, and 10 specimens [2]) of *L. fabricii*, 75—169 mm. long. The height of the body above the middle of the suctorial disc amounts in *L. liparis* to 14.9—20.2 % of the total length, the length of the head (measured from the end of the snout to the end of the opercular flap) to 21.2—24.6 %. In *L. fabricii* the proportions are relatively 20.5—25.3 % and 25.4—28.6 % [3]).

The pectoral fins are also, as has often been mentioned, shorter in *L. liparis* than in *L. fabricii*; their length (reckoned from the place where the fin gets clear of the body) amounts in the former to 14.5—17 %, in the latter to 17—22.5 % of the total length.

The size of the eyes to which had been attached a considerable importance with regard to the separation, is on the contrary subject to great individual variation. To be sure the eyes are as a rule comparatively small in *L. liparis*, their horizontal diameter generally amounting to 2.8—3.8 % of the total length, but it can rise to 4.8 %; and in *L. fabricii* the proportion is generally 4.1—6.7 %, but can sink as low as 3.7 %.

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1) 6 from West-Greenland, 2 from East-Greenland, 3 from Iceland, 1 from Norway.

2) 2 from West-Greenland, 6 from East-Greenland, 1 from the Kara-Sea, 1 from the northern Norway (Porsangerfjord in the East-Finmark; sent to me by Prof. Collett as «*L. liparis*»).

3) Hereby must however be remembered that these characteristics cannot very well be applied to young specimens; in these the front part of the body is namely comparatively high also in *L. liparis*, and the relative length of the head diminishes in *L. fabricii*, sinks namely (in specimens of ca. 40—47 mm.) to 25.4—25.1 % of the total length.

Other characters, as an ampler (*L. fabricii*) or slighter (*L. liparis*) pigmentation of Peritoneum, are no doubt of too little consequence and too variable to be of any special importance.

This is my impression with regard to the material which has been at my disposal chiefly from West- and East-Greenland. Possibly it will not agree with experiences from other seas.

L. fabricii is evidently a more genuine arctic fish than *L. liparis*. *L. liparis* is by far the more frequent at West-Greenland, from East-Greenland we have only met with it at the southmost part, on the contrary *L. fabricii* is very common in the north.

Liparis (Careproctus) reinhardti Kröyer.

E. Lönnberg mentions (l. c. p. 13, sub nom. «*Cyclogaster gelatinosus*») this species among the fishes caught by the Kolthoff-expedition 1900, at the North-eastern Greenland. By letter Dr. L. kindly communicated to me the following particulars: 3 specimens were caught at the mouth of Franz Joseph Fjord at a depth of 200—300 metres; 1 specim. off Franz Joseph Fjord between Bontekoe Ö and Mackenzie Bugt, where the depth was 250 metres; and 1 specim. at 72° 25′ lat. N. 17° 56′ long. W. where the depth was 300 metres.

Blenniidæ.

Lumpenus maculatus B. Fries.

Kingak (Angmagsalik Fjord). 25. 6. 1902. 1 specim. 136 mm. Numbers of rays in the fins: D. 59; A. 1 + 37; P. 15.

Lumpenus lampetriformis Walbaum.

Angmagsalik. 10—0 fms. 16. 9. 1900. Eel-seine. 2 specim. 211—223 mm.

Hekla Havn. 25. 2. 1892. Dredge. 1 specim. 174 mm.

Numbers of rays in the fins: D. 72—73; A. 49; P. 14—15.

Lumpenus medius Reinhardt.

Forsblads Fjord, at the mouth. 14—3 fms. 28. 8. 1900. Eel-seine. 1 specim.

The most important measurements of this specimen are as follows:

Total length	53.5	mm.
Length of head	10	»
Distance between end of snout and anus	22	»
Distance of dorsal fin from end of snout	10.2	»
Length of pectoral fin	7	»
Largest height of the body	5.25	»

The colour is yellowish-grey with very indistinct spots on the trunk, tail and dorsal fin.

Zoarcidæ.

Lycodes pallidus Collett[1].

1878. *Lycodes pallidus* Collett, Forh. Vidensk. Selsk. Chria. No. 14, p. 70.
1880. *L. pallidus* Collett, The Norwegian North-Atlantic Expedition, Fishes, p. 110, Pl. III, fig. 26—27.
1901. *L. Vahlii* forma *pallida* Smitt, Bih. K. Sv. Vet.-Akad. Handl. Bd. 27, Afd. IV, No. 4, p. 24 (partim), No. 12 & 14—26.
1901. *L. Vahlii typica* Smitt, ibid., p. 26 (partim), No. 30—39.
1901. *L. reticulatus* forma *frigida* Smitt, ibid., p. 29 (partim), No. 2—9.

This species was caught by the Nathorst-expedition 1899 in Franz Joseph Fjord at a depth of 760 metres (4 specim.), and at 73° 20′ lat. N. 21° 20′ long. W. where the depth was 70 metres (1 specim.). Moreover it was caught by the Kolthoff-expedition 1900 in Mackenzie Bugt (N. of Franz Joseph

[1]) All the *Lycodinæ* mentioned in this treatise belong to «SvenskaVetenskaps-Akademiens» museum (Stockholm), where I have had the opportunity of examining them — thanks to professor F. A. Smitt's kindness.

Fjord) where the depth was 12—35 metres (numerous [35] specim.), off Mackenzie Bugt where the depth was 100 metres (3 specim.), at the inner part of Myskoxe Fjord (Franz Joseph Fjord) where the depth was 100 metres (2 specim.), at the outer part of Myskoxe Fjord where the depth was 200 metres (1 specim.), at the mouth of Franz Joseph Fjord where the depth was 200—300 metres (4 specim.), off Franz Joseph Fjord (between Bontekoe Ö and Mackenzie Bugt), where the depth was 250 metres (2 specim.), and SE. of Hvalros Ö where the depth was 80—100 metres (1 specim.).

In all no less than 53 specimens were caught in 1899—1900, 40—178 mm. long.

Lycodes eudipleurostictus Jensen.

1880. *Lycodes esmarkii* Collett, The Norwegian North-Atlantic Expedition, Fishes, p. 84 (partim), Pl. II, fig. 19—21.
1901. *L. Vahlii* forma *pallida* Smitt, Bih. K. Sv. Vet.-Akad. Handl. Bd. 27, Afd. IV, No. 4, p. 24 (partim), No. 13.
1901. *L. Vahlii typica* Smitt, ibid., p. 26 (partim), No. 40—42.
1901. *L. eudipleurostictus* Jensen, Vidensk. Medd. Naturh. Foren. Kbhvn. p. 206.

The body zoarciform. Of the total length the height above anus amounts to 8.1—13.6 %, the length of the head to 19.8—24.3 %, the distance between the end of the snout and anus to 36.7—41.4 %. Hind margin of pectoral fins incised. Colour brown with yellowish-white nuchal spot and 5—8 narrow yellowish-white transverse bands. Scales cover the body right to the front of the dorsal fin as well as the vertical fins almost to their margins. Lateral line double, just behind the base of the pectoral fins devided in a mediolateral and a ventral branch, both distinct. App. pyloricæ 2. Size up to 325 mm.

R. br. 6; D. 100—103; A. 88—92; P. 20—22 (23).

2 specimens of this *Lycodes* were caught by the Nathorst-expedition 1899 in Franz Joseph Fjord at a depth of 760 metres, and 2 specimens were caught by the Kolthoff-expedition 1900, likewise in Franz Joseph Fjord at 200—300 metres' depth. The length is 68—320 mm.

L. eudipleurostictus differs especially by the following characters from *Lycodes esmarkii* Collett with which species it was formerly confounded: The vertical fins have fewer rays; the posterior margin of the pectoral fins have a distinct incision; the two branches of the lateral line are distinct; the colour pattern shows no intimation of the garland pattern so characteristic for *L. esmarkii*; the small intestines have 2 small appendices (which are not found in *L. esmarkii*).

Lycodes reticulatus Reinhardt
var. n. *macrocephalus.*

Pl. XIII, fig. 2 a & b.

1901. *Lycodes reticulatus* forma *reticulata* Smitt, Bih. K. Sv. Vet.-Akad. Handl. Bd. 27, Afd. IV, No. 4, p. 33 (partim), No. 26 & 28—36, Fig. 4—5.

1901. *L. reticulatus* forma *seminuda* Smitt, ibid., p. 31 (partim), No. 13.

The body zoarciform. Of the total-length the height above anus amounts to 10—12.2 %, the length of the head in the males to 26.2—28.6 %, in the females and young specimens to 25—26.6 %, the horizontal diameter of the eye to 4.3—4.8 %, the distance between the end of the snout and anus to 46.2—50.6 %, the length of the pectoral fins to 13—14.4 %. The young ones have dark, and dark edged transverse bands, 7—9, on a light background, besides a dark spot on the end of the caudal fin; a light band across the back of the neck, and on the sides of the head often a dark longitudinal stripe. In the older specimens a more or less pronounced reticular pattern is developed through the dark edges of the bands, especially on the front part of the body. The scales in older specimens are reaching from a little way behind the base of the pectoral fins to the end of the tail, or they stop a little in front of the latter, the belly and fore part of the back being however naked; no scales on the fins. Lateral line mediolateral. App. pyloricæ 2. Size: 245 mm.

R. br. 6; D. 91—96; A. 72—78; P. (19) 20—21.

One single specimen of this new variety was for the first time caught by the Nathorst-expedition 1899, in Franz Joseph Fjord, at a depth of 100—110 metres. In 1900, 6 specimens were caught by the Kolthoff-expedition at 72° 25′ lat. N. 17° 56′ long. W. at a depth of 300 metres, 3 specimens were caught at 73° 55′ lat. N. 19° 20′ long. W. at a depth of 150 metres, and 1 specimen at 74° 35′ lat. N. 18° 15′ long. W. (SE. of Pendulum Ö), where the depth was 150 metres. The size of these 11 specimens is 61—245 mm.

This variety has a great resemblance to *L. reticulatus* Reinh. from West-Greenland, especially with regard to colour pattern as both of them when they grow older have the dark transverse bands transformed into a more or less pronounced reticular pattern; moreover they both have a mediolateral lateral line; nor can they be distinguished by the numbers of rays in the fins. On the other hand the var. *macrocephalus* seems to be a comparatively large-headed and large-eyed fish, which will be seen by the following comparison between two male specimens of about equal size:

	L. reticulatus forma *typica*	*L. reticulatus* var. *macrocephalus*
Total length in mm.	255	245
Length of head .... in % of total length	25.1	28.6
Horizontal diameter of eye » » » » »	3.5	4.3

L. rossi Malmgr. is also closely related to the here mentioned variety, but it has a smaller head (the length of which amounts to 22.4—25.3 % of the total length), and comparatively small eyes (their horizontal diameter amounts to 3.6—4 % of the total-length); moreover it has on the average fewer rays in the pectoral fins viz. (17) 18—19 (20) [1]).

Lycodes seminudus Reinhardt.

1838. *Lycodes seminudus* Reinhardt, Kgl. D. Vidensk. Selsk. Skr. VII, p. 223.
1880. *L. seminudus* Collett, The Norwegian North-Atlantic Expedition, Fishes, p. 113, Pl. IV, Fig. 28.
1901. *L. reticulatus* forma *seminuda* Smitt, Bih. K. Sv. Vet.-Akad. Handl. Bd. 27, Afd. IV, No. 4, p. 31 (partim), No. 14—15, 17—18 & 20—22.

The body zoarciform. Of the total-length the height above anus amounts to 9—10.6 %, the length of the head to 25—28.5 %, the horizontal diameter of the eye to 5.3—3 %, the distance between the end of the snout and anus to 44.6—50.6 %, the length of the pectoral fins to 9.6—11 %. The colour is uniform greyish-brown, or there are indistinct dark transverse bands on trunk and tail, or there are distinct dark transverse bands (7—9), and as a rule a light nuchal band. As a rule the scales stretch to a point above or near anus, rarely to the end of the adpressed pectoral fin. The lateral line is mediolateral. App. pyloricæ 2. Size up to 445 mm.

R. br. 6; D. 91—97; A. 73—78; P. (19) 20—22.

One specimen was caught by the Nathorst-expedition 1899, south of Shannon Ö (74° 52′ lat. N. 17° 16′ long. W.), at a depth of 350 metres, and 2 specimens in Franz Joseph

[1]) Thanks to Professor Collett's kindness I have had the opportunity of examining a whole series of *L. rossi* from Spitsbergen.

Fjord at a depth of 760 metres. 4 specimens were caught by the Kolthoff-expedition 1900, at different places in Franz Joseph Fjord, at 200—300 metres' depth.

The length of these 7 specimens is 129—280 mm. They have all distinct dark transverse bands on trunk and tail, and as a rule light nuchal band.

Lycenchelys kolthoffi n. sp.

Pl. XIII, fig. 1.

1901. *Lycodes Verrillii* Smitt (nec Goode & Bean), Bih. K. Sv. Vet.-Akad. Handl. Bd. 27, Afd. IV, No. 4, p. 22, fig. 1—3.

The body anguilliform. The height above anus amounts to 4.9—5.2 % of the total-length. The head, the length of which amounts to 14.3—14.8 % of the total-length, is rather broad and flat, the trunk approaching cylindrical, the tail is of a low very lengthened form not much compressed except near the end. The anterior part of the lower-jaw is situated a good way behind the end of the upper-jaw. 7 cavities for the lateral line along the upper-jaw and below the eye. The distance between the end of the snout and anus amounts to 27.8—28.4 % of the total-length. The distance of the dorsal fin from the end of the snout amounts to 18.6—18.9 % of the total-length. Colour yellowish-white with many brown spots which at the posterior end of the tail ornament both the vertical fins and the body between them, but on the front part of the tail and on the trunk proper they are chiefly found on the dorsal fin, the back and the upper part of the flank; a dark brown spot on the upper part of the axilla, and a dark curved band across the pectoral fin on the membrane between the rays; the upper side of the head brown, its sides and underside whitish; a dark band from the end of the snout to the eye, a dark spot behind the eye and another on the gill-cover. The scales stretch from the end of the tail to the front part of the dorsal fin or a little past this place; the belly and lower part of the side of the trunk (in front of anus) are however naked; no scales on the fins. The lateral line double, rather distinct from the opercular flap till towards anus (the ventral branch), moreover a few pores are seen along the middle-line (the mediolateral branch). App. pyloricæ not developed. The size (of the two males before me) about 130 mm.

R. br. 6; D. ca. 124; A. ca. 110; P. 14—15.

Distribution. Northern East-Greenland, ca. 160 fathoms.

The Kolthoff-expedition caught 2 specimens (♂♂) off the East-Coast of the northern Greenland (72° 25′ lat. N. 17° 56′ long. W.) on July 30th 1900; the depth was 300 metres, the bottom of the sea consisted of stone and sand.

The most important measurements of these specimens are as follows:

		♂	♂
Total-length	in mm.	128.5	131.5
Length of head	» »	19	18.75
Distance between end of snout and anus	» »	36.5	36.5
Height above anus	» »	6.75	6.5
Distance of dorsal fin from end of snout	» »	24.25	24.5
Length of pectoral	» »	14.5	13.5
Length of snout	» »	6.3	6.4
Horizontal diameter of eye	» »	3.25	3.25

The North-American *Lycodes Verrillii* Goode & Bean (Oceanic Ichthyology, 1895, p. 309, fig. 277), with which F. A. Smitt (l. c.) had identified the here mentioned species, is a quite different species as will be seen by the measurements given below of 2 specimens presented by the Smithsonian Institution to the Zoological Museum of Copenhagen.

L. verrillii Goode & Bean:

			♂	♀
Total length	in	mm.	135	138
Length of head	»	»	26	22
Distance between end of snout and anus	»	»	45	44
Height above anus	»	»	7.25	8.5
Distance of dorsal fin from end of snout	»	»	35	32
Length of pectoral	»	»	12	10.5
Horizontal diameter of eye	»	»	5	5.5

Compared with *L. verrillii* Goode & Bean *L. kolthoffi* has:

The body more slender, as the height above anus amounts to 4.9—5.2 % of the total length (in *L. verrillii* the corresponding numbers are 5.5—6.2 %).

Anus situated more to the front, its distance from the end of the snout amounting to 27.8—28.4 % of the total-length (in *L. verrillii* 31.9—33.3 %).

The head comparatively shorter, its length amounting to 14.3—14.8 % of the total length (in *L. verrillii* 19.3 [in ♀ 16] %).

The dorsal fin starting comparatively farther to the front, as its distance from the end of the snout amounts to 18.6—18.9 % of the total-length (in *L. verrillii* 23.2—25.9 %).

The pectoral fins larger, as their length amounts to 10.3—11.3 % of the total-length (in *L. verrillii* 8.3—8.9 %).

The eyes comparatively smaller, as their horizontal diameter amounts to 2.5 % of the total-length (in *L. verrillii* 3.7—4 %).

Moreover the dark markings form a marble-pattern in *L. kolthoffi*, but in *L. verrillii* regular transverse bands.

L. kolthoffi is much closer related to *L. sarsii* Coll., from which species it is however easily distinguished by its eyes being comparatively a little smaller, its pectoral fins larger, and its dorsal fin starting more to the front; in a 140 mm. long *L. sarsii* ♂, the horizontal diameter of the eye amounts namely to 2.9 % of the total-length, the length of the pectoral fin to 7.9 %, the distance of the dorsal fin from the end of the snout to 22.2 %. Moreover the colour pattern is quite different, in *L. kolthoffi* very spotted, in *L. sarsii* on the contrary more uniform, only with indistinct shadings down the flanks.

Gymnelis viridis Fabricius.

Angmagsalik. 9—0 fms. 14. 9. 1900. Eel-seine. 2 specim. 97, 114.5 mm.

Off Henry Land. ca. 20 fms. 21. 7. 1900. Dredge. 1 specim. 112 mm.

Hekla Havn. 3—6 fms. 20. 8. 1891. 2 specim. 116, 118 mm.

Hekla Havn. 3—9 fms. 9. 8. 1891 & 15. 3. 1892. 3 specim. 83—106 mm.

Hekla Havn. 3—5 fms. 15. 4. 1892. 1 specim. 107 mm.

SE. of Sabine Ö. 110 fms. 10. 7. 1900. Dredge. 1 specim. 82 mm.

Lönnberg (l. c. p. 13) mentions it among the fishes caught by the Kolthoff-expedition 1900, at the North-eastern Greenland.

There are no colour markings in any of the specimens from Hekla Havn. The others on the contrary are ornamented with dark transverse bands; the specimen from Henry Land has moreover no less than four ocelli on the dorsal fin, the two front ones situated above anus, the two posterior ones fully half a head's length behind them; of the specimens from Angmagsalik the larger one has an eye-like spot a little in front of the middle of the whole length of the dorsal fin, and moreover a row of light spots along the base of the fin situated just opposite to the light narrow spaces between the transverse bands; the smaller specimen has two very indistinct eye-like spots in the front part of the fin, and light perpendicular stripes on the fin, opposite to similar but more strongly marked ones on the back of the body which divide the dark transverse bands.

Professor N. Knipowitsch[1]) has lately pointed out that the figure in Collett's work on the fishes of the Norwegian North-Atlantic Expedition (pl. IV, fig. 32) is not quite correct, as the snout (in front of the eye) is too long. In the specimens at my disposal the dorsal fin also as a rule starts farther back than Collett indicates, namely above the space between anus and the end of the pectoral fin, sometimes behind, sometimes in front of the middle of the line which connects these points; only in one specimen the dorsal fin is continued as a low fold to a point above the hindmost third of the pectoral fin, that is, as far to the front as Collett states it in his diagnosis.

Gadidæ.

Gadus callarias Linné.

Graah mentions the common Cod among the fishes which he saw during his stay on the coast of the South-eastern Greenland (l. c. p. 194).

Gadus ogac Richardson.

1836. *Gadus ogac* Richardson, Fauna boreali-americana, p. 246.
1842. *G. ogat* Kröyer, in Gaimard: Voyages en Scandinavie, en Laponie etc., Poissons, Pl. 19.

Graah mentions this species among the fishes which he saw on his voyage along the South-eastern Greenland (l. c. p. 194);

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[1]) Zool. Ergebnisse d. Russ. Exped. nach Spitzbergen, Fische; Ann. Musée Zool. de l'Acad. Imp. des Sciences St. Pétersbourg, T. VI, 1901, p. 20.

there can scarcely be any doubt with regard to the correctness of the determination, for he makes a distinction between this cod which he calls «Ogak» according to the statement of the Greenlanders, and the common cod (*G. callarias*) or «Saraudlik».

G. Holm mentions (l. c. p. 54) «Fjord-Cod» among the fishes which are found at Angmagsalik, adding that the Eskimo only get them when the Crested Seal brings them up to the surface. I have learned by mag. sc. C. Kruuse, that by Fjord-Cod is meant the cod which the Eskimo call «Ûvak», but this is the same as «Ogak», that is *Gadus ogac* Rich. Kruuse did not see it himself during his stay at Angmagsalik, but the Danes there told him the same about it as Holm states.

Gadus saida Lepechin.

Tasiusak. In crevices by the ice-foot, close under shore (steep rock). 12. 5. 1899. 3 specim. 83, 117, 162 mm.

Tasiusak. 5—10 fms. Dredging under the ice. 25. 5. 1899. 1 specim. 130 mm.

Tasiusak. 10. 3. 1901. 3 specim. 49, 111, 117 mm.

Angmagsalik. 9—0 fms. 14. 9. 1900. Eel-seine. 4 specim. 85, 102, 113, 162 mm.

Angmagsalik. 10—0 fms. 16. 9. 1900. Eel-seine. 11 specim. 72.5, 80, 83, 92, 96, 100, 102.5, 105.5, 119, 158, 187 mm.

Turner Sund. 2—0 fms. 25. 7. 1900. Eel-seine. 5 specim. 58.5, 71.5, 86.5, 95.5, 267 mm.

Hekla Havn. 12. 8. 1891. 1 specim. 254 mm.

Hekla Havn. 15. 9. 1891. 2 specim. 110, 132 mm.

Hurry Inlet, the coast of Jameson Land. 7—0 fms. 7. 8. 1900. Eel-seine. 42 specim. 45—74 mm.[1]).

[1]) The size of this fry is remarkably fluctuating viz: 45, 46, 46, 47, 47.5, 49, 50, 50.5, 51, 52, 53, 54, 54.5, 55, 55.5, 56, 56.5, 57, 57, 57, 57, 58, 58, 58.5, 58.5, 60, 60.5, 61.5, 61.5, 61.5, 62, 62, 62, 62, 64, 65, 65.5, 67, 67.5, 68, 71, 74 mm. Probably they are all dating from the year before (I-group).

Hurry Inlet, the south coast of Jameson Land. Just near the beach, in very shallow water. 3. 8. 1891. 2 specim. Fry. 13.5—16 mm.

Hurry Inlet. At the surface. 6. 7. 1900. 1 specim. 73.5 mm.

Hurry Inlet. At the surface. 4. 8. 1900. 1 specim. 185 mm.

Hurry Inlet. In a Bow-net. 4. 8. 1900. 1 specim. 223 mm.

Fleming Inlet. 118 fms. 24. 8. 1900. Dredge. 2 specim. ?—77 mm.

Forsblads Fjord. 90—50 fms. 30. 8. 1900. Beam-trawl. 4 specim. 70, 71.5, 82.5, 92.5 mm.

Bay (l. c. p. 54) writes that it was very common in Scoresby Sund.

It was caught by the Germania-expedition at Sabine Ö («*Gadus glacialis* n. sp.» Peters l. c. p. 172).

Lönnberg writes (l. c. p. 13), that it was the most frequent of all the fishes caught by the Kolthoff-expedition 1900, at the North-eastern Greenland.

E. Bay (l. c. p. 54) mentions *Gadus saida* from the field-ice (68° 43′ lat. N. 19° 14′ long. W.; 75° 30′ lat. N. 7° 11′ long. W.) and both he and Sören Jensen often observed some small fishes, during their sailing among the field-ice, which they, undoubtedly correctly, supposed to be *G. saida.* Jensen thus writes in his diary (2—6. VII. 1900; ca. $72^1/_2$—$74^1/_2$° lat. N. $4^2/_3$—$6^1/_2$° long. W.): «Often when we struck against the sheets of ice, a small fish appeared which I suppose to be *Gadus saida.* It was sitting on the ice-foot in the corner between this and the sheet of ice». «These last days where we have been amongst rather compact ice many small fishes have been seen *(Gadus saida).*» «*Gadus saida* is constantly seen; in the compact ice where the ship has great difficulty in getting on it is frequently seen». Similar observations were made by the Kolthoff-expedition to East-Greenland 1900;

Lönnberg writes (l. c. p. 13): «A very interesting observation was made concerning the habits of the Polar-cod, which was found abundantly swimming the surface of the sea round the drifting ice even in such places where the depth of the ocean was 2000 metres and more». Bay is inclined to believe that *Gadus saida* — at least at a young age — leads a pelagic life. And Lönnberg writes: «It thus leads sometimes a pelagic life». Jensen on the contrary in his diary is of the opinion, that *G. saida* evidently is no pelagic species whatever, no more than the Amphipods (and masses of Diatoms) which are found together with it on the ice-foot; we «have here to do with a peculiar life of shore species which live out here among the sheets of ice».

The three largest ones (223, 254, 267 mm.) of the specimens at my disposal are females, while the largest male only measures 185 mm. In the largest female caught July 25th, the eggs are 0.35 mm. in diameter; in a 187 mm. long female caught Sept. 16th, the diameter of the largest eggs is 0.6 mm.

The numbers of rays in 6 specimens are as follows:

	$D.^1$	$D.^2$	$D.^3$	$A.^1$	$A.^2$	P.	V.
Angmagsalik	13	15	20	18	20	19	6
»	12	16	20	17	19	19	6
»	13	15	20	18	19	19	6
Turner Sund	13	16	19	19	20	19	6
Hekla Havn	12	18	21	19	21	19	6
Hurry Inlet	14	15	20	18	22	20	6

The fry (of 45 mm. and more) is pigmented on back and flanks with dark cross-formed or stellated chromatophores. In larger young ones the dark chromatophores are sometimes amassed in some places towards the back, and produce an intimation of transverse bands; the distal margins of the dorsal fins and partly also of the anal fins are frequently strongly pigmented.

In fig. 1 a & b, plate XII is represented a young one of the Polar-cod in natural size (45 mm. long). It reminds us about the fry of *Gadus virens* by the abundant rather equally distributed pigmentation, but the latter has (at a similar total length) a very marked longitudinal stripe of closely placed chromatophores along the middle-line of the side of the tail. The fry of the common cod *(Gadus callarias)* also looks quite different when of the same size: «The colour is grouped in a characteristic way in dark and light spots on the flanks of the trunk so as to form a chequered pattern» [1]). Moreover the fry of *G. saida* is characteristic by the slender form and the large eyes.

Two post-larval Polar-cods have been caught on Aug. 3rd 1891, in Hurry Inlet at the south-coast of Jameson Land just near the beach in very shallow water; they were caught there together with the fry of *Cottus quadricornis* mentioned p. 237.

The smaller of them is represented in fig. 1 a&b, plate XI. The length is 13.5 mm. The lower jaw runs steeply upwards and projects in front of the upper jaw when the mouth is shut. The median fin stretches from the back of the neck round the tail and does not stop until just in front of anus. The notochord is continued almost to the posterior margin of the fin, and is not yet bent upwards; rays for the caudal fin are developed a little in front of its end, both above and below. Paired fins have appeared. On each side of the back along the base of the fin-edgings is a pigmented stripe, and a similar one on the middle part of the tail, along each side of the under part, moreover dark chromatophores along part of the middle-line of the side, on the front part of the tail, partly also under the middle-line and along a line which almost corresponds with the upper limit of the abdominal cavity. The upper side of the head behind the eyes is moreover strongly pigmented.

In the young one which was a little larger, ca. 16 mm. long,

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[1]) Compare C. G. Joh. Petersen, Fra den danske biologiske Station, XI, 1902, p. 7, Fig. 1.

one discovers under a strong lens that three dorsal fins and two anal fins are developing in the form of low ridges at the base of the median fin — to this my attention was drawn by Dr. C. G. Joh. Petersen, and I mention it because the specimen was hereby identified as a *Gadus*.

The two last named post-larval specimens evidently are from this year (O-group); concerning the young ones from the year before, compare the note p. 266—67.

Brosmius brosme Ascanius.

A female specimen ca. 600 mm. long of the Torsk was brought home by the East-Greenland expedition 1900; it was presented to the expedition by J. Petersen, commercial manager, Angmagsalik, and was according to his statement taken from the mouth of a Crested Seal (*Cystophora cristata* Erxl.).

It is interesting that the occurrence of the Torsk is hereby proved; for there can now scarcely be any reason to doubt that it also lives at West-Greenland which was already said to be the case by Fabricius (Fauna groenlandica, 1780, p. 149), but later on considered as doubtful by Lütken (Vidensk. Medd. Naturh. Foren. Kbhvn., 1881, p. 255).

Onus reinhardti (Kröyer M. S.) Collett.

1880. *Onos reinhardi* Collett, The Norwegian North-Atlantic Expedition, Fishes, p. 131, Pl. IV, fig. 34.

Mag. sc. C. Kruuse brought home a specimen of this Rockling from Kingak (Angmagsivik) in Angmagsalik Fjord. It was harpooned with arrow by the Greenlanders June 19th 1902, in small inlets on the promontory which forms the Angmagsæt-place (that is the place where the Angmagsæt are caught); compare *Mallotus villosus* p. 275.

The following measurements will show the close accordance with the measurements given by Collett (l. c. p. 135) for his specimens.

Total-length	251	mm.
Length of head	50	»
Horizontal diameter of eye	8.5	»
Length of snout	15	»
Length of postorbital part of head	26.2	»
Height of trunk above anus	50	»
From end of snout to 1st dorsal	47	»
» » » » » 2nd »	76	»
» » » » » anus	115	»
From anus to end of caudal	138	»
Height of caudal peduncle	13.75	»
The interorbital width	10.75	»
Length of pectoral	36.5	»
» » ventral	47	»
» » 1st ray of 1st dorsal	15.5	»

Macruridæ.

Macrurus fabricii Sundevall.

A female specimen 640 mm. long of this deep-sea fish was brought to the surface by a Crested Seal (*Cystophora cristata*) on Sept. 30th 1901, off the mouth of Sermilik close to Orsuluviak S. of Tasiusak. Mag. sc. Chr. Kruuse who wintered that year at Angmagsalik took care of the fish, and brought it to the Zoological Museum here.

Pleuronectidæ.

Hippoglossus (Platysomatichthys) hippoglossoides Walbaum.

Mag. sc. C. Kruuse brought home 3 small specimens (150—220 mm.) from Kingak (Angmagsivik) in Angmagsalik Fjord. They were harpooned with arrow by the Greenlanders on June 19th 1902, in small inlets on the promontory which forms the

Angmagsæt-place (that is the place where the Angmagsæt are caught); compare *Mallotus villosus* p. 275.

G. Holm mentions (l. c. p. 54) Halibut[1]) among the fishes found at Angmagsalik adding that the Eskimo get them when they are brought to the surface by the Crested Seal. I suppose that by «Halibut» is meant this species whose particular name generally is «The small halibut» or «Hellefisk».

Drepanopsetta platessoides Fabricius.

Angmagsalik. 15. 4. 1901. From a Shark's stomach.

2 specim. Ca. 150—210 mm.

The above mentioned specimens were sent home by Sören Nielsen (commercial assistant); they are half way digested, but can with certainty be classified as «Long-Rough Dabs».

Lönnberg (l. c. p. 13) mentions it among the fishes caught by the Kolthoff-expedition 1900, at the North-eastern Greenland. According to a communication by letter from Dr. L. it was caught at 72° 25′ lat. N. 17° 56′ long. W. at a depth of 300 metres. Only 1 specimen was caught.

Paralepididæ.

Paralepis kröyeri Lütken.

1842. *Paralepis borealis* Kröyer (nec Reinhardt) in Gaimard: Voyages en Scandinavie, en Laponie etc., Poissons, Pl. 16, B, Fig. 1.
1891. *Paralepis kröyeri* Lütken, Vidensk. Medd. Naturh. Foren. Kbhvn. p. 230.

A specimen of this Paralepid about 263 mm. long was found dead, drifting in the water in Sermiligak Fjord N. of Angmagsalik in Sept. 1892. The body is curved and bent so

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[1]) It is not correct when Bay (l. c. p. 58) writes that according to Captain Holm *Hippoglossus vulgaris* (Fleming) is found at Angmagsalik. Holm uses the more vague expression «Halibut».

that the measurements cannot be exactly stated. The numbers of rays in the fins are as follows: D. 10; A. 31; P. 12; V. 9.

Lütken has (l. c. p. 227—231) given a detailed account of the species, and its relation to *P. borealis* J. H. Reinhardt, with which species Kröyer had confounded it.

Salmonidæ.

Salmo alpinus Linné[1].

Tasiusak. From a lake with salmon-river. 1. 8. 1899. 1 specim. (♀). 455 mm.

Tasiusak. From the mouth of the river. Harpooned by Greenlanders. 1901—02. 3 specim. 125—165 mm.

Sieralik. From small rivers. 20. 7. 1902. 1 specim. 50 mm.

Ikerasausak. From small rivers. 30. 6. 1902. 1 specim. 72 mm.

Angmagsalik. From the salmon-river. 11—18. 9. 1900. 5 specim. 350—390 mm.

Hekla Havn. From a river. 11. 8. 1891. 6 specim.

Hurry Inlet. In salmon-net by the shore. 9. 8. 1900. 1 specim. (♀). 590 mm.

Two small specimens (50—120 mm.) were caught (in July) by the Germania-expedition, in a fresh-water lake in Sabine Ö (Peters l. c. p. 174, sub nom. ?*Salmo Hoodii* Rich.).

According to verbal communication from C. Kruuse it is common in all rivers of ordinary size in the Angmagsalik district, nay he even saw it in clayey outlets of glacier-streams.

[1]) As I intend in «*Conspectus Faunæ Groenlandicæ*» to discuss in detail the whole of our very considerable material of Greenland Salmon, I shall not here enter into any discussion as to whether we can distinguish between one or more sub-species.

At Tasiusak *S. alpinus*, according to Bay (l. c. p. 55—57), migrates in summer from the sea up the rivers and lakes to propagate. When the expedition arrived at Tasiusak towards the middle of Sept. 1892, the migration was still going on, but seemed according to the Greenlanders to have greatly decreased. Yet no less than 25 fishes were caught on the first day (Sept. 12th) in a small net placed by a cataract; they were large fishes, 1—1¼ kilog.; the males especially had splendid colours, and the hook-shaped jaws characteristic for salmons during the time of propagation. Already on the next day only 11 were caught, and during the last part of their stay only a few specimens. Sören Jensen writes in his diary-notes from Tasiusak, that the nets are put out at the end of July; not a few are caught from July to Sept., then the migration stops, and *S. alpinus* winters in the lake; when the ice of the river breaks up it goes to sea again, but it has then become very lean. — On Oct. 2nd 1891, Bay saw a rather large number of *S. alpinus* under the ice of a fresh-water lake in Danmark Ö.

When G. Holm stayed at Angmagsalik (1884—85), the fishing with nets was evidently unknown, for he writes that during the summer «Salmon» is caught in the rivers with a three-branched pitchfork, during the winter through holes in the ice with a harpoon; sometimes they are also caught by the aid of a dam which falls dry at low-water, and is placed at the outlet of a river.

Mallotus villosus O. F. Müller.

Angmagsalik Fjord. 3. 6. 1899. 2 specim. (♂♂, 150 mm.)
Angmagsivik. 19. 6. 1902. 1 specim. (♀, 119 mm.)
Kingorsuak. 29. 7. 1902. 1 specim. (♀, 109 mm.)

The Capelan or «Angmagsak», in plural «Angmagsat» (spoken «Angmagsæt»), as it is called by the Greenlanders, is eagerly sought for during the spring at Angmagsalik[1]). G. Holm writes about this l. c. p. 82:

«The Angmagsæt are caught during the spring in the last half of May and June at Kingak in Angmagsalik Fjord. All the inhabitants flock together in this place, and the tents are spread on the hilly ground which is still covered by deep snow.

The Angmagsæt are taken out of the water, from the boats rowed by women, with large cylindriform scoops a little more than a foot high and broad fastened to a ca. 15 feet long stake. The scoop is made of two wooden rings between which are placed ca. 12 bars. These bars are interwoven with fine seal-skin straps, the bottom is like-wise formed by a net-work of the same material. From kayaks the Angmagsæt are taken with spears formed by thin wooden sticks placed closely together. Every bit of ground on the rocks or on the grass is employed for the drying of the fish which is then afterwards arranged, drawn on strings of skin, and rolled up in large bundles to be kept for winter supply.»

«The spawn of the Angmagsæt together with other spawn collected among the sea-weeds has a fine taste and is a favourite dish.

The Angmagsæt generally appear before the winter ice is broken up in the middle part of the fjord, while it is away both from the inmost and outmost parts. As all the people winter farther out at the fjord they get to the Angmagsæt-place by a combined use of boats, rowed by women, and of sledges.»

C. Kruuse told me that when sailing during the fishing-season past Kingak, one can see the Angmagsæt sport by thousands on the surface of the water near land. He never observed any exceptional mortality among the fishes during or after spawning time.

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[1]) All the inhabited district has been named after this fish; Angmagsalik means namely: «Having Angmagsat».

E. Bay tells (l. c. p. 57) that during the stay of the expedition at Angmagsalik (1892) bundles of dried Angmagsæt were often seen. On the contrary it was neither seen at Hekla Havn nor at any other place in or north of Scoresby Sund.

Plagiostomi.

Somniosus microcephalus Bloch & Schneider.

According to Holm the «Greenland Shark» is very common at Angmagsalik, and C. Kruuse tells me that it goes right up to the inner part of the fjords. Bay writes (l. c. p. 58): «During the wintering of the Ryder-expedition in Scoresby Sund (1891—92) a few were caught near Hekla Havn». He also tells that a Greenland shark was caught while the ship lay among the field-ice on July 13th 1891 (75° 6′ lat. N. 10° 29′ long. W.); according to sealers it is not at all uncommon there.

Holm writes (l. c. p. 81) that during the winter the catching of sharks is often of great importance for the Angmagsaliks: «A large opening in the ice is made, and some old blubber fastened to a stone is let down into the water. Above this is placed some seal's flesh from which the blood is slowly running into the water. The catching takes place when it gets dark, then the Greenlanders run about on the ice and scream to entice the sharks to come to the surface. Once there they remain there quite quietly, and allow themselves to be harpooned. The catch is often so rich that they stop it on account of the abundance of the spoil. The women often take part in this catch».

Plate XI.

Fig. 1 a. Post-larval Polar-cod, *Gadus saida* Lep. August 3, 1891. East-Greenland (Hurry Inlet, the south coast of Jameson Land just near the beach, in very shallow water). P. 269.

- 1 b. The same, dorsal view.

- 2. Young Four-horned Cottus, *Cottus quadricornis* L. August 3, 1891. East-Greenland (Hurry Inlet, the south coast of Jameson Land just near the beach, in very shallow water). P. 237—238.

- 3 a. Young Four-horned Cottus, *Cottus quadricornis* L., somewhat older. August 7, 1900. East-Greenland (Hurry Inlet, in pools on the beach). P. 238.

- 3 b. The same, dorsal view.

- 4. Young Sea-scorpion, *Cottus scorpius* L. var. *groenlandica* Lütk. August 5, 1899. East-Greenland (Kangerdlugsuatsiak). P. 238.

- 5. Young *Icelus bicornis* Reinh. West-Greenland (Egedesminde). P. 239.

- 6. Young *Gymnacanthus tricuspis* Reinh. West-Greenland (The harbour of Pröven). P. 238—239.

The appended line indicates the natural size.

Tavle XI.

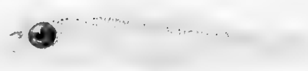
Th. Bloch del.

T. N. Möller sculp.

Plate XII.

Fig. 1 a. Young Polar-cod, *Gadus saida* Lep., nat. size. August 7, 1900. East-Greenland (Hurry Inlet, Jameson Land near the beach). P. 268—269.

- 1 b. The same, dorsal view.
- 2 a. *Artediellus uncinatus* Reinh., the male, nat. size. West-Greenland. P. 242—244.
- 2 b. *Artediellus uncinatus* Reinh., the female, nat. size. West-Greenland. P. 242—244.



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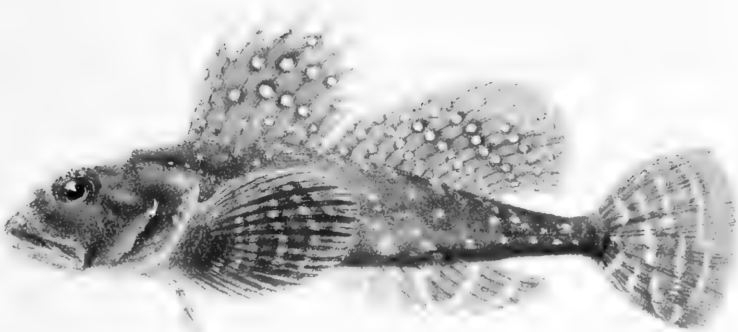
1b



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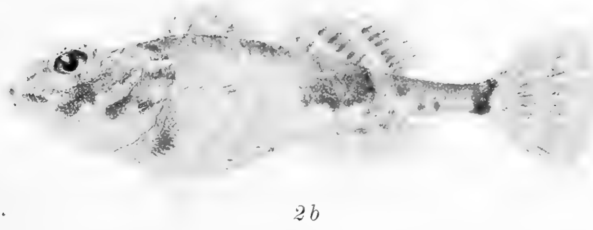


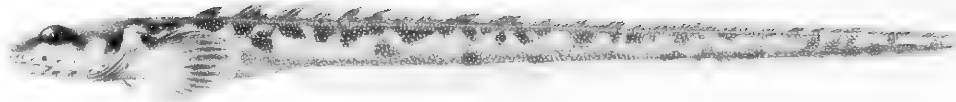
2b

Th. Bloch del. Pacht & Crone phototyp.

Plate XIII.

Fig. 1. *Lycenchelys kolthoffi* n. sp., nat. size. East-Greenland (72° 25′ N. 17° 56′ W.), 300 metres. P. 261.

- 2 a & b. *Lycodes reticulatus* Reinh. var. n. *macrocephalus*, nat. size. North-eastern Greenland. P. 258.



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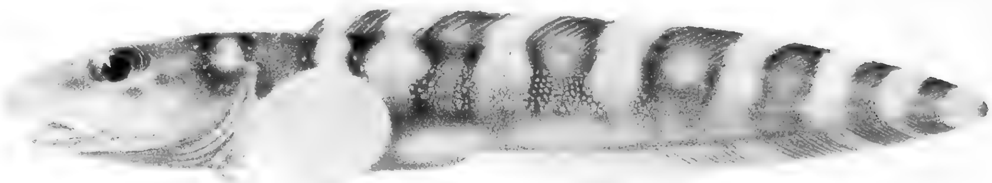

2 a

2 b

Th. Bloch del. Pacht & Crone phototyp.

VIII.

Weitere Beiträge

zur

Fauna des Jura von Nordost-Groenland.

Von

Prof. Dr. **E. Fraas** in Stuttgart.

Vom Herrn N. Hartz wurden mir 2 Fundstücke zur Bestimmung übergeben, welche derselbe seiner Angabe gemäss auf Jameson Land am Scoresby Sund, c. 70° n. B., während der dänischen Expedition nach Nordost-Groenland im Jahre 1900 gesammelt hatte. Dieselben stammen aus dem jurassischen Sandstein[1]), dessen marine Fauna von Lundgren[2]) auf Grund der Aufsammlungen von Bay und Hartz in den Jahren 1891—1892 bearbeitet worden ist.

1. Fussspur eines Dinosauriers.

Der Abdruck eines Fusses, welcher als Positiv, d. h. als Vertiefung auf der Sandsteinplatte erhalten ist, zeigt 4 deutlich ausgeprägte Zehen-Eindrücke, welche zweifellos von dem Abdruck eines einzigen Fusses herrühren (Fig. 1). Von diesen Eindrücken liegen 3 bei einander und bilden den vorderen Rand

---

[1]) Der Fussspur des Dinosauriers wurde in einer losliegenden Steinplatte auf Neills Felsen am Dinosaurus-Flusse, c. 9 kilom. nördlich von Kap Stewart, c. 35 Meter ü. d. M. gefunden.

Der Wirbelkörper von *Ophthalmosaurus* fand sich (mit Ammoniten, Belemniten und einer Gasteropode zusammen) in einem sehr glimmerreichen, leicht verwitternden Thon-Schiefer, 550—580 Meter ü. d. M. an der Vardeklöft, 17 kilom. nördlich von Kap Stewart. Alle diese Fossilien waren in Konkretionen eingebettet. N. Hartz.

[2]) B. Lundgren, Anmärkningar om några Jurafossil från Kap Stewart i Ost-Grönland. Meddelelser om Grönland Bd. XIX, 1896, pag. 189 ff.

des Fusses mit 3 Zehen, während der 4. Eindruck median, aber weit zurück liegt und nicht von einem Ballen sondern nur von einer rückwärts gestellten Zehe herrühren kann. Die 3 vorderen Eindrücke sind ziemlich gleichartig gestaltet und bestehen aus einer ovalen Vertiefung, welche nach vorne in einem gerundeten Winkel verläuft, und dieser Punkt bezeichnet auch diejenige Stelle, wo sich die Zehe am tiefesten in den Boden eingegraben hat. Ein mit einer kurzen spitzigen Kralle versehener Fuss

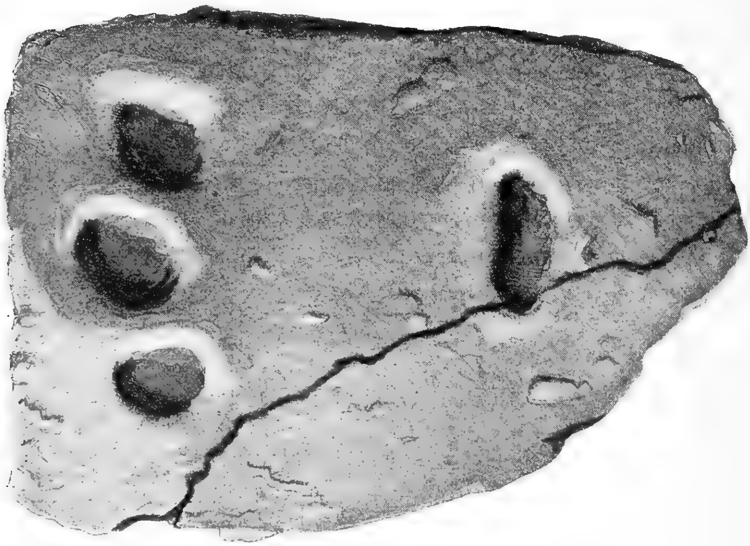

Fig. 1.

konnte eine solche Vertiefung erzeugen, welche durch späteres Zusammenfliessen des sandigen Bodengrundes etwas an Deutlichkeit einbüsste und eine abgerundete Form annahm. Auffallend ist die rückwärts gelegene Vertiefung, welche eine quergestellte schwach gebogene sichelförmige Gestalt zeigt und zwar so, dass der Schwerpunkt der Vertiefung nach vorne gerichtet ist. Eine nach rückwärts gestellte Zehe mit einer ausgeflachten Kralle könnte beim Sprunge einen derartigen Eindruck erzeugen, da dabei die Kralle stark eingegraben und zugleich nach vorne gepresst wurde. Die Dimensionen der Fusspur sind folgende: Die vorderen Vertiefungen sind 12—14 mm lang und 5—6 mm breit; der gegenseitige Abstand beträgt 11 mm, während die gesammte Spannweite der Fährte am Vorderrande 50 mm misst. Der hintere Eindruck ist 18 mm breit und mit seinem Vorderrande 65 mm von dem vorderen Rande des mittleren Zeheneindruckes entfernt.

Diese geringen Grössenverhältnisse weisen auf ein Thier von mässiger Grösse, aber mit sehr characteristischem Fuss hin.

Fig. 2.

Die erste Zehe (Hallux) war nach rückwärts gerichtet und mit breiter Kralle versehen (Fig. 2); beim Sprung trat dieselbe energisch in Thätigkeit und grub sich am tiefsten ein. Nach vorne finden wir 3 Zehen gerichtet und annähernd gleich gespreitzt, jedoch beim Sprung etwas ungleich aufgesetzt, indem die Endphalange der zweiten Zehe in der Axe des Fingers gestellt war, während die dritte und vierte Zehe etwas nach aussen seitlich auswichen. Eine fünfte Zehe war nicht vorhanden oder jedenfalls so rudimentär, dass sie beim Auftreten den Boden nicht berührte. Ein derartiger Bau der Fusses ist sehr aussergewöhnlich und ich kenne keine Faehrte, welche sich mit dem vorliegenden Stücke in Einklang zu bringen wäre. Dagegen sind uns wohl derartige Füsse mit 3 nach vorne und einer nach hinten gerichteten Zehe in der Paläontologie bekannt, sie gehören theils den Vögeln theils den Dinosauriern an. Unter den Vögeln würde der Fuss von *Archaeopteryx* den Anforderungen für die Bildung der vorliegenden Fährte entsprechen, nur beim Hallux wäre ein anderer mehr nach der Längeaxe des Fusses ausgegrabener Eindruck zu erwarten. Auch glaube ich, dass überhaupt der Abdruck eines Vogelfusses, der stets mit der ganzen Sohle auf den Boden drückt, sich anders gestalten müsste, als diese, offenbar von einem springenden oder hüpfenden Thiere herrührende Fährte.

Unter den Dinosauriern war diese Art der Bewegung vielfach ausgebildet und der Hinterfuss von *Compsognathus* zeigt auch neben den 3 wohlentwickelten Zehen II—IV eine freilich rudimentäre erste Zehe , dei jedoch noch mit Phalangen und Kralle versehen war. Erst in neuerer Zeit wurde durch Osborn[1]) infolge sorgfältiger Ausgrabungen die genaue Anatomie des Fusses gewisser Dinosaurier bekannt und die Verhältnisse, welche nach ihm ein carnivorer Dinosaurier («wahrscheinlich *Allosaurns*») aufweisst, entsprechen vollständig dem Bilde, das wir uns auf Grund der Fährte von dem entsprechenden Fusse gemacht haben. Der Hallux ist bei diesen Arten kräftig entwickelt und beim Sprung musste sich derselbe ungemein kräftig in der Boden eingraben. Die 3 übrigen Zehen sind ganz wie bei unserer Fährte nach vorne gestellt und gespreitzt; alle sind mit spitzigen Krallen versehen. Nun stimmen freilich die Grössenverhältnisse nicht, indem *Allosaurus* und seine Verwandten gewaltige Riesen von 6—8 m Länge waren,

---

[1]) H. F. Osborn, Fore and hind limbs of Carnivorous and Herbivorous Dinosaurs from the Jurassic of Wyoming. Bulletin of the American Museum of Nat. Hist. Vol. XII, Art. XI, p. 161—172, New York, Okt. 30, 1899.

deren Pfoten 8 mal die uns vorliegende an Grösse übertreffen, aber das hat wenig zu sagen, denn es gab wohl sicher auch kleine junge Thiere dieser Gruppe oder ihr nahe verwandte kleine Arten.

Ich komme zu dem Schlusse mit der Behauptung, dass die vorliegende Fährte von einem kleinen Dinosaurier herrührt, der entsprechend den carnivoren Dinosauriern eine springende Bewegungsart hatte und in der Anatomie seines Fusses die grösste Ähnlichkeit mit den von Osborn beschriebenen *Allosaurus*-Arten zeigte.

2. Wirbel von Ophthalmosaurus (Baptanodon).

In einer Sandstein-Geode eingeschlossen wurde ein isolirter Wirbel-Körper (Fig. 3, 4) gefunden, welcher sich nach seiner tief amphicoelen Gestalt sofort als der eines Ichtyosauriers bestimmen liess. Beim Aufschlagen der Geode ist der Wirbel theilweise verloren gegangen, aber die noch erhaltene Hälfte, verbunden mit dem Abdruck im Gestein lassen noch eine sichere Bestimmung zu. Obgleich der Rand der Wirbelkörpers nicht blosgelegt worden konnte, so ist doch nach der kreisrunden Gestalt mit annähernder Sicherheit anzunehmen, dass es sich um einen vorderen Schwanzwirbel handelt, da bei allen Rumpf- und Halswirbeln die kräftige Ausbildung der seitlichen Fortsätze dem Wirbelkörper einen mehr oder minder eckigen Umriss verleiht.

Die Masse ergeben einen Durchmesser der Scheibe von 55 mm bei einer Dicke am äusseren Rande von 22 mm. Der Wirbel-Körper ist so tief amphicoel, dass in der Mitte eine kaum $^{1}/_{2}$ mm dicke Knochenschichte übrig bleibt, wie sich beim Zusammenfügen der Doppelkegels, den der Abdruck bildet, erkennen lässt. Die Knochensubstanz ist vorzüglich erhalten und zeigt das für die Ichthyosaurswirbel characteristische Gefüge.

Es ist nun zwar eine etwas missliche Sache aus dem doch recht indifferenten Wirbelkörper eine nähere Bestimmung dieses Ichthyosauriers vornehmen zu wollen und doch ist die aussergewöhnlich flache scheibenförmige Gestalt mit einem Verhältnisse von Länge zur Breite wie 2 : 5 ein Merkmal, das nur wenigen Arten zukommt. Man könnte unter den liassischen Arten am meisten die langschwänzigen Formen, wie *Ichthyosaurus longirostris*, *planartus*, *hexagonus* u. a. beiziehen, aber bei allen

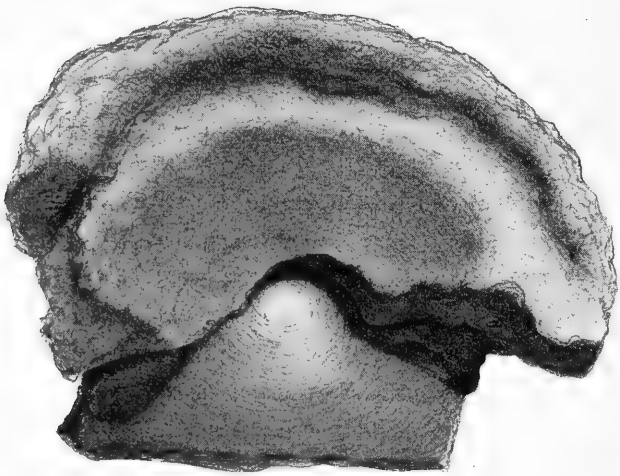

Fig. 3.

diesen ist der Wirbelkörper auch im Schwanztheile viel eckiger oder an den Kanten abgeflacht gestaltet, ebenso wie die Verknöcherung im centralen Theile kräftiger ist. Vorzüglich dagegen stimmt der Wirbelkörper mit denen des amerikanischen *Baptanodon* Marsh[1]) überein, den ich auf Grund eingehender Untersuchungen für vollständig ident mit *Ophthalmosaurus* Seeley[2]) halte, welchem Namen die Priorität gebührt. Bei diesen Formen des englischen und des amerikanischen unteren Oxford

[1]) Americ. Journ. of Sciences and arts 1879, Vol. XVII und 1880, Vol. XIX.
[2]) Quart. journ. geolog. Soc. 1874, XXX, p. 696.

finden wir dieselben flachen Wirbel-Körper mit kreisrunder Umrandung und äusserst dünner centraler Verknöcherung, so dass ich nicht anstehe, den Wirbelkörper von Jameson Land für denjenigen eines den amerikanischen und englischen Arten von *Ophthalmosaurus* sehr nahe stehenden Ichthyosauriers zu erklären.

Die beiden Fundstücke, die Fährte eines carnivoren Dinosauriers wie der Wirbel eines *Ophthalmosaurns* sind zwar an

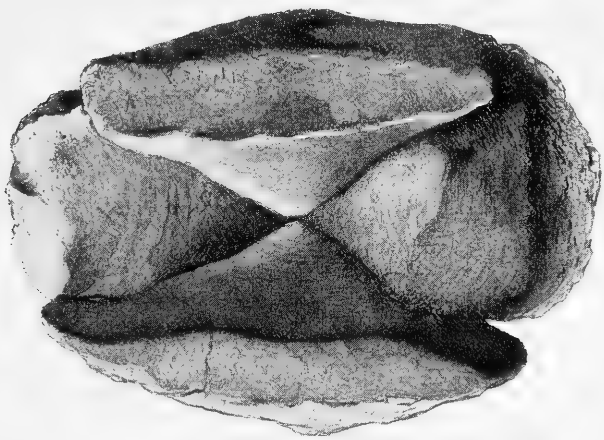

Fig. 4.

sich sehr unbedeutend, aber sie stimmen doch vorzüglich mit der von Lundgren beschriebenen Fauna überein. Ich hatte im Jahre 1901 Gelegenheit, den amerikanischen Jura von Wyoming und Colorado näher kennen zu lernen und bin erstaunt, wie sehr die Fauna von Kap Stewart mit derjenigen der *Baptanodon*-Schichten (Shirley Stage) Wyomings übereinstimmt. Ohne näher darauf einzugehen, denn hierzu wäre eine sorgfältige Prüfung des Originalmateriales nothwendig, will es mir scheinen, als ob auch hier, wie in Wyoming der marine Jura dem unteren Oxford (Lamberti-Cordatus-Zone) angehören würde.

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IX.

On the Mollusca of East-Greenland.

I.

Lamellibranchiata.

With an introduction on Greenland's fossil Mollusc-Fauna from the quaternary time.

By

Adolf Severin Jensen.

1905.

On the fossil quaternary Mollusc-Fauna of Greenland.

One of the problems which most has taken up my thoughts during my work with the Greenland mollusc-fauna is the question: why has the small polar-sea-mussel *Yoldia arctica* died out in the southern West-Greenland?

That *Yoldia arctica* quite has disappeared from the coast of the southern West-Greenland I consider most probable. In the previous lists over Greenland's mollusc-fauna by Beck, Mörch and Posselt, *Yoldia arctica* is certainly put down as a recent form from some more particularly mentioned localities of the coast area colonized by Denmark, but the specimens which form the basis of these statements are either fossil or of a very old appearance, and they can consequently not be taken as a proof of the present occurrence of the species there. And it was only «fragments» which Sutherland dredged at Hunde-Eiland. The where-about of the southern limit of its present distribution I cannot indicate. I have myself seen recent specimens taken in Murchison-Sound (between 77°—78° N.) by the late Swedish zoologist A. Ohlin, but the species is also mentioned by D. Walker from Melville-Bay [1].

It is true that the animal life in the South-Greenland

[1] Comp. besides my treatise: «Om Molluskerne i de hævede Lag ved Búlandshöfði» (Overs. Kgl. Danske Vidensk. Selsk. Forhandl. 1904, Nr. 6) where, on p. 12—18 (386—392), I have given a survey over the present distribution of *Yoldia arctica*.

fjords has not yet been so systematically explored, that we dare take it for granted that *Yoldia arctica* does not occur there at all. On the other hand the energetic collectors of the past century such as Amondsen, C. Holböll, H. P. C. Möller and O. Torell have together with later expeditions from Sweden, Denmark and Germany procured so considerable a material to the determination of the general character of the fauna that we with certainty may say that *Yoldia arctica* has no extensive distribution there, and even if *Yoldia arctica* one day should be found surviving in some or other corner of a fjord, this would not change the principal fact, viz. that in opposition to the present time *Yoldia arctica* was formerly commonly distributed at the southern West-Greenland. That this has been the case may be concluded from the fact that *Yoldia arctica* has frequently been taken in the raised layers at Disco-Bay, both on the island Disco and on the opposite shore: a part of Greenland which has especially been object of investigation. Thus I have been able to examine *Yoldia arctica* from the following more particularly stated localities: clay-terraces at the inner end of the Sydostbugt (Sylow); Orpigsuit S. of Christianshaab, till 50 feet above the sea level (N. Hartz); Kiakusuk N. of Christianshaab, 60 feet above the sea level (M. C. Engell); the Lerbugt at Claushavn (Pfaff); Niakornak at Jakobshavn, 140 feet above the sea level (K. J. V. Steenstrup); Iginiarfik at Disco Fjord, ca. 28 feet above the sea level (K. J. V. Steenstrup).

And it was a well developed form of *Yoldia arctica* which at that time lived at this coast, its length was up to 25 mm., a size which the species only obtains at a so high-arctic coast as the northern East-Greenland (comp. p. 318). It cannot be doubted that the *Yoldia arctica* which are found in these raised claybeds originate from a period of the quaternary time where West-Greenland's climate had a still more arctic character than at present.

Must we then think that *Yoldia arctica* at present cannot thrive at the southern West-Greenland? I do not believe it. On another occasion I have recently compiled all the information at hand regarding the distribution of *Yoldia arctica*[1]). It appears from this that this small bivalve demands in order to thrive a slight yearly variation in the temperature of the water, namely from its absolute minimum which is about at — 2° 6 C. to ca. + 2° 5 C. Such low temperatures occur however just in the South-Greenland fjords at the depths at which *Yoldia arctica* lives, viz. at ca. 3—118 fms. We know this from the measurements of temperature taken with Negretti and Zambra's inverting-thermometer by J. A. D. Jensen and by R. R. J. Hammer. I allow myself here to copy the temperature statements for the summer:

Place.		Date.	Depth in fms.	Temperature.
Nagsugtok,	67° 40′ N.[2])	16. VII 1879.	5	2·8° C.
—	—	—	10	1·1° -
—	—	—	20	0·9° -
—	—	—	30	1·0° -
—	—	19. VII 1879.	10	1·1° -
—	—	—	20	0·4° -
—	—	—	30	0·2° -
—	—	—	40	— 0·1° -
Niakungunak,	64° 53′ N.[3])	24. VII 1885.	20	2·3° -
(= Fiskefjord)	—	—	50	0·1° -
—	—	—	92	— 0·3° -
—	—	25. VII 1885.	20	1·6° -
—	—	—	30	1·3° -
—	—	—	50	0·3° -
—	—	—	100	— 0·3° -
Godthaabs-Fjord[4])		7. VIII 1885.	50	1·4° -
—		—	100	0·4° -
—		4. IX 1885.	50	2·2° -
—		—	100	1·1° -

In the winter, 1879—80 the following temperatures were taken in Jakobshavn's Ice Fjord[5]):

[1]) Jensen, l. c.
[2]) Medd. om Grønland, II, 1881, p. 207—208.
[3]) Ibid. VIII, 1889, p. 83—84.
[4]) Ibid. p. 97.
[5]) Ibid. IV, 1883, p. 28.

Depth in fms.	3. XI.	6. XI.	8. XI.	10. XI.	24. IV.	8. V.	9. V.
0	0° 0	—2° 2	—2° 4	—2° 4	—0° 8	—1° 3	0° 0
5		—1° 2	—1° 0	—1° 5			
10	1° 3	—0° 9	—0° 7	—0° 9		—0° 2	0° 0
20	1° 9	—0° 4	—0° 7	—0° 6		—0° 2	
25				—0° 3			
30		—0° 3	—0° 3	0° 4		0° 3	
40	2°		1° 0	1° 0			
42					0° 0		
50						0° 5	
60		—0° 0					
70			0° 3	0° 4		1° 6	
80	0° 7						
95					0° 8		
100		0° 7		1° 1			
110	1° 0		0° 4.				

Now we might perhaps suppose that the melting of the ice which undoubtedly at present is more considerable than during the period of maximum glaciation, and therewith following reduction of the salinity of the water have driven *Yoldia arctica* away from the south-western coast of Greenland. This can, however, not have caused the extinction of *Yoldia arctica*, as observations from other places teach us that this small bivalve is an «euryhalin» form which will thrive equally well where the salinity is very slight, e. g. near glaciers and at the outlets of large rivers, and where the water is of very high salinity (more than 35 ⁰/₀₀, acc. to N. Knipowitsch).

I have for a long time thought that *Yoldia arctica* is extinct at the south-western Greenland for the reason that the temperature of the water during a period of the post-glacial time passed the limit at which this bivalve can live, and that *Yoldia arctica* has had no opportunity of migrating south and recover the lost area afterwards when the conditions again had become favourable.

But if a warmer period had existed it would have left some traces. We know that climatic oscillations cause migrations of animals and we might expect that some southern forms would have appeared and again have retired.

I think we find an example of this in *Cyprina islandica* L. In a short treatise[1]) I have settled that this well-known bivalve is a typical boreal form. The northern limit of its distribution may be drawn from the upper «warm» area of the White-Sea and the Murman-Coast north of Iceland to the New-Found-land-Bank and the southern part of St. Lawrence-Bay. Dead shells of *Cyprina islandica* have, however, several times been taken at the southern West-Greenland (at the colony Jakobshavn and in the Davis-Strait) where the species does not live at present. They originate thus from a warmer period of Greenland's history. Unfortunately we do not know the beds in which the shells have been deposited[2]).

On the other hand we may point out the situation of some layers in which shells occur of another bivalve from a warmer period viz. *Anomia ephippium* L. This bivalve is like the preceding species a boreal form. At Europe it stops at the Murman-Coast and at the «warm» area of the White-Sea. It does not invade the eastern Murman-Sea which forms a part of the Arctic-Sea's «cold» area and with regard to the fauna is characterized by the fact that the boreal animal forms disappear and are replaced by high-arctic ones[3]). On the America side it is going a little further north than *Cyprina islandica* viz. to the coast of Labrador, but it has never been taken living at the Greenland coast. Fossil it has on the contrary been taken in two places on Greenland's west-coast by J. A. D. Jensen.

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[1]) Ad. S. Jensen: Studier over nordiske Mollusker. II. *Cyprina islandica.* Vidensk. Medd. Naturhist. Foren. Kbhvn. 1902, p. 33.

[2]) The shell of *Isocardia cor* previously mentioned by W. C. Brögger and by myself (l. c. 1902, p. 41) was recorded to have been taken by the Swedish Expedition of 1871 in the Davis-Strait. However, having visited the Riks-Museum in Stockholm I have arrived at the conclusion that it ought not to be taken into consideration, as an error in label possibly has taken place.

[3]) N. Knipowitsch: Zur Kenntniss der geologischen Geschichte der Fauna des Weissen und des Murman-Meeres; Verhandl. Kais. Russ. Mineralog. Gesellsch. St. Petersburg, Bd. XXVIII, No. 1, 1900.

It was first taken at Ikertok-Fjord, 66° 45′ N., in an old raised beach till a height of ca. 25 feet. Later on it was found on the small island Nepisat, which is situated ca. 5 miles from the mouth of the Evigheds-Fjord, on the southern side of the fjord and ca. 65° 50′ N. The raised beach formed here a slope which was ca. 15 feet high[1]). Two valves are at hand from the first place and one from the latter[2]).

If we would be very sceptic we might of course make the objection, that the occurrence of *Anomia* in the raised layers really do not prove that the layers have been deposited during a more genial climate, as it is a well-known fact that *Anomia* is no free-living mollusc. It attaches itself to all kinds of objects at the bottom of the sea, among others to sea-weed. For this reason it might be supposed to have floated with sea-weed from the American to the Greenland coast. I have myself felt this weakness in the argumentation and therefore hesitated in calling the attention to these finds of the southern *Anomia*.

A find has however of late come to my knowledge which, according to my opinion, seems to make it beyond any doubt that Greenland during a period of the quaternary time has had a warmer marine climate than at present. I have during the later years asked our Greenland visiting naturalists to collect shells from raised beaches and terraces, and among those who have complied with my request Dr. M. C. Engell has, according to my opinion, succeeded in making an interesting and important find.

The locality is situated at «the great lake» at 68° 37.5′ N. inside the Orpigsôk or Orpigsuit-Fjord south of Christianshaab.

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[1]) Both localities have been mentioned by J. A. D. Jensen in Medd. om Grønland, VIII, 1889, p. 49 and p. 73.

[2]) These *Anomia*-shells are kept in the Mineralogical Museum of the University. Prof. N. V. Ussing has given me the most liberal access to the whole material of subfossil shells from Greenland, contained in the said Museum.

Dr. Engell describes the conditions in the following manner[1]: «West of the great lake we find a raised sea-bed. One meter above the surface in the great lake is a sandy layer where the common mussel occur in such abundance that they in some places form a shell layer. I might in several places around the lake point out traces of this raised sea-bed, but it was only on the western side that I found fossils. The surface of the raised sea-bed . . . is overlaid by a deposit consisting of sand, gravel and rough stones». On the accompanying chart (Tavle III) the surface of the great lake is indicated to be 10 meters above the sea-level, the mussel-layer is thus situated ca. 11 meters above the sea-level.

Dr. Engell brought home from this locality some shells of the mussel (*Mytilus edulis* L.); they originate from grown up specimens of a length up to 73 mm.; they are as yet partly united and filled with sand and fine gravel. In a small sample of the layer I moreover found the following species:

Tellina balthica L. A specimen with united valves. *Tellina calcaria* Chemn. A very small specimen. *Saxicava arctica* L. *Mya truncata* L. *Littorina rudis* Mat. *Littorina obtusata* L. var. *palliata* Say. *Balanus* sp.

Besides Dr. Engell brought two other valves. Before I informed him to which species they belonged and which conclusions might be drawn from them I questioned him as to their origin pretending that I took it for granted that these shells by chance had come among the samples from Greenland, but Dr. Engell persisted in saying that he had brought them home from his first Greenland voyage (1902), he was even able with certainty to remember the locality where he had taken them: they were lying in loose sand over the mussel-layer at the before mentioned great lake, 11—12 meters above the sea level, and the bed was to be seen on the surface.

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[1]) M. C. Engell: Undersøgelser og Opmaalinger ved Jakobshavns Isfjord og i Orpigsuit i Sommeren 1902; Medd. om Grønland, XXVI, 1904 (p. 64).

As every possibility of mistake seemed to be out of the question I no longer concealed for Dr. Engell that the valves he had found originated from *Zirphaea crispata* and that the occurrence of this bivalve proved the layer to be deposited during more genial climatic conditions than we find at Greenland at present.

The one is a right valve, the other a left of a length of respectively 48 and 65 mm.; they are without periostracum and bleached, but otherwise well preserved; one shows holes made by the polychætous Annelid: *Polydora ciliata* Johnst. On the valves was left a little of the surrounding soil consisting of coarse sand whose mineralogical composition, after an examination by Mr. O. B. Böggild, fully agrees with the material from the mussel-layer.

That *Zirphaea (Pholas) crispata* L. no longer lives at Greenland may be regarded as a fact. Surely we do not often get living specimens of this burrowing bivalve in the dredge; more frequently we dredge its dead valves or find these washed ashore. But in no respect the least trace of *Zirphaea crispata* is at hand from Greenland.

The American authors agree that the northern limit of the present distribution of this bivalve is in the eastern Canada at Gulf of St. Lawrence (Rimouski)[1]. Its proper home is at New-England. The southern limit cannot be fixed.

On the European side of the Atlantic it is distributed from the western France to the northern Norway, where it has been found in a few localities in the West-Finmark, but not in the East-Finmark[2]. It lives moreover at the south-western Iceland where it was observed by Eggert Olafsen[3].

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[1] Verrill & Smith: Report upon the Invertebrate Animals of Vineyard Sound and adjacent waters, 1894, p. 377; J. W. Dawson: The Canadian Ice Age, 1894, p. 227; Whiteaves: Catalogue of the Marine Invertebrata of Eastern Canada, 1901, p. 151.

[2] G. O. Sars: Mollusca Regionis Arcticae Norvegiae, 1878, p. 97.

[3] Olafsen: Reise igjennem Island, 2. D., 1772, p. 1009 (*Pholas ... truncata*. Tab. XI, Fig. 3, 4 & 6).

Zirphaea crispata is thus a typical boreal form. The bed at Orpigsuit in which its shells occur, must have been deposited during a climate at least as mild as that which we find at present in the sea at the eastern Canada and at the West-Finmark.

In West-Greenland in three localities situated rather distant from one another (65° 50′, 66° 45′, and 68° 37. 5′ N.) we are now acquainted with raised beaches containing a mollusc-fauna in which a few species suggest a more genial marine climate than the present. I do not believe this period to be very far back.

A quite similar view is set forth by the Iceland-geologist Helgi Pjetursson. He expresses himself in the following way[1]:

«K. J. V. Steenstrup mentions from several places in North-Greenland «dead glaciers», that means masses of ice covered with gravel which formerly moved but now according to strong melting have partly or completely become separated from their snow-field and which now so to speak have become overpowered by their own moraine. But the ice-formation has again increased, and Steenstrup mentions several places where a new glacier has been formed or is forming and slides down over the dead glacier[2]).

If we now compare the quantity of sediments accumulated in the fjords in shape of terraces with these statements and consider that according to all probability such terraces would be far from occurring to the same extent even if an upheaval took place now, we arrive at the following result:

In a geologically spoken very late time the climate of Greenland has been somewhat more genial than now, and the ice consequently retired. The broad ice-crust which formerly covered the border of the coast melted away, and later on great glaciers decreased so considerably that they were unable of transporting their moraines. They ceased moving and became «dead glaciers». On account of this strong melting the border

[1]) Medd. om Grønland, XIV, 1898, p. 339—40.

[2]) Medd. om Grønland, IV, 1883, p. 80—81 and Pl. V.

of the coast was overflowed by enormous streams of water. These deposited, in times when the sea-level was higher, the masses of sand and gravel of which the present terraces consist».

It is reasonable to make a comparison between the above mentioned layer at Orpigsuit and the so-called Zirphaea-layers in the northern Jutland (Vendsyssel), deposited at the end of the glacial time when the temperature of the sea increased and *Yoldia arctica* had become extinct. There is in both localities a typical coast-formation consisting of coarse sand or gravel with a littoral fauna of a cold temperate character. In the Zirphaea-layer in Vendsyssel *Mytilus edulis* is, as at Orpigsuit, the fossil that occurs most generally and in greatest numbers. Sometimes it forms whole layers. The other predominant forms are the following ones: *Cyprina islandica*, *Tellina calcaria*, *Tellina balthica*, *Mya truncata*, *Saxicava arctica*, *Zirphaea crispata*, *Littorina rudis*, *Buccinum undatum* and *Balanus* sp.[1]. Though we only have a small casual sample at hand from Orpigsuit the great ressemblance in the composition of the faunas will immediately strike the attention, *Cyprina* and *Buccinum* excepted it is the same species which occur.

Such a parallel has, indeed, been drawn before, namely by K. J. V. Steenstrup who during his journeys in Greenland has investigated several raised beaches. Among the fossiliferous beaches he attributes a special interest to Ungorsivik at the mouth of the Disco-Fjord. About this locality he writes as follows[2]: «With regard to Ungorsivik it is evident that two kinds of raised sea-beds exist here, an older which reaches a height of ca. 20 feet and which is characterized by *Saxicava rugosa*[3]) and a younger which only reaches a very little above the ordi-

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[1]) Comp. A. Jessen: Danmarks geologiske Undersøgelse, I. Række, Nr. 3, 1899 (p. 213—232).

[2]) Medd. om Grønland, IV, 1883, p. 232.

[3]) The fossil that most frequently occur in the Yoldica-clay in Vendsyssel is not *Yoldia arctica*, but *Saxicava arctica* (= *S. rugosa*).

nary high water mark and is characterized by *Myltius edulis.* This last formation appears as whole banks of shells on large areas of the point. It also covers the greater part of the flat ice-scratched rocky island Satok outside the Disko-Fjord. These two different horizons remind in many respects of the conditions in Vendsyssel». These words contain a prediction of the find which now is made at Orpigsuit.

N. Hartz's collections in 1890 show that the arctic layers are not wanting either at Orpigsuit. In a clay-brink further out, at the inner end of the Orpigsuit-Fjord, Hartz found a great quantity of shells «just from the niveau of the plain (which only is situated a few feet above the sea) to the top of the bank (60—70 feet above the sea)». The shells which Hartz took home were collected at a height «till 50 feet above the sea level» [1]). I have looked over these shells and I found the following species: *Yoldia arctica* Gray, *Leda pernula* Müll., *Nucula tenuis* Mtg. var. *expansa* Reeve, *Cardium groenlandicum* Chemn., *Cardium ciliatum* Fabr., *Tellina calcaria* Chemn., *Axinus flexuosus* Mtg., *Mya truncata* L. et var. *ovata*. This composition of the fauna suggests that the clay has been deposited during the high-arctic conditions.

On this quite small territory at Orpigsuit we see collected the changing faunas of the shifting periods whose series according to all probability is as follows. At the beginning: the high-arctic fauna of the glacial time with *Yoldia arctica.* Next: the deposits of the cold temperate period with *Zirphaea crispata*; *Yoldia* has disappeared during this period. At last we have outside in the fjord the present arctic fauna; the *Zirphaea* has become extinct, but the *Yoldia* has not immigrated again. — Here we find an uncommonly favourable occasion of studying the immigration and emigration of the individual species and thus in details get to understand Greenland's history in the quaternary period.

It seems to me that we here have a task which ought to

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[1]) Medd. om Grønland, XV, 1898, p. 40.

be taken up by Danish naturalists, namely: a minute unswerving investigation of the raised beaches in West-Greenland, especially of the area around the Disco-Bay. If such a problem, however, is to be solved in the right way, it will be necessary to chose the right men: a geologist beforehand acquainted with quaternary deposits, and a zoologist who has made the biology of the northern molluscs an object of special study; a man qualified in both directions may possibly be found.

Raised beaches with fossil molluscs also occur in East-Greenland, in its northern part. They appear abundantly in the area around the Scoresby-Sound according to investigations undertaken by the Danish expeditions of 1891—92[1]) and 1900. They also occur at Forsblad-Fjord, Sophia-Sound and at Franz Joseph-Fjord where they were discovered by the Swedish expedition in 1899.

Prof. A. G. Nathorst is the first who has shown that also in that part of Greenland may be found evidences that milder climatic conditions than the present ones have ruled here during a period of the quaternary time. He writes as follows[2]): «The locality at the mouth of Sophia-Sound south-west of Robertson-Island is of interest because even *Mytilus edulis* occurs there as fossil. Yet this species was not seen at more than 25 meters above the sea-level while other bivalves were found up to a height of 51 meters.... The occurrence of *Mytilus* in a fossil state here is of great interest, as it has not been found living north of 66° N.[3]) and has, strange enough, not been stated as fossil from Scoresby-Sound. Another occurrence of the same bivalve however is still more peculiar. Dusén noticed it namely in-

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[1]) Den østgrønlandske Expedition, udført i Aarene 1891—92 under Ledelse af C. Ryder. Geologi ved Edv. Bay. Medd. om Grønland, XIX, 1895 (p. 171—176).

[2]) A. G. Nathorst: Bidrag till nordöstra Grönlands geologi. Geol. Fören. Förhandl. Bd. 23, 1901 (p. 304).

[3]) Later on it has however by C. Kruuse been found to occur as far north as ca. 66° 30′ N., comp. this treatise p. 325.

most in Franz Joseph-Fjord at the entrance of a small valley north-east of Nordenskiöld-Glacier. The height above the sea level was inconsiderable and not supposed to surpass 10 meters. Its occurrence in this place indicates essentially other conditions than the present, as a bivalve of its habits cannot live in a fjord where icebergs are continually formed and are drifting about such as is the case at present».

I have gone through the material collected by the Danish expeditions, and among this I have found also a species which does not live any longer at the eastern North-Greenland, namely *Pecten islandicus* Müll. (see this paper p. 333). It was discovered by N. Hartz under conditions which he describes as follows[1]: «On Rolige Bræ near the Kobberpynt (inner Scoresby-Sound) I found ca. 75 feet above the sea level a few hundred yards from the edge of the glacier, clay, gravel and small rolled or rubbled stones (gneiss) in great abundance. Among this material a few rounded and rubbed fragments of *Pecten islandicus* and *Saxicava arctica* (det. H. Posselt) occurred. These bivalve fragments originate most likely from deposits higher up along the edge of the glacier and this suggests rather considerable changes in the distribution of the ice». As mentioned before *Pecten islandicus* is at present wanting in the sea at East-Greenland; this might suggest a deterioration of the climate since the time when it lived in the inner Scoresby-Sound. For *Pecten islandicus* is hardly a typical high-arctic form. Thus it does not occur in the Arctic-Sea at the north-coast of Siberia, and in the Kara-Sea it no doubt occurs utterly seldom and locally, as among repeated expeditions to this sea the «Dijmphna» only has taken one single specimen (the locality has unfortunately not been indicated). It is however an arctic form since it flourishes at Spitzbergen and at the southern West-Greenland.

This find of *Pecten islandicus* ought however for the present

[1]) Medd. om Grønland, XIX, 1896, p. 175.

to be kept distinct from the find of *Mytilus edulis*; as hardly any resemblance may be said to exist but this that both species are extinct at the northern East-Greenland, and that both suggest a milder climate than the present — in time they may be far apart. In the first instance we find the fragments of valves of *Pecten islandicus*, which Hartz found, rounded and rubbed, they must thus have been in a moraine or other glacier bed, and nobody knows how old these deposits may be. Moreover the height at which these fragments were found is indeed equal with the greatest height at which *Mytilus edulis* occurs, but this height is according to Hartz the secondary height, and nobody knows at which height the original bed has been situated. *Pecten islandicus* need on the other hand not to indicate so genial a period as *Mytilus edulis* and may consequently be found on a higher (colder and for this reason older) niveau than the last mentioned species. There is a certain probability that both species belong to the same genial period, but it is nothing but a probability.

These finds from the west- and the east-coast make Greenland one of the northern countries, where we have been able to prove, that the climatic conditions have been milder during a period of the quaternary time than they are at present.

An extinction in post-glacial time of certain mollusc-species which compared with the present faunas must be called southern species has by and by been pointed out from the following areas: The Baltic, the Danish waters, Bohuslän, the southern and western Norway (the «Littorina»- or the «Tapes»-time); Scotland («Pecten-maximus bed»); the northern Iceland (deposits with *Purpura lapillus*); the north-coast of Russia (deposits with *Cardium edule*[1])). At last we find as far north as Spitzbergen

[1]) On a previous occasion (Vidensk. Medd. Naturhist. Foren. Kbhvn. 1905, p. 29) I have called attention to the fact that molluscs whose present limit of distribution is situated rather westerly were found in a fossil state still further east, at the lower Jenisei by the Russian Mammuth-Ex-

post-glacial deposits with well developed *Mytilus edulis*, *Cyprina islandica* and *Littorina littorea* which now-a-days do not occur in living state at this archipelago. *Littorina littorea* has at present its northern and eastern limit at the Finmark and in the White-Sea, *Mytilus edulis* does not go further than at Nowaia-Zemlia, and *Cyprina islandica* stops at the western part of the Murman-Sea. Fossil *Mytilus edulis* have also been found on Svenska-Förlandet and on Franz Joseph-Land[1]).

It becomes more and more evident that we have not to deal with a local phenomenon, but that these climatic changes have influenced a great part of the northern hemisphere. If all of them have taken place precisely at the same time we do not know yet.

If we again turn to the opposite side of the Atlantic we will come across a strange phenomenon at the coast of Canada which likewise seem to be in connection with a post-glacial more genial period. Prof. A. E. Verrill has shown that there are genuine colonies of southern species in the Gulf of St. Lawrence (from Chaleur-Bay to Prince Edward-Island and Cape Breton Island) and on the coast of Maine (Quahog-Bay), which are completely isolated from their co-species of the southern coast of New-England, and surrounded on all sides by more northern forms. And he tells us further, that at an earlier period these colonies were much more extensive. The shells of the round clam or «quahog» *(Venus mercenaria)* are abundant

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pedition of 1866 and by the Vega-Expedition. The species in question were as follows: *Tellina balthica* L., *Cyprina islandica* L., *Zirphaea crispata* L. and *Buccinum undatum* L., none of these species reach at present the Kara-Sea.

[1]) References to the literature dealing with this subject may be found in my short treatise on *Cyprina islandica* (l. c. 1902). N. Knipowitsch has later given detailed information regarding the Swedish expeditions' collections of postglacial molluscs from Spitzbergen (Ann. du Musée Zool. de l'Acad. Imp. d. Sci. St. Pétersbourg, T. VIII, 1903, p. 133—143). Comp. moreover G. de Geer: Die Gletscher von Spitzbergen; Verhandl. d. 7. internat. Geographen-Kongresses, II, p. 299—302. Berlin 1901.

in the mud in places where no living ones could be found, and they likewise occur in great quantities in certain old Indian shell-heaps on many of the islands in Casco-Bay, upon the coasts of which they do not now live. «That at a more remote period», says Verrill, «the marine climate of this region was still warmer, and the southern species were more abundant than during the period when the Indian shell-heaps were formed, is shown by the occurrence of great beds of oyster-shells a few feet beneath the mud in Portland harbour, where they are associated with quahogs and several other southern species, among which are *Callista convexa*, *Turbonilla interrupta*, and *Pecten irradians*. The last is not known to live at present north of Cape Ann, on the New-England coast»; *Callista convexa* occurs sparingly in shallow sheltered localities in Casco Bay; «but the oysters *(Ostrea virginiana)* and «scallops» (*Pecten irradians*) had apparently become extinct in the vicinity of Portland harbour before the period of the Indian shell-heaps, for neither of these species occurs in the heaps on the adjacent islands, while the quahogs lingered on until that time, but have subsequently died out everywhere in this region, except at Quahog-Bay». Prof. Verrill says that he can explain the presence of the southern species in no other way than by supposing «that they are survivors from a time when the marine climate of the whole coast, from Cape Cod to Nova-Scotia and the Bay of Fundy, was warmer than at present, and these species had a continous range from Southern New-England to the Gulf of St. Laurence» [1].

This genial period is probably contemporary with that time when *Anomia* and *Zirphaea* lived at West-Greenland. We have perhaps also in certain places of West-Greenland a parallel to

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[1]) A. E. Verrill: Results of recent Dredging Expeditions on the Coast of New-England. No. 5. The American Journal of Science and Arts, Third Series, Vol. VII, 1874, p. 134—138. Here cited after J. Geikie: Prehistoric Europe, 1881, p. 502—03.

the relics in the Gulf of St. Lawrence. I am thinking of such locally occurring, southern species as *Purpura (Polytropa) lapillus* L. and *Littorina obtusata* L.

Postscript.

From Dr. M. C. Engell I have just received a copy of a note: «Eine nachtertiäre Wärmeperiode in Grönland», which has been inserted in Dr. A. Petermann's Geogr. Mitteilungen 1905, Heft IV. It contains the statement that he has found marine deposits with shells of molluscs at the east-side of the Disco-Bay, and a chart on which these beds have been marked, together with information regarding the deposits at Orpigsuit (Orpigssôk). The rest of the note has been constructed over verbal communications which I gave Dr. Engell when he delivered the collected shells.

It would for several reasons have been desirable that Dr. Engell had shown me his report of my words to him before publishing it. Among others because «the warm period» in his report is devoid of the necessary proof. Thus Dr. Engell only writes: «Dieser Fund von Zirphaea hat Interesse, weil er zeigt, dasz Grönland nach dem Beginn der Vergletscherung eine wärmere Periode gehabt hat». I must have forgotten to inform Dr. Engell about the reason why we are justified in attributing the find of *Zirphaea* such a far reaching importance.

I may now refer the reader whom Dr. Engell has deserted on a burning point to p. 296—97 of the present treatise; there will be found the explanation which is wanting in Dr. Engell's representation.

The Mollusca of East-Greenland.

I.

Lamellibranchiata.

The first information regarding the mollusc-fauna of East-Greenland was procured by «Die zweite Deutsche Nordpolarfahrt». In the account of the results of this the so-called Germania-Expedition Prof. K. Möbius has worked out the molluscs [1]. Of Lamellibranchiata 9 species are mentioned which were all collected at Jackson-, Clavering-, Sabine- and Shannon Isles: *Modiolaria laevigata* Gray («*M. discors* L.»), *Cardium groenlandicum* Chemn., *Astarte borealis* Chemn., *Astarte elliptica* Brown («*A. sulcata* d. C.»), *Astarte Banksii* Leach («*A. compressa* Mont.»), *Astarte crenata* Gray («*A. crebricostata* Forb.»), *Venus fluctuosa* Gould («*V. astartoides* Beck»), *Mya truncata* L. and *Saxicava arctica* L. («*S. rugosa* L.»).

Then a quantity of molluscs was collected by the zoologist E. Bay during the Danish East-Greenland expedition, 1891—92. The working of these molluscs was left to H. J. Posselt who in the «Riks Museum» in Stockholm also investigated the material collected by Nordenskiöld's expedition in 1883 at the south-eastern Greenland. Thus Posselt's list [2] over the Lamellibranchiata came to include 23 species, viz.: *Pecten groen-*

[1] Die zweite Deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän Karl Koldeway. 2. Bd. Wissenschaftliche Ergebnisse. Leipzig 1874. II. Zoologie (p. 248—252).

[2] Den østgrønlandske Expedition, udført i Aarene 1891—92 under Ledelse af C. Ryder. Østgrønlandske Mollusker undersøgte af Henr. J. Posselt. Medd. om Grønland, XIX, 1896, p. 61—93, Tav. I.

landicus Sow., *Pecten imbrifer* Lov., *Mytilus edulis* L., *Dacrydium vitreum* Möll., *Modiolaria laevigata* Gray, *Portlandia arctica* Gray, *Leda pernula* Müll., *Arca pectunculoïdes* Scacchi, *Arca glacialis* Gray, *Cardium groenlandicum* Chemn., *Cardium ciliatum* Fabr., *Astarte borealis* Chemn., *Astarte crenata* Gray, *Astarte sulcata* d. C., *Astarte compressa* L., *Astarte Banksii* Leach, *Axinus flexuosus* Mont., *Venus fluctuosa* Gould, *Tellina* (*Macoma*) *calcaria* Chemn., *Tellina moesta* Desh. («*Macoma calcaria* Chemn. var. *subovalis* n.»), *Neaera obesa* Lov., *Saxicava arctica* L. and *Mya truncata* L.

At last R. Hägg has published a list over the Lamellibranchiata from the north-eastern Greenland collected by the Swedish Kolthoff-Expedition of 1900[1]). This list comprises in total 23 species: *Nucula tenuis* Mont., *Leda pernula* Müll., *Portlandia intermedia* M. Sars, *Portlandia lenticula* Möll., *Portlandia arctica* Gray, *Arca glacialis* Gray, *Arca pectunculoïdes* Scacchi, *Modiolaria laevigata* Gray, *Modiolaria nigra* Gray, *Pecten groenlandicus* Sow., *Pecten imbrifer* Lov., *Astarte borealis* Chemn., *Astarte crenata* Gray, *Axinus flexuosus* Mont., *Axinopsis orbiculata* G. O. Sars, *Tellina moesta* Desh. («*T. calcaria* Chemn. var. *subovalis* Poss.»), *Venus fluctuosa* Gould, *Cardium groenlandicum* Chemn., *Cardium ciliatum* Fabr., *Neaera obesa* Lov., *Mya truncata* L., *Saxicava arctica* L. and *Lyonsia arenosa* Möll.

From East-Greenland 29 species of the Lamellibranchiata were thus known up to date.

The present list comprises in total 41 species as 12 «new» ones have been added, viz: *Leda minuta* Müll., *Portlandia frigida*

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[1]) Richard Hägg: Mollusca und Brachiopoda gesammelt von der Schwedischen zoologischen Polarexpedition nach Spitzbergen, dem nordöstlichen Grönland und Jan Mayen im J. 1900. Arkiv för Zoologi, uttg. af K. Sv. Vetensk. Akad., Bd. 2, No. 2, 1904. — When summing up the species, I have excluded *Modiolaria corrugata* Stimps. the record of which is due to a mistake in the determination and *M. substriata*, as this only is a variety of *M. laevigata* (comp. this treatese p. 327).

Torell, *Crenella decussata* Mont., *Limatula hyperborea* n. sp., *Tellina Torelli* Iap. Steenstr., *Tellina Loveni* Iap. Steenstr., *Cardium elegantulum* Möll., *Cyrtodaria Kurriana* Dunker, *Lyonsiella abyssicola* M. Sars, *Thracia truncata* Turt., *Thracia septentrionalis* Jeffr. and *Pandora glacialis* Leach.

The greater part of this new material has been collected by the late zoologist Sören Jensen who took part in the Amdrup-Hartz expedition in 1900. Quantitatively seen this material is far superior to that collected by the earlier expeditions and adds a most important contribution to the information of the horizontal and vertical distribution of the various species along the East-Greenland coast. A rather considerable material was moreover collected by the botanist Chr. Kruuse, who stayed in Angmagsalik in 1901—02 and who on my request availed himself of the opportunity of making zoological collections. Finally, a good deal of molluscs were collected at Angmagsalik and in some more northern localities by Chr. Kruuse and the physician K. Poulsen (who took part in Amdrup's expedition in 1898—99), although they met with great obstacles caused by the ice.

The 41 species of Lamellibranchiata which at present are known from East-Greenland are as follows (they will be more closely mentioned in the subjoined pages):

1. *Nucula tenuis* Mont. var. *expansa* Reeve, p. 315.
2. *Leda pernula* Müll. var. *costigera* Beck, p. 316.
3. — *minuta* Müll., p. 317.
4. *Yoldia (Portlandia) arctica* Gray var. *portlandica* Reeve, p. 317.
   — — — var. *nux* Brøgger.
5. *Portlandia intermedia* M. Sars, p. 319.
6. — *lenticula* Möll., p. 320.
7. — *frigida* Torell, p. 320.
   — — — var. *nana* M. Sars.
8. *Arca glacialis* Gray, p. 321.

9. *Arca pectunculoïdes* Scacchi var. *septentrionalis* G. O. Sars, p. 322.
10. *Mytilus edulis* L., p. 322.
11. *Dacrydium vitreum* (Holb.) Möll., p. 325.
12. *Modiolaria laevigata* Gray, p. 326.
— — — var. *substriata* Gray.
13. — *nigra* Gray, p. 328.
14. *Crenella decussata* Mont., p. 329.
15. *Limatula hyperborea* n. sp., p. 329.
16. *Pecten groenlandicus* Chemn., p. 331.
17. — *imbrifer* Lov. var. *major* Leche, p. 332.
(*Pecten islandicus* Müller, p. 333).
18. *Astarte Banksii* Leach var. *Warhami* Hanc., p. 333.
— — — var. *striata* Leach.
19. — *borealis* Chemn. var. *placenta* Mörch, p. 335.
20. — *crenata* Gray, p. 337.
— — — var. *inflata* Hägg.
— — — var. *acuticostata* Jeffr.
21. — *sulcata* d. C., p. 339.
22. — *elliptica* Brown, p. 339.
23. *Axinus flexuosus* Mont., p. 341.
24. *Axinopsis orbiculata* G. O. Sars, p. 342.
25. *Tellina (Macoma) calcaria* Chemn., p. 342.
26. — — *Torelli* Iap. Steenstr., p. 343.
27. — — *moesta* Desh., p. 345.
28. — — *Loveni* Iap. Steenstr., p. 348.
29. *Venus (Liocyma) fluctuosa* Gould, p. 351.
30. *Cardium ciliatum* Fabr., p. 352.
31. — *elegantulum* (Beck) Möll., p. 352.
32. — *(Serripes) groenlandicum* Chemn., p. 353.
33. *Mya truncata* L., p. 354.
— — var. *uddevallensis* Forb.
34. *Cyrtodaria Kurriana* Dunker, p. 356.
35. *Saxicava arctica* L., p. 357.

36. *Lyonsia arenosa* Möll. var. *sibirica* Leche, p. 359.
37. *Lyonsiella abyssicola* M. Sars, p. 360.
38. *Thracia truncata* Turt., p. 360.
    — — var. *devexa* G. O. Sars.
39. *Thracia septentrionalis* Jeffr., p. 360.
40. *Pandora (Kennerleyia) glacialis* Leach, p. 361.
41. *Neaera obesa* Lov. var. *glacialis* G. O. Sars, p. 361.

The majority of the here enumerated species are common to the whole coast area, a few of them not, on the contrary, and just the last ones show that the south-eastern Greenland with regard to the mollusc-fauna has a strong resemblance to the west-coast (it is the colonized West-Greenland), while the north-eastern Greenland forms a part for itself. It must, however, be added that by the south-eastern Greenland is meant the area around Angmagsalik, as the coast from here downwards to Cape Farvel is almost unknown with regard to the lower animal life; there is, however, every reason to believe that the fauna will turn out to be homogeneous in its broad features.

If we compare the mollusc-fauna in the Augmagsalik area (ca. $65^1/_2$—$66^1/_2$° N.) with that of the northern East-Greenland, it will at once be noticed that there are certain species whose northern limit is situated at Angmagsalik and that other species on the contrary do not go as far southward as to Angmagsalik

We shall here only lay stress on such species which occur in abundance and which according to their size are not easily overlooked. As southern species which certainly stop at Angmagsalik I can from shallow water mention the mussel *(Mytilus edulis* L)., and the periwinkle *(Littorina rudis* Mat.), from deeper water *Astarte sulcata* d. C. Among the northern forms which stop north of Angmagsalik I can provisionally call the attention to *Yoldia (Portlandia) arctica* Gray and *Pandora glacialis* Leach from shallow water, and from deeper water *Limatula hyperborea* n. sp. and *Astarte crenata* Gray var. *acuticostata* Jeffr.

I moreover suppose the following species of which a few specimens only are at hand to have their northern limit at Angmagsalik: *Cardium elegantulum* Möll. and *Dentalium entale* L.

The mentioned species which stop north of Angmagsalik are likewise wanting at the colonized West-Greenland. And the species which have their northern limit at Angmagsalik belong also to the fauna of the colonized West-Greenland. It is reasonable to believe that still more of the species of the west-coast reach the south-eastern Greenland. In the shore belt we still want species as *Yoldia hyperborea* Torell, *Limatula subauriculata* Mont., *Pecten islandicus* Müll.[1]), *Cyamium minutum* Fabr. and *Tellina balthica* L.[2]). They will probably be found later on, when a greater part of the south-eastern coast has been investigated. At present our knowledge is, as said, limitid to the area around Angmagsalik, which forms the northern limit of Southeast-Greenland.

We are now able to settle that the Northeast-Greenland has a pure high-arctic mollusc-fauna. The Southeast-Greenland on the contrary is a transitional area where several high-arctic forms have given up (at any rate *Yoldia* (*Portlandia*) *arctica*, *Limatula hyperborea*, *Astarte crenata* var. *acuticostata* and *Pandora glacialis*) while on the other hand several southern forms have immigrated[3]).

In a previous paper[4]) I have pointed out that we with

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[1]) That *Pecten islandicus* occurs in a fossil state in the northern East-Greenland I have mentioned on p. 301.

[2]) Another might perhaps also mention *Nucula nucleus* L., *Cardium minimum* Phil., *Cardium fasciatum* Mont. and *Syndosmya nitida* Müll. I have, however, a not quite unfounded doubt that these species wrongly have been referred to Greenland's fauna, but more about this at another occasion.

[3]) Or, perhaps more rightly spoken, have still resisted, as A. G. Nathorst's discovery of raised beds with *Mytilus edulis* in the Northeast-Greenland suggests that the southern fauna formerly has had a wider range than at present (comp. p. 300—301).

[4]) Ad. S. Jensen: The Fishes of East-Greenland. Medd. om Grønland, XXIX, 1904, p. 217—220.

regard to the fish-fauna may trace a similar distinction between a «southern» and a «northern» East-Greenland. The cause of this must essentially be looked for in hydrographical conditions. The warm Atlantic water flows northwards along the west-coast of Iceland and forms the so-called Irminger-Stream. At the north-west coast of Iceland and the submarine ridge, which extends to Greenland in north-western direction, the main part of the warm water turns towards Greenland and flows southward. The sea south of the ridge, the «Irminger-Sea», is thus with regard to the hydrographical conditions to be reckoned to the northern Atlantic: the temperature is proportionally high and the salinity considerable. Along the southeast coast of Greenland itself runs however the cold arctic stream from the north and either drives the warm water away from the coast or overflows this[1]. For this reason the difference between the two faunas is not so conspicuous at the Greenland coast as it is out in the Denmark-Strait, when we compare the fauna south of the ridge with that north of the ridge. With regard to the fishes I have more minutely pointed this out in the just cited treatise; with regard to the molluscs I shall have to postpone this till my future account of this animal-group will appear in the report of the Danish Ingolf-Expedition.

Though the typical high-arctic species are wanting at Angmagsalik this territory shows yet in other ways the character of being a transitional area, as several species with the same appearance as in the arctic seas occur in the littoral belt together with boreo-arctic forms as *Mytilus edulis, Cardium elegantulum*

[1] It is highly deplorable that the bottom-temperature was not taken in the places where dredgings or trawlings were undertaken. We should otherwise have possessed a series of observations from the East-Greenland coast which would have been of great importance for the determination of the temperature's influence on the distribution of the species. As a preliminary investigation measurements of temperature are just as important as for instance determinations of the depths, especially in such remote regions which are only visited by scientific expeditions.

and *Littorina rudis.* I shall here give some examples. *Leda pernula* Müll. belongs to the variety *costigera* Beck; it is a large, rather thin shelled form, whose posterior end is bent strongly upwards and on the inner side provided with a well-developed longitudinal rib, stretching from the outmost point near to the umbo. *Astarte Banksii* Leach appears in the variety *Warhami* Hancock which especially is characterized by the lengthened elliptical shape of the shell; but shorter forms also occur. *Astarte borealis* Chemn. is represented by the variety *placenta* Mörch which has a compressed shell covered with a thick bast-like periostracum. *Mya truncata* L. occurs in the variety *uddevallensis* Forbes whose shell is short, its posterior end obliquely truncate, the hind margin going forwards below; together with this, more lengthened forms also occur approaching up to the typical form. *Saxicava arctica* occurs frequently with exceedingly thick shells, but it can also be thin shelled.

The present list over East-Greenland's mollusc-fauna also comprises the fossil species from the quaternary time. From the Southeast-Greenland we do not know any fossiliferous beaches. On my request Chr. Kruuse has during his sojourn of almost a year at Angmagsalik investigated this area without finding the slightest trace of such. In the Northeast-Greenland the Danish expeditions of 1891—92 and 1900 as well as the Swedish Nathorst-Expedition of 1899 have on the contrary in many localities found evidence of a negative shifting of the shore-line after the glacial time, both in the region around Scoresby-Sound, Forsblad-Fjord and Franz Joseph-Fjord. A not quite small quantity of shells from these raised beds have been brought home. Peculiarly enough they contain no gastropods, but only bivalves of the following species: *Leda pernula* Müll., *Yoldia (Portlandia) arctica* Gray, *Mytilus edulis* L., *Modiolaria laevigata* Gray, *Pecten islandicus* Müll., *Astarte Banksii* Leach, *Astarte borealis* Chemn., *Astarte elliptica* Brown, *Axinopsis orbiculata* G. O. Sars, *Axinus flexuosus* Mont., *Tellina calcaria* Chemn., *Cardium ciliatum* Fabr., *Cardium groenlandicum* Chemn., *Mya truncata* L. and *Saxicava arctica* L. They will be more minutely mentioned, in their proper place, with detailed statements regarding the find place and its height above the sea level, as far as information about this is at hand. Of special interest are *Mytilus edulis* and *Pecten islandicus*, as both have died out at the Northeast-Greenland, but sufficiently has been said about this in the introduction (p. 300—302).

The position of the localities where Danish expeditions have collected molluscs.

Where the species are mentioned the localities have been arranged in the direction from south to north.

	Lat. N.	Long. W.
Amitsuarsik	65° 37′	37° 22′
Angmagsalik	65° 30′—65° 40′	37° 30′—37° 40′
Angmagsalik, off.	65° 30′	37° 20′
Angmagsivik (Kingak)	65° 58′	37° 2′
Cape Borlase Warren	74° 20′	19°
Cape Broer Ruys	73° 30′	20° 20′
Cape Dalton	69° 24′	24° 8′
Cape Dan	65° 32′	37°
Cape Hope	70° 26′	22° 29′
Cape Stewart	70° 25′	22° 37′
Cape Tobin, 57 fms.	70° 23′	22°
Cape Tobin, 120 fms.	70° 23′	22°
Danmark's Ø	70° 27′	26° 12′
Fleming-Inlet	71° 51′	22° 27′
Forsblad-Fjord, 3—14 fms.	72° 28′	25° 23′
Forsblad-Fjord, 50 fms.	72° 27′	25° 10′
Forsblad-Fjord, 90—50 fms.	72° 27′	25° 28′
Gaaseland	70° 5′—70° 30′	
Hekla-Havn	70° 27′	26° 12′
Henry-Land, 9—11 fms.	69° 35′	23° 35′
Henry-Land, off.	69° 34′	23° 35′
Hurry-Inlet, 0—3 fms.	70° 50′·2	22° 31′
Hurry-Inlet, 0—7 fms.	70° 50′·2	22° 31′

	Lat. N.	Long. W.
Hurry-Inlet, 10 fms.	70° 25′	22° 30′
Hurry-Inlet, 50 fms.	70° 36′	22° 31′
Ikerasausak	65° 58′·5	37° 27′
Ingmikertok	65° 45′	36° 58′
Jameson-Land	70° 25′	23°
Kangerdlugsuatsiak	66° 18′	35° 28′
Kingorsuak	66° 8′	37° 10′
Rømer-Fjord	69° 38′	23° 31′
Sabine-Island	74° 30′	19° 45′
Sabine-Island, off.	74° 17′	15° 20′
Sabine-Island, SE. of	74° 25′	18° 30′
Scoresby-Sound, off.	69° 25′	20° 1′
Sierak	65° 57′	37° 5′
Smalsund	65° 59′	35° 52′
Solo-Fjord	67° 17′	33° 13′
Stewart-Island, N. of	69° 55′	22° 45′
Tasiusak	65° 37′	37° 34′
Tiningnekelak	65° 56′	37° 40′
Tunok	65° 53′	36° 51′
Turner-Sound, 0—2 fms.	69° 44′	23° 29′·5
Turner-Sound, 3 fms.	69° 44′	23° 30′
Turner-Sound, 8 fms.	69° 43′·5	23° 33′
Ødesund	66° 15′	35° 25′

Nuculidae.

Nucula tenuis Montagu.

1900.	Cape Dalton	9—11 fms.	Fine clay with small stones	7	specimens.
1900.	Turner-Sound	ca. 3 —		16	—
1900.	Hurry-Inlet	7—0 —	Sand and clay	2	—
1900.	The mouth of Hurry-Inlet	50 —	Sand and clay	2	—
1900.	SE. of Sabine-Island	110 —	Fine clay with stones and gravel	1	—

The Kolthoff-Expedition of 1900 took 12 specimens in the Mackenzie-Bay, N. of Franz Joseph-Fjord, on muddy ground where the depth was 6½—19 fms. (Hägg l. c. p. 6).

All the East-Greenland specimens belong to the variety with the angular somewhat expanded shape: *expansa* Reeve; they obtain a length of up to 15·5 mm.

Leda pernula Müller.

1901—02. Tasiusak...30—50 fms.		1 specimen.	
1900. Cape Dalton.... 9—11 —	Clay with small stones	12 —	and 1 valve.
1900. Turner-Sound ... ca. 3 —		6 —	
1891—92. Hekla-Havn . 3—6 —		6 —	
1900. Hurry-Inlet...... 50 —	Clay with stones	17 —	and 3 valves.
1900. Forsblad-Fjord ..14—3 —		1 —	
1900. SE. of Sabine-Island 110 —	Fine clay with stones and gravel	1 —	

In 1883 the Nordenskiöld-Expedition took 5 specimens off Angmagsalik at 25—40 fms.; it was moreover taken by the Kolthoff-Expedition in 1900 in Mackenzie-Bay, N. of Franz Joseph-Fjord, on muddy ground and at depths from $6^1/_2$—19 fms. (14 specimens) and 53 fms. (1 specimen) (Hägg l. c. p. 8).

Along East-Greenland *Leda pernula* has thus been found to occur on the line from Tasiusak to Sabine-Island, or from ca. $65^1/_2$—$74^1/_2$° N.

All the specimens found at East-Greenland belong to the variety *costigera* Beck. The periostracum is on the whole light and straw-coloured. The concentric striation is fine (sometimes however more distinct). In larger specimens the periostracum is frequently wanting on a great part of the shell and the underlying lime highly eroded; apart from this the shell is in itself rather thin; the longitudinal rib on the inside of the posterior end is well developed.

The species obtains a considerable size at East-Greenland. From Turner-Sound we have one specimen of 26 mm., from Cape Dalton several of 27—32 mm. and from Hurry-Inlet some of 30—34 mm.

Fossil. The East-Greenland Expedition of 1900 found a fragment of a valve at Hurry-Inlet, opposite the anchoring place.

Leda minuta Müller.

1901—02. Ingmikertok.. 10— ca. 30 fms. 3 valves.

The valves are of a rather recent appearance; their maximum length is 11 mm.

Yoldia (Portlandia) arctica Gray.

1900. Cape Dalton ...	9—11 fms.	Fine clay with small stones	3 specim. (empty).
1900. Turner-Sound ..	ca. 3 —		23 — (the 8 empty)
1891—92. Hekla-Havn	ca. 12 —		2 — (one empty) and 1 valve.
1900. Hurry-Inlet	7—0 —	Clay and sand	140 —
1900. Fleming-Inlet ..	118 —	Red clay	15 —
1900. Forsblad-Fjord .	14—3 —		1 — (empty).

The largest specimen is from Hekla-Havn and is of a length of 25·25 mm., of a height of 14 mm., and of a breadth of 9·75 mm. Among the specimens from Turner-Sound and Hurry-Inlet the largest have a length of 24 mm.; among those from the great depth (118 fms.) in Fleming-Inlet the largest only measures 14 mm.

The vast majority of the East-Greenland specimens, which I have at hand, belong to the variety *portlandica* Reeve; this is a lengthened, low and proportionally compressed form of which I shall state some measures:

	Length.	Height.	Breadth.
a. Turner-Sound	25 mm.	13·5 mm.	9·5 mm.
b. — —	23·5 —	13·25 —	8·75 —
c. Cape Dalton	19·5 —	11 —	7 —
d. Turner-Sound	16 —	9·2 —	5·75 —

A very few specimens on the contrary approach the variety *siliqua* Reeve by a shorter, higher, and more ventricous shape, what will be seen from the following measurements:

	Length.	Height.	Breadth.
a. Turner-Sound	22·25 mm.	13·5 mm.	9·5 mm.
b. — —	18·25 —	11·5 —	8 —
c. — —	18 —	10·75 —	7·75 —

One specimen, from Scoresby-Sound (Hekla-Havn), belongs to the form which W. C. Brøgger has named var. *nux*[1]; it is highly ventricous as the var. *inflata* Leche, but more lengthened. Its measures are:

Length 16 mm. Height 10·5 mm. Breadth 8·75 mm.

The shell is frequently more or less covered with a black incrustation. This consists indeed of hardened bottom-material, but its formation and fastening are probably highly supported by the rootlets of a Hydroid *(Perigonimus)* which grows on the shell.

At East-Greenland *Yoldia arctica* has also been taken by the Swedish expeditions.

First by the Nathorst-Expedition of 1899 in the following places[2]:

Scoresby-Sound, Fame Isles	12—13 fms.	Clay	15	specim.
— — —	ca. 5 —	Mud	11	—
— — —	4—2½ —	Mud	14	—
72° 1′ N. 23° 3′ W.	17—21 —	Mud	3	—
Franz Joseph-Fjord	ca. 5—1½ —	Mud with sand and algae	11	—
Cape Benett (73° 26′ N.) ...	5—6 —	Sandy mud with algae	1	—

All these specimens belong to the variety *portlandica* Reeve and obtain a length of up to 26·5 mm. (Scoresby-Sound, 12—13 fms.), which is the maximum length of the recent individuals hitherto known; thus they very nearly reach the largest known specimens from quaternary deposits, namely of 27 mm. in the southern Norway and of 28·3 mm. in Bohuslän.

Next by the Kolthoff-Expedition of 1900 in the following places:

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[1]) Brøgger: Om de senglaciale og postglaciale nivåforandringer i Kristianiafeltet, p. 37—38, Tab. V, Fig. 3 a, b, c. Norges geol. Undersøgelse Nr. 31, 1900—01.

[2]) The specimens belong to «Naturhistoriska Riks-Museum» in Stockholm, where I have examined them.

Franz Joseph-Fjord, outer part of Myskoxe-Fjord	116 fms.	Clay. A very great number of specimens.
Mackenzie-Bay, N. of Franz Joseph-Fjord	$6^1/_2$-10	Mud. 3 specimens (one empty).
— - — —	$6^1/_2$-19	Mud. A very large number of specimens.

All the specimens of this expedition belong to the var. *portlandica* Reeve and reach a length of 25 mm. (comp. R. Hägg l. c. p. 14—16).

Thus we see that *Yoldia arctica* at the northern East-Greenland belong to the most common molluscs as it has been found at numerous localities from ca. $69^1/_2$—$73^1/_2$° N. And it thrives on this coast at depths changing from ca. 3—118 fms.

In a fossil state it has only been taken at one locality, namely at the Gaasefjord in Scoresby-Sound. The further details have been described by N. Hartz in the following way: «At the inner end of Gaasefjord large clay-deposits were found along the glacier river, formed of very fine dusty clay.... In the clay was found a fragment of *Portlandia (Leda) arctica* and at the mouth of the river a whole valve of the same species which appeared quite recently to have been washed out of the clay»[1]. I have verified the correctness of the determination.

Portlandia intermedia M. Sars.

1900.	N. of Stewart-Island	158 fms.	Clay with stones	2 specim. (young).	
1900.	The mouth of Hurry-Inlet	50 —	Clay with stones	9 —	
1900.	Fleming-Inlet	118 —	Red clay	7 — (one empty).	
1900.	Forsblad-Fjord	90—50 —	Clay with stones and gravel	ca. 40 —	
1900.	SE. of Sabine-Island	110 —	Fine clay with stones and gravel	3 —	and 7 valves.
1891—92.	Off Sabine-Island	127 —			1 valve.

The maximum length is 16 mm.

The Kolthoff-Expedition of 1900 took a specimen in the outer part of Myskoxe-Fjord, a side-fjord of Franz Joseph-Fjord, where the depth was $116^1/_2$ fms. and the bottom consisted of clay (Hägg. l. c. p. 11).

[1]) Medd. om Grønland, XIX, 1896, p. 176.

Portlandia lenticula Möller.

1900. Cape Dalton ...	7—11 fms.	Fine clay with a few stones	1 valve.
1900. Hurry-Inlet	7—0 —	Clay and sand	10 specimens.
1900. Hurry-Inlet	50 —	Clay with stones	30 —
1900. Fleming-Inlet ..	118 —	Red clay	1 —
1900. Forsblad-Fjord .	14—3 —		1 — (empty).
1900. Forsblad-Fjord .	90—50 —	Clay with stones	17 — (10 empty).

Two of the largest specimens (from Hurry-Inlet, 50 fms.) have the following measures:

Length 7·5 mm.	Height 5·2 mm.	Breadth 4·5 mm.
— 7·2 —	— 5 —	— 4·6 —

The number of the hinge-teeth is on both sides 13 in a specimen of a length of 6·5 mm.

The Kolthoff-Expedition of 1900 took it in the following localities (Hägg l. c. p. 13):

Franz Joseph-Fjord, outer part of Myskoxe-Fjord	116½ fms.	Clay (3 specim.).
Off Mackenzie-Bay, N. of Franz Joseph-Fjord..	58 —	Mud (1 specim.).

Portlandia frigida Torell.

1900. Cape Dalton ...	7—11 fms.	Fine clay with small stones	5 specim. and 2 valves.
1900. Hurry-Inlet	50 —	Clay with stones	12 — (2 empty).
1900. Forsblad-Fjord .	90—50 —	Clay with stones and gravel	20 — (2 empty).
1900. Forsblad-Fjord .	14—3 —		1 — (empty).

Var. *nana* M. Sars.

1900. Cape Dalton	7—11 fms.	Fine clay with small stones	1 specimen.
1900. Turner-Sound	ca. 3 —		1 —
1900. Hurry-Inlet	7—0 —	Clay and sand	5 —
1900. The mouth of Hurry-Inlet	50 —	Clay with stones	9 — (3 empty).
1900. Fleming-Inlet	118 —	Red clay	3 — (1 empty).
1900. Forsblad-Fjord	90—50 —	Clay with stones and gravel	Numerous spec.
1900. SE. of Sabine-Island...	110 —	Fine clay wit stones and gravel	1 — (empty).

G. O. Sars has in his excellent work: «Mollusca Regionis Arcticae Norvegiae» without giving ground eliminated «*Yoldia* *nana*» which was recorded by his father[1]). It seems to me, however, as if the specimens from East-Greenland might be divided into two groups; the one would be in accordance with the typical *Portlandia frigida* as it has been described and figured by Torell[2]), the other, on the contrary, by the lesser height of the shell and the more ventricous shape in accordance with M. Sars's *P. nana*. For this reason I cannot approve of quite excluding *P. nana*; on the other hand I think it better only to consider it a variety of *P. frigida*, since it only differs from this by the shape of the shell and since transitional stages moreover occur. I cannot confirm the difference that *P. frigida* has fewer teeth than *P. nana*, as I find the number in both to go up to 8—9. M. Sars himself has also felt doubtful. For he writes as follows under «*Yoldia nana* Sars, nov. spec.»: «An varietas Yoldiae frigidae Torell?» It is however correct that there is a slight difference in size. Among the specimens at hand from East-Greenland the largest var. *nana* measures 3·5 mm., while the largest typical *frigida* is of a length of 5 mm.

Arcidae.

Arca glacialis Gray.

1900. Cape Hope	121 fms.	Clay with stones	2 specimens.
1900. Hurry-Inlet	10 —	Clay	11 — and 1 valve.
1900. Hurry-Inlet	50 —	Clay with stones	ca. 80 —
1891—92. Jameson-Land	10—60 —		3 —
1900. Fleming-Inlet	118 —	Clay	3 —
1900. Forsblad-Fjord	ca. 50 —	Clay with stones	4 — and 8 valves.
1900. Forsblad-Fjord	90—50 —	Clay with stones	2 — and 1 valve
1891—92. 72° 53′ N. 20° 36′ W.	96 —		3 —

The maximum length is reached by specimens from Hurry-

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[1]) M. Sars: Om de i Norge forekommende fossile Dyrelevninger fra Quartærperioden, p. 99, Fig. 118—120; Universitetsprogram for 1864. (1865).

[2]) O. Torell: Bidrag til Spitsbergens Molluskfauna, 1859, p. 148. Tab. I, Fig. 3.

Inlet, namely 23 mm. (from a depth of 50 fms.) and 24 mm. (from 10 fms.).

The Kolthoff-Expedition of 1900 took it in the following localities: Franz Joseph-Fjord, inner part of Myskoxe-Fjord, 53 fms., clay (15 specimens); Franz Joseph-Fjord, outer part of Myskoxe-Fjord, clay, 116 fms. (11 specimens); Mackenzie-Bay N. of Franz Joseph-Fjord, $6^1/_2$—19 fms., mud (31 specimens); off Mackenzie-Bay, 53 fms., mud (25 specimens). The maximum length was 27·8 mm. (Hägg l. c. p. 17—19).

Arca pectunculoïdes Scacchi
var. *septentrionalis* G. O. Sars.

1891—92.	72° 24′ N.	19° 42′ W.	130 fms.		1 specimen.
1891—92.	74° 17′ N.	15° 20′ W.	127 —	Clay with stones	1 — and 1 valve.
1900.	SE. of Sabine-Island		110 —		1 — and 1 valve.

The largest specimen was of a length of 12·5 mm.

The Kolthoff-Expedition of 1900 took a specimen off the north-eastern Greenland (72° 25′ N. 17° 56′ W.); the depth was ca. 160 fms. and the bottom consisted of stones and sand.

Mytilidae.

Mytilus edulis Linné.

1891—92.	Tasiusak	Between tide-marks	1 specimen.
1898—99.	Tasiusak		1 — and 8 valves.
1901—02.	Tasiusak		Numerous specim.
1901—02.	Tasiusak	0—ca. 5 fms.	Numerous specim.
1901—02.	Tasiusak	$^1/_2$—5 —	Numerous specim.
1901—02.	Tasiusak	10—5 —	1 specimen.
1901—02.	Angmagsivik....	$^1/_2$— ca. 5 —	2 —

The largest specimen is of a length of 84 mm.

All the East-Greenland specimens, which I have seen, belong to a rather elongated form what will be seen from the following measurements: a) length 84 mm., height 40 mm.; b) length 80 mm., height 34 mm.; c) length 68 mm., height 33 mm.; d) length 70·5 mm., height 31·5 mm.; e) length 66 mm., height

32 mm.; f) length 59·5 mm., height 26·5 mm. A few proportionally high specimens convey the impression, that they have been unable to develop freely as they are deformed («squeezed»).

The valves of the East-Greenland specimens are sometimes rather thin, sometimes rather solid; on the whole they cannot be said to be especially thick. At Denmark we find for instance a similar variation sometimes leading to still greater thickening of the valves.

Almost all the East-Greenland specimens have the concentric lines of increase with intervals very distinct; thus the surface shows a number of deep furrows (a corresponding number of conspicuous ribs may sometimes be noticed on the inner side); it looks as if the growth is arrested periodically. On a specimen of 84 mm. I have counted 17—18 of such concentrical furrows.

On the East-Greenland coast the limit of the mussel's distribution may be fixed at about 66° 30′ N. It was observed so far north, but not further, by C. Kruuse, when he took part in G. Amdrup's exploration of the coast. No expedition has found *Mytilus edulis* in a living state further north in East-Greenland, and the late zoologist Sören Jensen, whom I requested to look for the mussel during the expedition of 1900, told me that he had seen nothing of the mussel till he came down to Angmagsalik.

This makes it still more strange that the Nathorst-Expedition of 1899 should find *Mytilus edulis* fossil at ca. 73° N., namely at the mouth of Sophia-Sound, 25 meters above the sea-level, and quite inmost in Franz Joseph-Fjord, 10 meters above the sea-level[1]). This is, however, not an exceptional phenomenon, the mussel having also become extinct in other high-arctic localities, namely at the icy-sea-coast of Siberia, Franz Joseph-Land, Svenska-Förlandet and Spitzbergen[2]).

[1]) A. G. Nathorst: Bidrag till nordöstra Grönlands geologi; Geolog. Fören. Förhandl. Bd. 23, 1901, p. 304.

[2]) A more detailed mention of this will be found in Ad. S. Jensen:

Mr. C. Kruuse, who stayed at Angmagsalik in 1901—02, has on my request made the mussel object to observations. As it may be of interest to obtain information regarding this animal form here at the northern limit of its distribution I shall communicate the notes which Kruuse kindly sent me, excluding some less essential details.

«*Mytilus edulis* is not rare in the Angmagsalik district. I have taken it in several places in Tasiusak, at 65° 37′ N., where it however only occurs frequently in «Strømstedet» Kilitilik (= the mussel-place) and does not pass the lenght of 5 cm. I have moreover seen it in abundance in Tunok, in the littoral belt in less numbers, but the specimens were large, of a length of 6—8 cm.

It is rather common at the bird-islands in Ikerasak, Kangârsik, Kingak Angmagsivik (66° N.), Ingmikertok, Ingmikertorajik, Ikerasausak, Kuarmiut, Tiningnekelak, Norait and Anova.

In most of these localities only a few specimens of a length not exceeding 5 cm. occurred, besides young ones; but in one single place my native companion found at low water ca. 6 pints of very large specimens (8 cm.).

According to the Rev. Ryttel's statement it is very common in Ikerasausak along the whole coast of the sound.

At all the natives' dwellings, houses as well as tent-places, we find in the kitchenmiddens considerable heaps of shells which almost entirely consist of *Mytilus*. The specimens are most frequently exquisitely large, but now and then we also find heaps of smaller specimens till quite young ones.

The natives highly appreciate the mussel, they neglect no opportunity to eat it in numbers, where they find it on their summer journeys, they will even postpone their journeys for days in order to use the low water time to empty some rocks.

Studier over nordiske Mollusker, II; Vidensk. Medd. Naturh. Foren. Kbhvn. 1902 (p. 40—41). Comp. also N. Knipowitsch, Ann. Musée Zool. de l'Acad. Imp. des Sci. St. Pétersbourg, T. VIII, 1903, p. 133; and the present treatise p. 300—303.

It is always eaten au naturel and the natives do not care for it when it has been cooked. As food it is yet of the greatest importance in spring when the supply of seal-meat has been used up. Then it is gathered with the hand through the holes and cracks in the ice, which always are formed around skerries and rocks by the changing rising and sinking of the ice (tidal action). Together with the fucaceae *Agarum Turneri, Laminaria groenlandica* and the Florid *Rhodymenia palmata* the mussels are called «Strandting» and have often before the beginning of the colonization saved the inhabitants from perishing with hunger, and they still play a considerable part in the winter diet.

North of the inhabited district I only remember to have seen it once at about 66° 30′ N. A few and small specimens were here found in a crevice situated between tide-marks. They were at once devoured by the hungry members of the expedition. I have neither noticed it on the old tent-and dwelling-places and doubt that it occurs here in greater numbers.

Mytilus lives rather freely, it is rarely found as a hold for Laminarians, though it occurs in the Laminaria woods. It likes clear streaming water and avoids decidedly all places where greater quantities of freshwater run into the sea. I have never found it in the inner end of the fjords where the water is made clayey by the glacier rivers.

It is not seldom found on the bird-islands whither it has been taken by brooding birds.»

Dacrydium vitreum (Holböll) Möller.

1900. Cape Dalton	9—11 fms.	Fine clay with small stones	3 specim. and 3 valves.
1900. Hurry-Inlet	10 —	Clay	1 — (empty).
1900. Hurry-Inlet	50 —	Clay with stones	20 specimens.
1900. Fleming-Inlet	118 —	Clay	1 — (dead) and 1 valve.
1900. Forsblad-Fjord	50 —	Clay with stones	1 specimen.
1900. Forsblad-Fjord	90—50 —	Clay with stones	24 specim. (5 empty) and 3 valv.
1891—92. 74° 17′ N. 15° 20′ W.	127 —	Clay with stones	1 specimen.

1900. SE. of Sabine-Island .... 110 fms. Fine clay with stones and gravel
1 specimen.
1900. Sabine-Island .... Laminarians 1 — (very young).

At East-Greenland *Dacrydium vitreum* has thus been found from Cape Dalton to Sabine-Island, or from $69^1/_2$—$74^1/_2$ N.

The species obtains a considerable size at East-Greenland, namely a length of up to 6 mm.

Modiolaria laevigata Gray
et var. *substriata* Gray.

1899. Cape Dan ....10—15 fms. Rocky ground with Laminarians
1 specimen.
1901—02. Tasiusak ...... $^1/_2$—5 — 5 —
1898. — ...... 3—5 — Stony ground with some Algae
14 specimens.
1899. — ...... 5—20 — Stony ground with Algae
Numerous specimens.
1899. — ...... 6—10 — Mud with a few Algae
1 specimen.
1899. — ......20—30 — Stony ground with Algae
6 specimens.
1892. — ...... 13 — 3 —
1901. Angmagsalik .... Numerous specimens in their Byssus nest.
1900. — .... 10—0 — 5 specimens.
1892. Angmagsalik-Fjord . 10—25 — 2 —
1902. Ingmikertok ....10— ca. 30 — 1 —
1902. Tiningnekelak...... 1 — 30 — (small young ones).
1901. — ...... 5—10 — 10 —
1902. — ...... Fucaceae, sand 5 —
1902. Tunok .... Between tide-marks 1 —
1902. Angmagsivik .....$^1/_2$— ca. 5 fms. 1 —
1899. Smalsund .... $^1/_2$—1 — Rocky ground with some Algae
3 specimens.
1899. Ödesund .... 5—15 — Rocky ground with Algae
2 specimens.
1899. Kangerdlugsuatsiak . Rocky ground with Algae
Numerous — (small).
1899. Solo-Fjord......... The beach Rocky ground with a few Algae
3 specimens (small).
1899. — — ....10—15 fms. Rocky ground with Algae
8 specimens.
1900. Cape Dalton .... 9—11 — Fine clay with small stones
15 specimens.

1900. Henry-Land........	20 fms.	Stones	ca. 50 spec. (0·5—19 mm.).
1900. Turner-Sound......	ca. 3 —		Numerous specimens.
1891—92. Scoresby-Sound	10—16 —		6 —
1891—92. — —	10—60 —		1 —
1891—92. Danmarks Ø...	6—7 —		1 —
1891—92. Hekla-Havn....	3—6 —		25 —
1891—92. Gaaseland.....			5 —
1900. Hurry-Inlet........	10 —	Clay	15 —
1900. Cape Borlase Warren	10 —	Laminarians	16 —
1900. Sabine-Island......		Laminarians	9 —

The Kolthoff-Expedition of 1900 took it in Mackenzie-Bay N. of Franz Joseph-Fjord at depths of $1^1/_2$—$5^1/_2$ fms. (1 specimen), $6^1/_2$—10 fms. (14 specimens) and $6^1/_2$—19 fms. (numerous specimens), according to R. Hägg (l. c.) who has recorded it as 3 species: *Modiolaria corrugata*[1]) (p. 22), *M. laevigata* (p. 23) and *M. substriata* (p. 25)[2]).

The Germania-Expedition of 1869—70 took it at Jackson-, Clavering-, Sabine- and Shannon-Isles at depths of 4—30 fms., according to Möbius who records it as *Modiolaria discors* (l. c. p. 251).

Modiolaria laevigata is thus extremely common along the East-Greenland coast and has been found as far North as collections on the whole have been undertaken (Shannon-Island at 75—$75^1/_2$ N.).

At East-Greenland the *laevigata*-form is by far the most frequently occurring and obtains a length of 36·5 mm. The variety *substriata* occurs comparatively seldom; it obtains a length of 32 mm.

Modiolaria corrugata Stimpson is up to the present day often confounded with *M. laevigata*, just as several authors speak of transition stages between them. They are however two

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[1]) I have had the opportunity of seeing some of the East-Greenland specimens which Mr. Hägg has examined, and I must declare his determination to be incorrect. *M. corrugata* does not occur at all at East-Greenland.

[2]) I only consider «*M. substriata*» a variety of *M. laevigata*, as transition stages occur between them.

very distinct species: *M. corrugata* may easily be distinguished from *M. laevigata* var. *substriata* (*M. laevis* Beck) by the character that the periostracum of the median area is not smooth, but shows a fine wrinkling when placed under a lens, almost as *M. nigra*; from the latter species *M. corrugata* differs again by the feature that the median area is distinctly set off against the posterior area as in *M. laevigata*.

Fossil. A fragment of a middle-sized valve was found at Hurry-Inlet opposite the anchoring place (Dan. East-Greenland Exped. 1900).

Modiolaria nigra Gray.

1901—02. Tasiusak	10—15 fms.		1 specimen.	
1900. Cape Dalton	9—11 —	Clay	25 —	
1900. Turner-Sound......	ca. 3 —		30 —	(1·5—44·5 mm.).
1900. Hurry-Inlet	7—0 —	Clay and sand	5 —	(3 empty).
1900. Cape Borlase Warren		Laminarians	1 —	(empty).

The largest specimen, the one from the last mentioned locality, is of a length of 45·5 mm.

The Kolthoff-Expedition of 1900 took 15 specimens, up to a length of 40 mm., in Mackenzie-Bay N. of Franz Joseph-Fjord, where the depth was $6^1/_2$—19 fms. (Hägg l. c. p. 26).

Modiolaria nigra is thus found from the most southern region up to Cape Borlase Warren which is situated at 74° 20′ N.

The shape is very variable in the East-Greenland specimens, sometimes low and ventricous, sometimes comparatively high and compressed, which will be seen from the measures stated below:

	Length.	Height.	Breadth.
a. Turner-Sound ...	44·5 mm.	21·5 mm.	16 mm.
b. Cape Dalton.....	40 —	22 —	14 —
c. — —	35·5 —	19·5 —	14·5 —
d. — —	35·5 —	20 —	12·5 —
e. — —	34·5 —	18.5 —	12·25—
f. Turner-Sound ...	31 —	17 —	10·5 —

Crenella decussata Montagu.

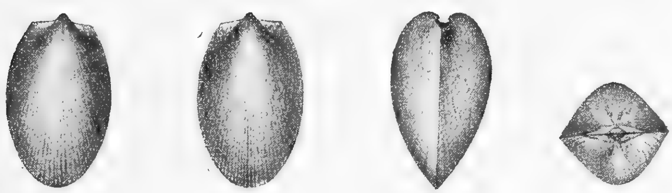
1901—02. Tiningnekelak.............. 1 specimen.

By this specimen, which is 4·75 mm. high, the species has for the first time been represented at East-Greenland.

Limidae.

Limatula hyperborea n. sp.

Shell oval or elliptical, extremely convex, white or yellowish white with a faint lustre. The valve is thin, a little oblique, the anterior margin forming a faint regular arch, the



a *b* *c* *d*

Fig. 1. *Limatula hyperborea* n. sp.
A specimen from East-Greenland (Forsblad-Fjord, 90—50 fms.), seen from the right side (*a*) and from the left (*b*), from before (*c*) and from above (*d*). $\times$ 3/2.

posterior margin being somewhat more arched above. Sculpture, 24—36 fine, but distinct and sharp radial ridges which disappear towards the sides; two of the middlemost are generally stronger and with larger interval than the others, and thus they form a rather marked furrow which is situated almost medially or a little to the side of a line through the middle of the valve (sometimes only one conspicuous median rib appears); the concentrical striation exceedingly fine. Beaks prominent; hinge-line comparatively long, almost straight, forming an obtuse angle with the side-margins; the ligament-pit triangular; the inside shining silvery white or pearly. The height is 15 mm., the length 9·5 mm. and the breadth 9 mm.

1900. Fleming-Inlet ...	118 fms.	Clay	1 specimen.	
1900. Forsblad-Fjord ..	ca. 50 —	Clay with stones	1 —	
1900. Forsblad-Fjord ..	90—50 —	Clay with stones	12 —	and 14 valves.

This new species may be distinguished from *Limatula elliptica* Jeffreys [1]) with which it has some resemblance, by the following characters: the shape of the shell is higher, the ventral margin forms with the side-margins a steeper arch, the radial ribs are sharp and not serrate. *L. subovata* Jeffreys [2]) is also a nearly related species, but it has much more numerous radial ribs (50—60) and is still more ventricous.

This new species not only lives at the northern East-Greenland but also at Spitzbergen and in the Kara-Sea of which I have convinced myself in the «Riks-Museum» in Stockholm [3]). It is probable that it also lives in the Barents-Sea and in the cold Arctic-Sea where «*L. subovata* Jeffr.» is said to have been taken in several places, according to Friele & Grieg [4]), it being very probable that *L. subovata* has been confounded with the present new species. The same probably holds good with regard to «*Lima elliptica* Jeffr.» which was taken by the Dutch expedition in the Barents-Sea at 130 fms., as Nomann [5]) states the maximum size to be 11 mm. length and 18 mm. height, a size which, as far as I know, never is obtained by *L. elliptica*, but would correspond very well with the present new species. The Ingolf-Expedition has taken very large specimens up to a height of 20 mm. of *L. hyperborea* (S. of Jan Mayen, 371 fms.).

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[1]) Brit. Conchol. II, 1863, p. 81.

[2]) Ann. Mag. Nat. Hist. (4) XVIII, 1876, p. 427.

[3]) The specimens from the Kara-Sea were by W. Leche referred to *Lima sulculus* (Leach) Lov. (Kongl. Sv. Vet.-Akademiens Handl. Bd. 16, Nr. 2, 1878, p. 34).

[4]) Norw. North-Atl. Exped. Zool., Mollusca, III, 1901, p. 7.

[5]) Niederländ. Arch. f. Zoologie, Suppl.-Bd. 1, 1881—82, Nr. 10, p. 4.

Pectinidae.

Pecten groenlandicus Chemnitz.

1901—02. Tasiusak	30—50 fms.		9 specimens.
1899. Ödesund	5—15 —	Stony ground with algae	2 specimens.
1900. Cape Dalton	9—11 —	Clay with small stones	1 fragment.
1900. Off Henry-Land	ca. 20 —	Stones	1 valve.
1900. Turner-Sound	ca. 3 —		1 specimen and 1 valve.
1891—92. Hekla-Havn	3—11 —		ca. 20 —
1900. Hurry-Inlet	10 —	Clay	ca. 50 —
1900. Fleming-Inlet	118 —	Red Clay	1 valve (of a young one).
1900. The mouth of Forsblad-Fjord	14—3 —		ca. 70 specimens.
1900. Forsblad-Fjord	90—50 —	Clay with sharp stones	6 specimens.
1900. Cape Borlase Warren	10 —	Laminarians	1 —
1900. Sabine-Island		Laminarians	4 —

The Nordenskiöld-Expedition of 1883 took 15 specimens (long. max. 27·5 mm.) off Angmagsalik (65° 40′ N. 35° 32′ W.) at a depth of 25—40 fms. and on clayey ground.

The Kolthoff-Expedition of 1900 took it in the following localities (comp. Hägg l. c. p. 28), specimens of a length of up to 26·5 mm.:

SE. of Walrus-Island	74° 30′ N.	42—53 fms.	Mud and stones	Numerous spec.
SE. of Pendulum-Island	74° 35′ N.	79 —	Mud and stones	2 specimens.

Pecten groenlandicus thus appears to be rather common along East-Greenland. It has been found to occur from $65^1/_2$° —$74^1/_2$° N. and will most probably be found to reach as far North as Greenland altogether.

Pecten groenlandicus obtains a very considerable size of up to a length of 28·5 mm. at East-Greenland, as in other high-arctic regions.

As it constantly is asserted that the left valve is considerably larger than the right (compare for instance Hägg l. c.

p. 28), I must maintain that J. Collin is perfectly right when writing: «in most specimens the valves are of the same size, only in a few the margin of the left valve will be found to project quite a little over the right one, still without bending over it» and (under *Pecten Hoskynsi* (non Forbes) Sars = *P. imbrifer* Lovén): «in all very thin shelled *Pecten*-forms the feeblest valve will yield in the edge when the animal in the agonies of death is strongly shutting the valves. This causes the peculiar concavity which runs concentrically with the shell edge, the sculpture conditions on the right shell imparting this with greater firmness».

In his posthumous diary Søren Jensen has put down the following observation regarding *Pecten groenlandicus*: «I was utterly astonished to see that this little bivalve was capable of swimming when fullgrown. It opens and shuts the valves, pushes the water back under the shutting, which takes place with a strong action, and thus rushes backwards through the water. The animals lying on the bottom of a glass of water might in this way «yawn» themselves quite up to the surface».

Pecten imbrifer Lovén.

1891—92. Off Scoresby-Sound	167 fms.	Clay with large stones	1 valve.
1900. Forsblad-Fjord......	50 —	Clay with stones	1 valve.
1900. Forsblad-Fjord......	50—90 —	Clay with stones	ca. 125 spec.

The Kolthoff-Expedition of 1900 took 1 specimen SE. of Pendulum-Island (74° 35′ N.), where the depth was 79 fms.; the ground consisted of mud and stones (Hägg l. c. p. 30).

The specimens at hand belong to the variety *major* Leche and obtain a length of up to 20·5 mm.

The sculpture of the left valve is exceedingly variable, it is sometimes provided with numerous radially arranged hollow vesicles, sometimes it only shows faint traces of such.

Pecten islandicus Müller.

1900. Off Angmagsalik.	140 fms.	1 fragment.
1900. Forsblad-Fjord...90—50	—	Fragments of a larger and a smaller valve.

Whole valves, not to speak of living specimens, have not been found at East-Greenland. And as it does not seem probable that a bivalve of such a considerable size as *Pecten islandicus* should have escaped notice it is to be doubted that the species lives at East-Greenland. But wherefrom do then the taken fragments originate? Do they arise from a submarine fossiliferous layer or from a shell layer on land? This last hypothesis is supported by the fact that N. Hartz in 1891—92 found a small fragment of a shell lying together with *Saxicava arctica* in fine clay on «Rolige Bræ» near the Kobberpynt in the inner Scoresby-Sound, 75 feet above the sea-level, and this fragment has correctly been recognized by Posselt as *Pecten islandicus*. Thus it appears that we here have to do with raised layers with *P. islandicus*, how could this fragment otherwise be found on the glacier! Hartz also writes: «These shell-fragments presumably originate from deposits higher up along the edge of the glacier and thus suggest that rather considerable changes have taken place in the distribution of the ice» [1]).

Astartidae.

Astarte Banksii Leach.

1901—02. Tasiusak	1/2—5 fms.		10 specimens.	
1899. Tasiusak	6—10 —	Muddy ground	1 —	
1899. Tasiusak	15—20 —	Rocky ground	1 —	
1899. Tasiusak	20—30 —	Stony ground	1 —	(empty).
1902. Tasiusak	30—50 —		3 —	
1900. Angmagsalik	9—0 —		3 —	
1901. Tiningnekelak	5—10 —		2 —	(empty).
1900. Cape Dalton	9—11 —	Clay	18 —	(6 empty).

[1]) Medd. om Grønland, XIX, 1896, p. 175—76. — Comp. moreover this treatise p. 301—302.

1900. Turner-Sound	ca. 3 fms.		10 specimens.
1891—92. Hekla-Havn.........			12 —
1900. Hurry-Inlet	7—0 —	Clay and sand	1 —
1900. The mouth of Hurry-Inlet	10 —	Clay	7 —
1900. Cape Borlase Warren	10 —		8 — (4 empty).
1900. Sabine-Island...........	3—5 —		5 — (4 empty).

The majority of the specimens at hand which reach a length of 24 mm. belong to the variety *Warhami* (= *Astarte Warhami* Hancock, Ann. Mag. Nat. Hist. vol. 18, 1846, p. 336, Pl. 5, Fig. 15—16) which is characterized by a lengthened shape of the shell, elliptical and generally rounded both in front and behind; the umbo is situated almost in the middle of the border of the shell. Generally the shell is rather compressed, but sometimes rather ventricous. The concentrical ribs frequently quite reach the ventral margin, but other specimens are only ribbed on the umbonal part or to the middle of the shell, while the rest of the shell only shows fine lines of increase (= *Astarte fabula* Reeve, in Belcher: The last of the Arctic Voyages, vol. II, 1855, p. 398, Pl. 33, Fig. 5 a, b).

Some specimens belong to the variety *striata* (= *Astarte striata* Leach) which according to my opinion only is a shorter form of *Warhami* [1]. It is not correct to distinguish them by the different colour of the periostracum as the variety *Warhami* for instance may begin as straw-coloured and end as dark brown.

At last there are a few specimens of a generally higher, more or less triangular form, with fine lines of increase but without ribs and with a shining periostracum [2].

Astarte Banksii was previously taken by the Germania-Expedition at the north-eastern Greenland, namely at Jackson-Island (M ö b i u s l. c. p. 251, s. n. «*Astarte compressa* Montagu»).

In a f o s s i l state it has been found in the following localities:

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[1]) Such a shorter form is figured by P o s s e l t as: *Astarte Banksii* Leach var. *Warhami* in his Östgrönl. Mollusker, Tav. I, Fig. 3—4.

[2]) Such a form is figured by P o s s e l t as: *Astarte Banksii* Leach (l. c. Fig. 1—2).

1891—92. Sandbanks between Cape Hooker and Cape Stewart, Jameson's Land. Ca. 10 valves.

1900. Northern part of Hurry-Inlet, quite down at the tributary river, 20—30 feet over the sea-level. 1 valve.

Astarte borealis Chemnitz.

1901—02. Tasiusak	$^1/_2$—5 fms.		8 specimens.
1898. Tasiusak	3—5 —	Stony ground	1 —
1899. Tasiusak	6—10 —	Muddy ground	1 —
1899. Tasiusak	20—30 —	Stony ground	4 valves.
1901. Tiningnekelak	5—10 —		1 specimen (empty).
1900. Turner-Sound	ca. 3 —		7 —
1900. N. of Stewart-Island	158 —	Clay with stones	1 valve.
1891—92. Hekla-Havn		Mud	ca. 12 specimens.
1900. The mouth of Hurry-Inlet	10 —	Clay	4 — (2 empty).
1900. The mouth of Forsblad-Fjord	14—3 —		2 —
1900. Cape Borlase Warren	10 —		4 — (1 empty).
1900. Sabine-Island	3—5 —		3 — (1 empty).

About 50 specimens were moreover taken in 1900; their label is unfortunately lost; thus the exact locality cannot be stated.

The species was previously taken both at the southern and at the northern East-Greenland. The Nordenskiöld-Expedition took 9 specimens off Angmagsalik at a depth of 25—40 fms.; the ground consisted of clay with small stones. The Kolthoff-Expedition of 1900 took 9 specimens in Mackenzie-Bay, N. of Franz Joseph-Fjord, at a depth of $6^1/_2$—10 fms. and on muddy ground (Hägg l. c. p. 33). The Germania-Expedition took it at Shannon-Island, Sabine-Island, Jackson- and Clavering-Island at 4—10 fms. (Möbius l. c. p. 251).

All the East-Greenland specimens, which I have at hand, are more or less compressed and as a rule extremely lengthened:

	Length.	Height.	Breadth.
Turner-Sound	44 mm.	35 mm.	18 mm.
—	40 —	30 —	14·25—
Tasiusak	32·5 —	27·2 —	13 —
—	29 —	24·5 —	10·5 —
Hekla-Havn	29 —	21·5 —	9·5 —
Forsblad-Fjord	27 —	20 —	8·25—

The umbonal region is provided with narrow, rather sharp folds which in the fullgrown specimens are continued shorter or longer down, but without reaching the middle of the shell, and as a rule they keep to the umbonal region. The periostracum is generally thick and bast-like, brown or blackish and frequently somewhat shining.

The East-Greenland specimens are probably to be referred to the variety *placenta* Mörch[1]. The specimens from Hekla-Havn were examined by Posselt who set them up as a new variety: *sericea* on account of the «lengthened shape» of the shell and the «thick epidermis with its silk-like lustre»[2]. Only the first mentioned quality might — according to my opinion — though hardly justify the setting up of a special variety and even in this respect numerous transitions to var. *placenta* exist.

In a fossil state the species was found by the Danish East-Greenland-Expedition of 1900 in the following localities:

Hurry-Inlet, Northern part, Liverpool-Coast	9 valves.
Hurry-Inlet, Northern part, from different banks, Ryders-Elv at the main river	20 —

They are either fragments or very rubbed valves.

Nathorst too found it fossil, namely at the mouth of Sophia-Sound at a height of 25—40 meters above the sea-level[3].

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[1] Mörch: Catal. des Moll. du Spitzberg; Mém. Soc. Malacol. Belgique, T. IV, 1869, p. 22.

Leche: Öfvers. öfver de af Sv. exped. til Nowaja-Semlja och Jenissej insaml. hafs-mollusker; K. Sv. Vetensk.-Akad. Handl. Bd. 16, Nr. 2, 1878, p. 19, Tab I, Fig. 4 a—c.

[2] Posselt: Østgrønl. Mollusker; Medd. om Grønland, XIX, 1895, p. 71, Tab. I, Fig. 8—12.

[3] A. G. Nathorst: Bidrag till nordöstra Grönlands geologi; Geol. Fören. Förhandl. Bd. 23, 1901, p. 304 («*Astarte arctica*»).

Astarte crenata Gray.

f. *typica*

Astarte crenata Gray, Reeve, Conchol. Icon. XIX, 1874, sp. 9. — *A. oblonga* Sowerby, Thes. Conchyl. II, 1855, p. 781, Pl. 167, Fig. 19.

The shell is oval, more or less convex, with numerous (ca. 50) comparatively low concentric ribs which disappear on the posterior part of the shell; the periostracum is light, yellowish.

1900. Hurry-Inlet	50 fms.	Clay with stones	Numerous specim.
1900. Cape Hope	121 —	Clay with stones	3 specimens.
1900. Cape Tobin	120 —		1 —
1891—92. 72° 24′ N. 19° 42′ W.	130 —		3 — (2 empty).
1900. 72° 51′ N. 20° 32½ W...	124 —	Clay	1 — (empty).
1891—92. 72° 53′ N. 20° 36′ W.	96 —		6 —
1891—92. 73° 24′ N. 20° W...	106 —		2 —
1900. SE. of Sabine-Island....	110 —	Fine clay with stones and gravel	10 spec. and some empty valves.

The largest specimens are of a length of 28 mm.

In its typical shape it is a rather characteristic form, but it is subjected to great variations[1]. The ribs may become fewer and more conspicuous, and all three dimensions are subject to considerable changings which will be seen from the following measures:

	Length. mm.	Height. mm.	The height in % of the length.	Breadth. mm.	The breadth in % of the length.
Hurry-Inlet	23	17·5	76·1	10·5	45·7
Cape Hope	23·5	17·5	74·5	11·25	47·9
SE. of Sabine-Island	23·5	18·2	77·4	12·5	53·2
— - — —	26·5	21·5	81·1	12	45·3

[1]) Hägg has set up the variety *incostata* (l. c. p. 37, Taf. I, Fig. 11—12) for some especially short and ventricous specimens. Our Museum possesses from Umanak in West-Greenland, from 250 fms., a similar form also with slightly developed and very closely arranged ribs.

Var. *inflata* Hägg.

Astarte crenata Gray var. *inflata* n. subsp. Hägg, Arkiv för Zoologi, Bd. 2, Nr. 2, 1904, p. 37, Taf. I, Fig. 4—6.

The shell is ventricose and approaches the oblique square, the upper and lower margin are almost parallel, the anterior end short, rounded, the posterior end truncate. The concentric ribs are generally rather numerous and well-developed, sometimes however less conspicuous or even effaced on a smaller or larger part of the shell (very rarely even quite wanting, so that the shell only shows a fine striation). The periostracum is yellow or brownish yellow. The maximum length is 19 mm.

1900. Forsblad-Fjord	ca. 50 fms.	Clay with stones	5 specimens.
1900. Forsblad-Fjord	90—50 —	Clay with stones	Numerous —
1891—92. 74° 17′ N. 15° 20′ W.	127 —	Clay with stones	2 specimens.

The number of ribs may increase up to ca. 40 and decrease to ca. 24 or still fewer as the umbonal part frequently is without folds, and quite smooth specimens may, as mentioned before, also occur.

Some measurements will show the variation-limits, from the oblong-trapeze shaped to the almost quadratic, and the more or less ventricous:

Length.	Height.	The height in % of the length.	Breadth.	The breadth in % of the length.
19 mm.	14·5 mm.	76·3	10 mm.	52·6
16·5 —	11·75 —	71·2	9·2 —	55·8
15·25—	12 —	78·7	8·5 —	55·7
15 —	11 —	73·3	7·3 —	48·7

Var. *acuticostata* Jeffreys.

Astarte acuticostata Jeffreys M. S., Friele, Nyt Mag. f. Naturvidensk. 23. Bd. 1877, 3. Hft., p. 1; ibid. 24. Bd. 1879, p. 223; Jeffreys, Proc. Zool. Soc. 1881, p. 711, Pl. 61, Fig. 9.

The shape takes form of a shorter or longer oblique square, more or less ventricous; the concentric ribs are numerous (ca. 25—40), well developed, more or less sharp, partly laminar and imbricated. The maximum length is 13 mm.

1900. N. of Stewart-Island	158 fms.	Clay with stones	2 specimens.
1900. Fleming-Inlet	118 —	Clay	1 —

I have after due consideration drawn in the present form as a variety under *Astarte crenata* Gray — Friele felt in 1879 (l. c.) inclined to consider it as a dwarf form of *A. crenata*, he has however as late as 1902 kept it under the specific name: *Astarte acuticostata*.

Astarte crenata Gray was previously taken at Shannon-Island, 30 fms. (Möbius l. c. p. 252, s. n. *A. crebricostata*). Moreover in the following localities by the Kolthoff-Expedition of 1900: the mouth of Franz Joseph-Fjord, 106—158½ fms., mud (1 specimen); off Mackenzie-Bay, 58 fms., mud (10 specimens); 72° 25′ N. 17° 56′ W., ca. 160 fms., stones and sand (12 specimens); SE. of Pendulum-Island, 74° 35′ N. 18° 15′ W., 79 fms., mud and stones (2 specimens) (Hägg l. c. p. 36).

Astarte sulcata da Costa.

1900. Off Angmagsalik.........	140 fms.	1 valve.

The species was previously taken off Greenland's south-east-coast. First by Nordenskiöld's Expedition of 1883 at depths of 25—40 fms. (4 specimens) and 130 fms. (several specimens); the ground consisted of clay with stones in both places. Next it was taken by the Ingolf-Expedition of 1896 on sandy ground at a depth of 204 fms.; the bottom-temperature was 4° 1 C. (1 specimen).

The form of *Astarte sulcata* which occurs at the south-eastern Greenland is comparatively close-ribbed and of a maximum length of 23 mm.

Astarte elliptica Brown.

(= *A. compressa* (L.?) G. O. Sars.)

1899. Tasiusak	20—30 fms.	Stony ground	4 specim. (2 empty).
1902. Tasiusak	30—50 —		5 —

1901. Tiningnekelak	5—10 fms.		3 specimens.	
1900. Cape Dalton	9—11 —	Clay	ca. 30 —	
1891—92. Hekla-Havn	3—6 —	Mud	ca. 20 —	
1900. Hurry-Inlet, the mouth	10 —	Clay	2 —	
1900. Forsblad-Fjord, the mouth	14—3 —		3 —	(1 empty).

The species was previously taken by the Swedish Expedition of 1883 «off the southeast-coast, 25—40 fms.» and by the Germania-Expedition at the northern East-Greenland (Möbius l. c. p. 251, s. n. «*A. sulcata*»).

The specimens which I have at hand from East-Greenland are on the whole rather lengthened, as will be seen from the following measurements:

	Length.	Height.	Breadth.
Cape Dalton	29·5 mm.	21·5 mm.	12·5 mm.
— —	29·5 —	21·5 —	11·5 —
Hurry-Inlet	27 —	20 —	9·5 —
Hekla-Havn	23·5 —	16 —	8 —
— —	22·5 —	16·5 —	7·75 —

The folds are stretching most frequently down to the ventral edge, it is however not seldom that they stop about the middle of the shell.

Posselt has set up the variety *depressa*[1]) for the most lengthened specimens (those from Hekla-Havn).

In a fossil state it has been taken in the following localities by the Danish East-Greenland-Expedition of 1900:

Hurry-Inlet, opposite the anchoring place	2 valves.
Hurry-Inlet, Northern part, Liverpool-Coast	7 —
Hurry-Inlet, Northern part, from different banks, Ryders-Elv at the main river	3 —
Hurry-Inlet, Northern part, quite down at the tributary river, 20—30 feet above the sea-level	ca. 25 —

The maximum length is 34 mm. The specimens are characterized—just as the specimens living at present at East-Greenland's coast — by the lengthened shape. As examples I shall state the measurements of some valves:

[1]) H. J. Posselt: Østgrønlandske Mollusker. Medd. om Grønland, XIX, 1895, p. 72, Tab. I, Fig. 5—7.

Length.	Height.
34 mm.	24 mm.
32 —	23 —
30 —	22·2 —

Lucinidae.

Axinus flexuosus Mont.

1900. Cape Dalton	9—11 fms.	Fine clay with small stones	3 specim.
1900. Turner-Sound......	ca. 3 —		1 —
1900. N. of Stewart-Island.	158 —	Clay with stones	5 —
1891—92. Hekla-Havn....		Mud	5 —
1900. Hurry-Inlet	7—0 —	Clay and sand	6 —
1900. Hurry-Inlet	50 —	Clay with stones	6 —
1900. Fleming-Inlet	118 —	Red clay	5 —
1900. Forsblad-Fjord	14—3 —		1 —
1900. SE. of Sabine-Island	110 —	Fine clay with stones and gravel	2 specim.

Some of the specimens at hand correspond by the oval-orbicular shape of the shell and by the two distinct folds on the posterior side with the variety *Gouldii* Phil. Others have on the contrary only one distinctly marked fold on the posterior side, and the shell approaches the rounded triangular shape. The maximum length is 6 mm. (the specimens from Hurry-Inlet, 50 fms.).

The Kolthoff-Expedition of 1900 took it twice at the northern East-Greenland, namely: Franz Joseph-Fjord, in the inner part of Myskoxe-Fjord, 53 fms., clay (2 specimens) and in the outer part of Myskoxe-Fjord, 116 fms., clay (3 specimens). These specimens were reaching a length of 6·6 mm. (Hägg l. c. p. 41).

Fossil it was taken by Hartz in the year 1900 in the following locality:

Hurry-Inlet, opposite the anchoring place .... 2 valves
(length 7·2 mm., height 7·5 mm.)

Axinopsis orbiculata G. O. Sars.

1901—02. Tasiusak				2 specimens.
1901—02. Ingmikertok ...				1 valve.
1900. Turner-Sound......	ca. 3 fms.			18 spec. & 6 valves.
1891—92. Hekla-Havn ...			Mud	2 —[1])
1900. Hurry-Inlet	7—0	—	Clay and sand	1 —
1900. Sabine-Island	5—3	—		3 —

The Kolthoff-Expedition of 1900 took a specimen in Mackenzie-Bay, N. of Franz Joseph-Fjord, where the depth was $6^1/_2$—10 fms.; the ground was muddy (Hägg l. c. p. 44).

The maximum length is obtained by the specimens from Hekla-Havn, namely 3·8 mm.

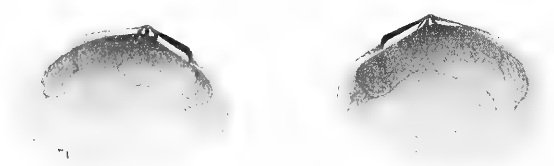
In a fossil state it was taken by Hartz in 1900 in the following locality:

Hurry-Inlet, opposite the anchoring place .... 10 valves (maximum length 4·25 mm.).

Tellinidae.

Tellina (Macoma) calcaria Chemnitz.

It is peculiar that this bivalve, which otherwise is very common in arctic seas, only has been taken once by the Danish



a *b*

Fig. 2. *Tellina calcaria* Chemn. A specimen seen from the inner side, for comparison with other species of *Tellina*, mentioned in this paper.

Expeditions, namely at Tasiusak at a depth of 20—30 fms. (2 empty specimens of a maximum length of 33 mm.).

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[1]) These specimens were by Posselt confounded with *Axinus flexuosus* from the same locality for which reason *Axinopsis orbiculata* has not been mentioned in his: Østgrønl. Mollusker.

The Nordenskiöld-Expedition of 1883 took it off Tasiusak (65° 40′ N. 35° 32′ W.), at depths of 25—40 fms. (1 specimen) and of 130 fms. (4 specimens); the ground consisted of clay with stones (Posselt l. c. 1898, p. 86).

At the northern East-Greenland the Nathorst-Expedition of 1899 took it in the following localities[1]):

Scoresby-Sound, Fame-Isles......	2½—4 fms.	Mud. 4 specim. (one of 35·25 mm., 3 young).
72° 43′ N. 26° 38′ W..............	18½—32 fms.	Mud. 1 specim. (Length 30 mm.).
Franz Joseph-Fjord	ca. 1½—5 —	Sandy mud. 9 specim. (Length 3—21 mm.).
Franz Joseph-Fjord	15—19 —	Clay with stones and gravel. 1 specim. (Length 36·25 mm.).

It was not taken by the Kolthoff-Expedition of 1900[2]).

Fossil it has been taken in the following localities:

1891—92. Danmarks-Ö in Scoresby Sound. At the top of the shell-heap, between the buildings of the station. Grey clay, ca. 20 feet above the sea-level. One fragment of a rather small valve.

1900. Northern part of Hurry-Inlet, Liverpool-Coast. 4 valves. Length: 25—31 mm.

1900. Polhem-Dal, Forsblad-Fjord. 8 valves. Length: 19—ca. 30 mm.

Tellina (Macoma) Torelli Iap. Steenstrup.

Tellina crassula Mörch (non Deshayes), in Rupert Jones, Arctic Manual, 1875, p. 131 & Rink's Dan. Greenland, 1877, p. 440. — *Tellina solidula* Leche (partim) K. Sv. Vet.-Akad. Handl. Bd. 16, Nr. 2, 1878, p. 12. — *Tellina lata* Leche (partim), ibid. p. 13. — *Tellina crassula*, forma: *T. Torelli* Steenstrup, in Johnstrup: Om de geologiske Forhold i den nordlige Del af Vendsyssel (Indbydelsesskrift til Kjøbenhavns Universitets Aarsfest), 1882, p. 8. — *Tellina Torelli* Iap. Steenstrup in schedulis Mus. Hafn. — *Tellina crassula* Jessen, Danmarks geol. Undersøgelse, 1. R. Nr. 3, 1899, p. 192 etc. — *Tellina (Macoma) Torelli* Jensen, Vidensk. Medd. Naturhist. Foren. Kbhvn., 1905, p. 34, Tab. I, Fig. 3 a—i.

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[1]) The specimens are kept in Stockholm's Riks-Museum, where I have seen them.

[2]) R. Hägg certainly mentions several specimens from two localities in Mackenzie-Bay (l. c. p. 47), but he admits in a postscript (p. 66) that the specimens in question belong to *Tellina moesta* Deshayes.

Shell rather small, somewhat convex and of an oblique oval-triangular shape, the anterior end elongated, rounded, the posterior end short, abruptly truncate running forwards or vertical. The ventral margin arched, somewhat rising behind, the antero- and postero-dorsal margins both descending, the latter especially marked, so that the dorsal margin forms a typical angle, almost right or a little larger, whose top is formed by the prominent umbo which is situated a little behind the middle. The valves rather solid

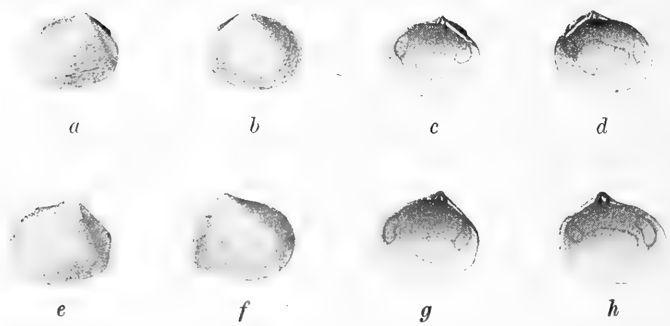

Fig. 3. *Tellina Torelli* Iap. Steenstr. *a, b, c, d* a recent specimen from Spitzbergen, seen from the outer and the inner side; *e, f, g, h* a fossil specimen from newer glacial Yoldia-clay in Vendsyssel (Denmark), seen from the outer and the inner side. Nat. size.

with a yellowish white or greenish yellow, faintly shining periostracum and fine lines of growth. The ligament is projecting, the hinge-margin narrow, the teeth comparatively large and well developed. The inside is white, the pallial sinus considerably longer on the left than on the right valve. Length, 13·5 mm.; height, 10·25 mm.; breadth, 6·1 mm. (Maximum length 20·5 mm.).

This species has only been taken once at East-Greenland, namely at Griper-Road on the southside of Sabine-Island (74° 30′ N. 19° 45′ W.) where Søren Jensen got two empty but paired valves at dredging between the boats anchoring ground (depth: ca. 10 fms.) and the shore. This specimen is uncommonly compressed: length, 17·25 mm.; height, 13·25 mm.; breadth, 5·75 mm.

Its further distribution is West-Greenland, Spitzbergen and the Kara-Sea; its vertical distribution is from ca. 20—40 fms. In a fossil state it occurs in the newer glacial Yoldia-clay in the northern Denmark (Vendsyssel), southern Norway (Moss) and the south-western Sweden (Halland) (comp. besides Jensen l. c., with the there given detailed record of the synonymy of the species, and the appendix in Vidensk. Medd. Naturh. Foren. Kbhvn. 1905, p. 149).

Tellina Torelli is with regard to size between *T. moesta* Desh. and *T. Loveni* Steenstr. The largest recent specimen, which I have seen, measures 17·25 mm. in length; the largest fossil (from Vendsyssel) measures 20·5 mm. It is a characteristic species which at once may be recognized by its oblique shape, moreover varying somewhat, sometimes rather short and high, nearly triangular, sometimes comparatively lengthened, approaching the oval. As another characteristic feature may be mentioned that the antero- and portero-dorsal margins together form a typical, almost right angle or a little larger whose top is formed by the projecting umbo. The short abruptly truncated posterior end and the comparatively strong cardinal teeth are also characteristic. The area situated behind a line from the umbo down to the postero-ventral angle is strongly inclining. The extent of the pallial sinus reminds of *Tellina calcaria* Chemn.: the pallial sinus is on the right valve low and short (fig. 3 *c*, *g*), on the left valve it is considerably higher and longer and reach very near to the impression of the anterior adductor (fig. 3 *d*, *h*).

Tellina (Macoma) moesta Deshayes.

Tellina moesta Deshayes, Proc. Zool. Soc. Lond., 1854, p. 361. — *Tellina sabulosa* var. an sp. n.? Mörch, in Rink's Grønland, 1857, p. 90. — *Tellina moesta* Reeve, Conchol. Icon. XVII, 1870, Tellina pl. 52, sp. 307; Mörch, in Rupert Jones, Arctic Manual, 1875, p. 131; idem, in Rink's Dan.

Greenland, 1877, p. 440; Collin, Dijmphna-Togtets zool.-bot. Udbytte, 1886, p. 443. — *Tellina lata* Leche (partim), K. Sv. Vet.-Akad. Handl. Bd. 16, Nr. 2, 1878, p. 13 & Vega-Exped. Vetensk. Iakttag., Bd. III, 1883, p. 439. — *Tellina lutea* Krause, Arch. f. Naturgesch. 1885, p. 37. — *Macoma calcaria* var. *subovalis* Posselt, Medd. om Grønland, XIX, 1895, p. 74 (partim), Tav. I, Fig. 15—16; idem, ibid. XXIII, 1898, p. 87 (partim); Hägg, Ark. för Zoologi, Bd. 2, Nr. 2, 1904, p. 47. — *Macoma krausei* Dall, Proc. U. S. Nat. Mus., XXIII, 1900, p. 322, Pl. IV, Fig. 8. — *Tellina (Macoma) moesta* Jensen, Vidensk. Medd. Naturhist. Foren. Kbhvn. 1905, p. 38, Tab. I, Fig. 4 a—f.

Shell middle-sized, more or less compressed, oval, the anterior end elongated and rounded, the posterior short and from umbo descending in a curve towards the ventral margin, which like the dorsal margin in front of umbo is slightly convex.

a *b* *c*

Fig. 4. *Tellina moesta* Desh. *a* a specimen from East-Greenland, seen from the outer side; *b*, *c* another specimen (from West-Greenland), seen from the inner side. Nat. size.

Umbones are very low and situated at the posterior third of the shell. The valves are rather thin with a greenish or white yellowish periostracum, somewhat shining, with fine concentric striæ and with some exceedingly fine radial lines. The ligament is somewhat projecting, the hinge-margin narrow, the teeth small, and the pallial sinus short on both valves. Length 24 mm., height 15·75 mm., breadth 7·75 mm. (The maximum length 34·5 mm.).

The Danish expeditions took it at the following localities:

1900. Cape Dalton	7—11 fms.		1 specimen.
1900. Turner-Sound	3 —		ca. 55 —
1891—92. Hekla-Havn.............			8 —
1900. Hurry-Inlet..................	10 —	Clay	2 —
1900. Sabine-Island...............	3—5 —		1 — and 1 valve.

The largest of these specimens measures 22·5 mm.

The Nathorst-Expedition of 1899 took it at the following localities, specimens of a length up to 21·5 mm.[1]):

Scoresby-Sound, Fame-Isles	$2^1/_2$—4 fms.	Mud	3 specim.
— —	ca. 5 —	Mud	1 —
— —	12—13 —	Clay	4 —
— Cape Stewart	7—$9^1/_2$ —	Mud and stones	2 —
Franz Joseph-Fjord.............	ca. $1^1/_2$—5 —	Sandy mud	12 —
— —	15—19 —	Clay with stones & gravel	2 specim.
S. of Little Pendulum-Island......	$9^1/_2$—11 —	Mud and sand	1 —

At last the Kolthoff-Expedition of 1900 took it at the following localities, specimens of a length of up to 28 mm.[2]):

Mackenzie-Bay, N. of Franz Joseph-Fjord ..	$6^1/_2$—10 fms.	Mud	1 specimen.
— — — — ..	$6^1/_2$—19 —	Mud	33 —

Tellina moesta is thus found to occur generally along East-Greenland from Cape Dalton (69° $24^1/_2$′ N.) till south of Little Pendulum-Island (74° 35′ N.).

Its further distribution is as follows: West-Greenland, Baffin-Land, Alaska, the Tschuktscher-Peninsula, the Siberian Arctic-Sea, the Kara-Sea, Nowaya-Zemlia and Spitzbergen. Its vertical distribution is 3—150 fms. (comp. Jensen l. c., with the there given detailed record of the synonymy of the species).

From *Tellina (Macoma) calcaria* Chemn. which *T. (M.) moesta* Desh. most resembles in size (it obtains a length of 34·5 mm.) it may be distinguished by the extent of the pallial sinus: in *T. moesta* the pallial sinus is short, not only on the right valve but also on the left, and on both valves the sinus stops at about the same distance from the impression of the anterior adductor (fig. 4 *b*, *c*); in *T. calcaria* the pallial sinus is, on the contrary, comparatively long on the left valve and approaches near to the impression of the anterior adductor,

[1]) Belong to the «Riks-Museum» in Stockholm where I have examined them.

[2]) Comp. R. Hägg l. c. who on p. 47 names the species *Tellina calcaria* Chemn. var. *subovalis* Posselt; but in a postscript p. 66 he has come to the conclusion that this «variety of *calcaria*» correctly must be regarded as *Tellina moesta* Deshayes.

much more than on the right valve (fig. 2 *a*, *b*). The shape of the shell is moreover different, in *T. calcaria* oval-triangular, in *T. moesta* oval; in the last mentioned species the posterior end is curved, generally short, sometimes it may, however, be a little elongated, so that the umbones are situated at the end of the posterior two fifths of the shell, almost as in *T. calcaria*, but the postero-dorsal margin slopes in this species more as a straight line downwards, the posterior end thus appears a little pointed with truncate posterior margin. As *T. calcaria*, however, may be somewhat variating regarding the shape and — though comparatively rarely — rather may resemble *T. moesta* we must still call attention to another difference between the two species: the periostracum shows in *T. calcaria* everywhere fine wrinkles between or crossing the concentric lines of growth while the periostracum in *T. moesta* is much more smoothly adpressed on the median area of the shell. Here appears on the other hand a number of exceedingly fine radiating striæ which are easily visible under a lens. These striæ are quite wanting in *T. calcaria*. The radiating lines may especially easily be recognized when the light is shining on the glistening periostracum.

Tellina (Macoma) Loveni Iap. Steenstrup.

Tellina inflata (Stimpson M. S.) Dawson (non Chemnitz), Canadian Naturalist, vol. 6, 1872, p. 377; Jeffreys, Proc. Roy. Soc. Lond., vol. 25, 1876, p. 182 & p. 199; Mörch in Rink's Dan. Greenland, 1877, p. 440; Verrill, Transact. Conn. Acad., vol. 5, 1882, p. 568; Posselt, Medd. om Grønland, XXIII, 1898, p. 84; *(Macoma)* Dawson, The Canadian Ice Age, 1894, p. 233; Verrill and Bush, Proc. U. S. Nat. Mus., XX, 1898, p. 778, Pl. 77, fig. 1 & Pl. 88, fig. 6; Dall, Proc. U. S. Nat. Mus., XXIII, 1900, p. 299; Whiteaves, Geol. Survey of Canada, 1901, p. 143. — *Thracia myopsis* Leche (partim), K. Sv. Vet.-Akad. Handl. Bd. 16, Nr. 2, 1878, p. 12. — *Tellina solidula* Leche (partim), ibid. p. 12. — *Tellina lata* Leche (partim), ibid. p. 13. — *Tellina moesta*, forma: *T. Loveni* Steenstrup, in Johnstrup, Om de geologiske Forhold i den nordlige Del af Vendsyssel (Indbydelsesskrift til Kjøbenhavns Universitets Aarsfest), 1882, p. 8. — *Tellina Loveni* Iap. Steenstrup in schedulis Mus. Hafn. — *Tellina moesta* Jessen, Danmarks geol. Undersøgelse, 1. R., Nr. 3, 1899, p. 192 etc. — *Macoma calcaria* var. *subovalis*

Posselt (partim), Medd. om Grønland, XIX, 1895, p. 74; idem, ibid. XXIII, 1898, p. 87 (partim). — *Tellina (Macoma) Loveni* Jensen, Vidensk. Medd. Naturhist. Foren. Kbhvn. 1905, p. 45, Tab. I, Fig. 5 *a—h*.

Shell small, rather convex, oval and not rarely rather expanded in front, the anterior end elongated, broadly rounded, the posterior end short, straightly truncate or slightly curved, the dorsal margin in front very slightly convex, behind a little descending, almost straight lined or a trifle curved. Umbones rather small, somewhat prominent and situated near the posterior third of the shell. The valves are rather thin with a white yellowish, sometimes a little greenish, faintly shining periostracum with

a *b* *c* *d* *e*

Fig. 5. *Tellina Loveni* Iap. Steenstr. *a*, *b*, *c*, *d* a specimen from East-Greenland, seen from the outer and the inner side; *e* a specimen (from Spitzbergen) of a somewhat different shape (expanded anteriorly), seen from the outer side. Nat. size.

fine closely arranged, sharp lines of growth. The ligament is rather large, somewhat projecting, the hinge-margin narrow, the teeth small, but distinct. The inside is white, the pallial sinus short, on the left valve a little longer than on the right. Length 12·5 mm., height 8·9 mm., hreadth 5·2 mm. (The maximum length is 15·5 mm.).

The Danish expeditions have taken this little *Tellina* in the following localities:

1900. Turner-Sound......	3 fms.		20 specimens.
1891—92. Hekla-Havn....			1 —
1891—92. Scoresby-Sound	10—16 —		1 —
1900. Hurry-Inlet........	10 —	Clay	2 —
1900. —	7—0 —	Sand and clay	1 — (empty).
1900. —	50 —	Sand and clay	1 —
1900. SE. of Sabine-Island	110 —	Fine clay with stones and gravel	4 specimens.

The largest of these specimens measures 14·5 mm.

The Nathorst-Expedition of 1899 took it in the following localities, specimens of a length of up to 14 mm.[1]:

Scoresby-Sound, Fame-Isles....	12—13 fms.	Clay	2 specimens.
72° 43′ N. 26° 38′ W...........	$18^1/_2$—32 —	Mud	1 —
Franz Joseph-Fjord	15—19 —	Clay, stones and gravel	1 —
SE. of Clavering-Island........	13—21 —	Mud and small stones	6 —

T. Loveni has thus been found along East-Greenland in the area from Turner-Sound (69° 44′ N.) to southeast of Sabine-Island (74° 25′ N.) at depths from 3—110 fms.

It occurs moreover at West-Greenland, at the east-coast of Canada[2], in the Kara-Sea, and at Spitzbergen. Its vertical distribution is from 3—150 fms. In a fossil state it occurs in the newer glacial Yoldia-clay in the northern Denmark (Vendsyssel) and in the southwestern Sweden (Bohuslän) (Comp. Jensen l. c. and the there given detailed record of the synonymy of the species, together with the appendix in Vidensk. Medd. Naturhist. Foren. Kbhvn. 1905, p. 149).

The present species is to be distinguished from *Tellina moesta* Desh. by the following features: the shell is more convex, the posterior margin most frequently truncate, and the shape therefore more angular; the outer surface shows no trace of the radiating lines which characterize *T. moesta*. Moreover it does not nearly obtain so considerable a size as that species; the largest recent specimen, which I have seen, measures 14·5 mm., the largest fossil specimen (from Vendsyssel) 15·5 mm. — From *Tellina Torelli* Steenstr. it may be distinguished by the following features: the postero-dorsal margin slopes less abruptly, so that the inner dorsal margin forms a flat curve; and the pallial sinus on the left valve stops at a greater distance from the impression of the anterior adductor.

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[1]) This material belongs to the «Riks-Museum» in Stockholm, where I have examined it.

[2]) According to Verrill & Bush (l. c.) it has also been taken off the east-coast of the United States (40° 3′—47° 40′ N.) at depths from 57—206 fms.

Veneridae.

Venus (Liocyma) fluctuosa Gould.

1900. Cape Dalton	9—11 fms.	Clay	2 specim. (young)	
1900. Turner-Sound	ca. 3 —		ca. 300 —	
1900. Hurry-Inlet	10 —	Clay	6 —	
1900. Cape Borlase Warren	10 —		1 —	
1900. Sabine-Island		Laminarians	ca. 20 —	
1900. Sabine-Island	5—3 —		1 —	and 1 valve.

The Germania-Expedition took it at Jackson- and Shannon-Island, at depths from 4—30 fms. (Möbius l. c. p. 252, s. n. *Venus astartoides* Beck).

The Kolthoff-Expedition of 1900 took 5 specimens in Mackenzie-Bay N. of Franz Joseph-Fjord, at a depth from 6½—10 fms. and on muddy ground (Hägg l. c. p. 49).

The specimens at hand which go up to a size of 25 mm., are rather variating with regard to the three dimensions; moreover it will be seen from the measurements below that the younger the specimens are the less elongated we will as a rule find them to be.

	Length.	Height.	Breadth.
a.	23·2 mm.	17·5 mm.	10·3 mm.
b.	22·5 —	15·5 —	9·75 —
c.	21 —	15 —	9 —
d.	20 —	15 —	9·2 —
e.	19·5 —	14 —	9·5 —
f.	14·5 —	10·5 —	5·5 —
g.	14·5 —	11 —	6 —
h.	14·25 —	11·25 —	6·5 —
i.	3·5 —	3·1 —	1·75 —
k.	3·3 —	3 —	1·75 —

The umbones are always eroded when the animal has passed its first youth.

Cardiidae.

Cardium ciliatum Fabricius.

1901—02. Angmagsalik............	30—50 fms.		2 specimens.
1891—92. Danmarks-Ö.............			4 —
1900. Hurry-Inlet..................	10 —	Clay	5 —
1900. The mouth of Forsblad-Fjord..	14—3 —		3 —

The Kolthoff-Expedition of 1900 took 2 specimens in Mackenzie-Bay (N. of Franz Joseph-Fjord) at a depth of $6^1/_2$—19 fms. and on muddy ground (Hägg l. c. p. 52).

The largest specimen, one of those from Mackenzie-Bay, measures 62 mm., the next, one of those from Forsblad-Fjord, is of a length of 57 mm. Thus the species obtains a considerable size at East-Greenland.

In a fossil state it has been found by the Danish Expedition of 1891—92 in the «Terrassepynt» on the east-side of Rypefjord, inner Scoresby-Sound. I have not seen the specimens, but they have been determined by Posselt[1]).

Nathorst also records it as fossil from a locality in the northeastern Greenland, namely at the mouth of Sophia-Sound at a height of 25—50 meters above the sea-level[2]).

Cardium elegantulum (Beck) Möller.

1899. Tasiusak.. 20—30 fms. Stony ground with a few algae 1 specimen.

This specimen is of the following dimensions: length 12 mm., height 9 mm., breadth 6·5 mm.

G. O. Sars as well as H. J. Posselt state North America's east-coast to be the home of this species, but undoubtedly incorrectly. Both authors most likely suppose *Cardium elegantulum* to be American because it has been introduced by Gould in his work over Massachussett's Invertebrata[3]), Gould however

1) Medd. om Grønland, XIX, 1896, p. 173.

2) A. G. Nathorst: Bidrag till nordöstra Grönlands geologi; Geol. Fören. Förhandl. Bd. 23, 1901, p. 304.

3) Gould & Binney: Rep. Invert. Mass., sec. ed., 1870, p. 141.

does not mention any American occurrences except Greenland. I have not been able either to find the species recorded as American in other lists by Packard, Dall, Bush, Whiteaves etc. It is, indeed, only mentioned as a Greenland species by Dall in his Synopsis of the Fam. Cardiidae and of the North-American species[1]. Its real distribution is thus: the colonized West-Greenland; the south-eastern Greenland; East-Iceland; the north-western Norway.

Cardium (Serripes) groenlandicum Chemnitz.

1900. Angmagsalik............	9—0 fms.		1 specimen.
1901—02. Angmagsalik........	½—5 —		1 — (empty).
1891—92. Danmark-Ö.........			4 —
1900. The mouth of Hurry-Inlet	10 —	Clay	3 —
1900. Hurry-Inlet............	7—0 —	Sand and clay	3 —
1900. Sabine-Island...........		Laminarians	1 —

The Germania-Expedition already took it at East-Greenland, but the locality has not been recorded (Möbius l. c. p. 251).

The Nordenskiöld-Expedition of 1883 took it off Angmagsalik (65° 40′ N. 35° 32′ W.) at a depth of 25—40 fms. and on clayey ground.

The Kolthoff-Expedition of 1900 took 3 specimens in Mackenzie-Bay, N. of Franz Joseph-Fjord, at a depth of 6½—19 fms. and on muddy ground (Hägg l. c. p. 50).

Möbius states the length to be 70 mm. Hägg states it to 64 mm. The largest of the specimens I have at hand, namely those from Angmagsalik and from Sabine-Island, measure 53—55 mm.

Fossil it has been found by Ryder in the Terrassepynt on the east-side of Rypefjord, inner Scoresby-Sound. I have not seen the specimens, but they have been determined by Posselt[2]).

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[1]) Proc. U. St. Nat. Mus. XXIII, 1900, p. 386.

[2]) Medd. om Grønland, XIX, 1896, p. 173.

Nathorst has also found it fossil in the north-eastern Greenland, at the mouth of Sophia-Sound at a height of 25—50 meters above the sea-level[1].

Myidae.

Mya truncata Linné.

1899. Cape Dan	10—15	fms.	Rocky ground with algae.	1 specim.
1899. Tasiusak	20—30	—		1 valve (of a young one).
1901—02. Angmagsalik...	½—ca. 5	—		8 valves.
1901—02. Ingmikertok ..	10—ca. 30	—		1 specimen (tiny).
1901—02. Tiningnekelak...	5—10	—		3 — and 3 valves.
1900. Cape Dalton	7—11	—	Fine clay with small stones	6 specimens (young).
1900. Henry-Land	20	—		2 valves (young).
1900. Turner-Sound	2—0	—		1 valve.
1900. Turner-Sound	3	—		A siphon of a large specim.
1891—92. Hekla-Havn.....	5	—	Mud	10 specim. (young ones and half grown specimens).
1900. Hurry-Inlet	7—0	—	Sand and clay	1 spec. (young one).
1900. Hurry-Inlet.........	10	—	Clay	4 — and 1 valve.
1900. Cape Borlase Warren	10	—		3 valves.
1900. Sabine-Island			Laminarians	1 valve.

The Nordenskiöld-Expedition of 1883 took empty valves of this species off Angmagsalik at a depth of 25—40 fms.

The Kolthoff-Expedition of 1900 took it in Mackenzie-Bay, N. of Franz Joseph-Fjord at depths of 6½—19 fms. (3 specimens) and of 6½—10 fms. (1 specimen), on muddy ground (Hägg l. c. p. 55).

The Germania-Expedition took it at Sabine-Island at a depth of 10—20 fms.

The recorded captures give naturally — on account of the burrowing habit of the animal — no reliable conception of the animal's frequency. The following lines quoted from Möbius (l. c. p. 252) shows that *Mya truncata* occurs in great abun-

[1] A. G. Nathorst: Bidrag till nordöstra Grönlands geologi; Geol. Fören. Förhandl. Bd. 23, 1901, p. 304.

dance in the far north of the east-coast: «Dr. Pansch fand in dem Magen eines Walrosses 500 Körper dieser Muschel und nur ein einziges Stücken einer Schale. Neben den Eislöchern, aus denen die Walrosse auftauchen, lagen Haufen von Schalen.»

The majority of the valves, I have at hand, belong to the form which by Forbes was called var. *uddevallensis*: the shell is short, its posterior end obliquely truncate, the hind margin going forwards below. Among the shells from the most southern locality, Tasiusak (Angmagsalik), several have, however, a more elongated shape, and some specimens have even the posterior end obliquely truncate, the hind margin going backwards below, and they are so elongated that they most nearly must be ascribed to forma *typica*. The maximum length of this latter form is 65 mm., of var. *uddevallensis* 53·5 mm.

Fossil it has been found in the following localities by the Danish expeditions:

1891—92. Danmarks-Ö, uppermost in the shell-heap between the station buildings, ca. 20 feet above the sea-level. Grey clay. Many fragments.

1891—92. Hekla-Havn, from a gravelly area across the isle. Some fragments.

1891—92. Hekla-Havn, at a cove. 14 valves, partly of var. *uddevallensis* partly of a more elongated shape.

1891—92. Moræenepynt, Scoresby-Sound, in clay in terraces on the rock, till 120 feet over the sea-level. Many fragments.

1891—92. The Terrassepynt on the east-side of Rypefjord, inner Scoresby-Sound. 4 valves of var. *ovata*[1]).

1891—92. Jameson-Land, in clay-banks ca. 50 feet above the sea-level. Many valves, of a more or less elongated shape, on the whole thick.

1891—92. Jameson-Land, between Cape Hooker and Cape Stewart, in sand-banks. A few fragments.

1900. Hurry-Inlet, opposite the anchoring place. Numerous valves (most fragments) of var. *uddevallensis* and of a little more elongated shape.

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[1]) Ad. S. Jensen: Studier over nordiske Mollusker, I. *Mya*. Vidensk. Medd. Naturhist. Foren. Kbhvn. 1900, p. 133. In Medd. om Grønland, XIX, 1896, p. 173, it is mentioned as «*Mya arenaria*».

1900. Northern part of Hurry-Inlet, Liverpool-Coast. Numerous valves, of a more or less elongated shape, a few var. *uddevallensis.*
1900. Northern part of Hurry-Inlet, from different banks, Ryders-Elv at the main river. Several valves, of a rather elongated var. *uddevallensis.*
1900. Northern part of Hurry-Inlet, quite down at the tributary, 20—30 feet above the sea-level. 6 valves, of var. *uddevallensis* and of a little more elongated shape.
1900. Polhem-Dal in Forsblad-Fjord. Numerous valves, of var. *uddevallensis* and of a little more elongated shape, partly very thick valves.

The Nathorst-Expedition of 1899 also found it fossil in several localities, namely: at the mouth of Sophia-Sound (partly in the variety *ovata*); at the south-side of Franz Joseph-Fjord; at Scott Keltie-Island, and on the continent south of this locality; in Dusén-Fjord in the inner part of Forsblad-Fjord[1]).

Saxicavidae.

Cyrtodaria Kurriana Dunker.

1901—02. Tasiusak	$^1/_2$—5 fms.		4 specimens.
1900. Jameson-Land	On shore		1 valve.
1900. Sabine-Island		Laminarians	4 specimens (3 empty).

The specimens are small. The largest specimen from Sabine-Island measures only 39 mm., the largest from Tasiusak 12·5 mm.

To the distinguishing features between this species and *Cyrtodaria siliqua* Spengler set forth by Dunker[2]) I shall add that the shell in *C. Kurriana* is proportionately elongated. While the height of a 51 mm. long specimen of *C. siliqua* makes 40 % of the length, is the proportion in a 39 mm. long specimen of *C. Kurriana* only 36 %, though the elongation is evenly increasing with the augmenting size.

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[1]) A. G. Nathorst: Bidrag till nordöstra Grönlands geologi; Geol. Fören. Förhandl. Bd. 23, 1901, p. 304.

[2]) Malakozool. Blätter, 8. Bd., 1862, p. 38.

Saxicava arctica Linné.

1899. Tasiusak	5—20 fms.	Stony ground with algae	8 specimens.	
1899. Tasiusak	20—30 —	Stony ground with algae	4 specim.	(empty).
1901—02. Tasiusak-Fjord			11 —	
1901—02. Angmagsalik		Fucaceae	3 —	
1901—02. Tiningnekelak	1 —		1 —	(tiny).
1901—02. Angmagsivik	$\frac{1}{2}$—5 —		1 —	
1900. Cape Dalton	9—11 —	Clay	10 —	(6 empty).
1900. Henry-Land	20 —		5 —	(young ones).
1900. Turner-Sound	ca. 3 —		4 —	(3 empty).
1891—92. Scoresby-Sound	60—10 —		4 —	
1891—92. Gaaseland			2 —	
1891—92. Danmarks-Ö			1 —	
1891—92. Hekla-Havn	5 —	Mud	Several —	
1900. Hurry-Inlet	7—0 —	Sand and clay	5 —	
1900. Hurry-Inlet	10 —	Clay	13 —	(2 empty).
1900. The mouth of Hurry-Inlet	50 —	Clay with stones	2 —	
1900. Forsblad-Fjord	90—50 —	Clay with stones	4 —	(2 empty).
1900. Cape Borlase Warren	10 —		6 —	
1900. Sabine-Island		Laminarians	1 —	

The species was previously taken by the Nordenskiöld-Expedition of 1883 off Angmagsalik, 25—40 fms., clay with stones (several specimens). By the Kolthoff-Expedition of 1900 in Mackenzie-Bay, N. of Franz Joseph-Fjord, at depths of $6\frac{1}{2}$—19 fms., muddy ground (many specimens), at $6\frac{1}{2}$—10 fms., mud (3 specimens) and at $1\frac{1}{2}$—$5\frac{1}{2}$ fms., mud and sand (1 specimen), and SE. of Walrus-Island (74° 30′ N. 18° 40′ W.) at 42—53 fms., mud and stones (2 specimens). By the Germania-Expedition it has been taken at Shannon-Island, at a depth of 30 fms.

This exceedingly variable bivalve occurs at East-Greenland mainly under the following forms:

A typical *arctica*-form, obliquely square, with the anterior end very short, abruptly bent down and with the foremost dorsal area sunken; two diagonal spiny ribs which however efface or disappear on the older parts of the shell. The maximum length is 26 mm.

An *arctica*-form with more prominent anterior end and with disappearing lunula; diagonal ribs as in the preceeding form, sometimes however only traces of them. The maximum length is 44 mm.

A *pholadis*-form, oblong, with short, rounded anterior end, elongated posterior end truncate behind, upper and lower margin almost parallel, without or only with faint traces of diagonal ribs. The maximum length is 50 mm.

I do not mean, however, that the *arctica*- and *pholadis*-forms represent fixed subspecies, not to say species as some authors mean. For we find transitions between them, both with regard to the shape and the ribs. They may not either be distinguished by the hinge, as we in typical *pholadis*-specimens may find a rather distinct tooth.

The East-Greenland specimens are exceedingly varying with respect to the solidity of the shell. Some specimens — both of the *arctica*- and the *pholadis*-form — have exceedingly thick valves. The growth layers are very frequently markedly segmented off at their border, so that it looks as if several individuals had taken possession of the same shell, one within the other. Other specimens have on the contrary utterly thin valves, so fragile that they will break if not treated with care.

Fossil it has been taken in the following localities by the Danish expeditions:

1891—92. Danmarks-Ö, uppermost in the shell-heap between the station-buildings, ca. 20 feet above the sea-level. Some fragments.

1891—92. Danmarks-Ö, from a gravelly area across the isle. 4 valves.

1891—92. Morænepynt in Scoresby-Sound, till 120 feet above the sea-level. Ca. 40 valves, essentially of the *arctica*-form, partly thick-shelled.

1891—92. Morænepynt in Scoresby-Sound, from the uppermost terrace, in clay, 120 feet above the sea-level. 1 valve, of the *arctica*-form.

1891—92. Rolige-Bræ near the Kobberpynt, inner Scoresby-Sound, ca. 75 feet above the sea-level. Some fragments.

1891—92. Jameson-Land, in clay-banks, ca. 50 feet above the sea-level. Ca. 28 valves, mainly of an elongated *arctica*-form.

1891—92. Jameson-Land, in sand-banks between Cape Stewart and Cape Hooker. Ca. 40 valves, of the *arctica*-form, partly thick-shelled.

1900. Hurry-Inlet, opposite the anchoring place. Some fragments.
1900. Hurry-Inlet, from different banks. Ca. 15 valves, most nearly of an elongated *arctica*-form.
1900. Northern part of Hurry-Inlet, Liverpool-Coast. Ca. 20 valves of the *arctica*-form, but partly very elongated.
1900. Polhem-Dal in Forsblad-Fjord. Ca. 20 valves, mainly of the *pholadis*-form, partly rather thick-shelled.

The fossil valves which reach a length of 49 mm. resemble those of the specimens living at present at East-Greenland, as both thin-shelled and exceedingly thick-shelled ones occur.

Nathorst mentions it as fossil from several localities: the mouth of Sophia-Sound; the south-side of Franz Joseph-Fjord; Scott Keltie-Island and on the continent south of this locality; Dusén-Fjord in the inner part of Forsblad-Fiord[1].

Lyonsiidae.

Lyonsia arenosa Möller.

1900.	Cape Dalton	9—11 fms.	Clay	2 specimens.
1900.	Turner-Sound	ca. 3 —		3 — (empty).
1900.	Hurry-Inlet	7—0 —	Sand and clay	9 — (5 empty).
1900.	Hurry-Inlet	10 —	Clay	2 —
1900.	Forsblad-Fjord	14—3 —		1 — and 1 valve.
1900.	Cape Borlase Warren ..	10 —		1 — (empty).

The Kolthoff-Expedition of 1900 took 10 specimens in Mackenzie-Bay, N. of Franz Joseph-Fjord, at a depth of $6^1/_2$—19 fms. and on muddy ground (Hägg l. c. p. 62).

The largest of the specimens, which I have at hand, measures 29·5 mm., the largest from the Kolthoff-Expedition measures even 34 mm.

By the elongated shape and considerable size the East-Greenland specimens appear to belong to the form which Hancock[2]) has named *Lyonsia gibbosa* (= L. *arenosa* Möller

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[1]) A. G. Nathorst: Bidrag till nordöstra Grönlands geologi; Geol. Fören. Förhandl. Bd. 23, 1901, p. 304.

[2]) A. Hancock: On Shells dredged on the West Coast of Davis's Strait; Ann. Mag. Nat. Hist. vol. 18, 1846, p. 338, Pl. 5, fig. 11—12.

var. *sibirica* Leche[1]. Some specimens have however the anterior end rather abruptly bent downwards.

The measurements of some specimens will show the range of variation:

	Length. mm.	Height. mm.	The height in % of the length.	Breadth. mm.	The breadth in % of the length.
Turner-Sound	29·5	17·3	58·6	13	44·1
— —	29·5	18·5	62·7	13·2	44·7
Hurry-Inlet . .	25·2	13	51·6	9·3	36·9
— — . .	22	12	54·5	8·4	38·2
— — . .	20	12·4	62	8·2	41

Lyonsiella abyssicola M. Sars.

1900. Forsblad-Fjord .... 50—90 fms. Clay with stones 3 specimens.

The largest specimen measures 5·2 mm. in length.

Anatinidae.

Thracia truncata Turton.

1899. Tasiusak	20—30 fms.		1	valve.
1900. Cape Dalton	9—11 —	Clay	1	specimen.
1900. Hurry-Inlet	10 —	Clay	1	—
1900. Forsblad-Fjord	ca. 50 —	Clay with stones	1	—
1900. Sabine-Island	5—3 —		1	—
1900. Sabine-Island		Laminarians	2	—

The specimen from Forsblad-Fjord belongs to the variety *devexa* G. O. Sars and is of a length of 10·2 mm.; among the others, the largest (that from Hurry-Inlet) measures 34 mm.

Thracia septentrionalis Jeffreys.

1901—02. Tasiusak......... ½—5 fms. 2 specimens and 1 valve.

The measurements of the perfect specimens are as follows:

[1] W. Leche: Arktiska Hafsmollusker; Vega-Exped. Vetensk. Iakttag. Bd. 3, 1883, p. 439, Tab. 32, fig. 3—4.

Length.	Height.	Breadth.
16·5 mm.	12·3 mm.	8·2 mm.
11·2 —	8·75 —	5·75 —

This species may be distinguished from *Thracia truncata* Turt. by the short posterior end, the umbones being situated behind the middle of the shell. In this respect it reminds of *Thracia papyracea* Poli, but in this species we find on the posterior area of the valve something like a fine chagrin, while in *Thracia septentrionalis* this part of the shell is rather grossly folded or striated.

Cuspidariidae.

Pandora (Kennerleyia) glacialis Leach.

1900. Cape Dalton	9—11 fms.	Clay	2 specimens (small).
1900. Turner Sound.........	ca. 3 —		10 — (4 empty).
1900. Hurry-Inlet	7—0 —	Sand and clay	1 — (empty).
1900. Hurry-Inlet	10 —	Clay	13 —
1900. Sabine-Island		Laminarians	5 —

The largest specimen measures 27·5 mm.

Neaera obesa Lovén

var. *glacialis* G. O. Sars.

1891—92. 69° 25′ N. 20° 1′ W.	167 fms.	1 valve
1900. Hurry-Inlet	7—0 —	Sand with clay. 5 specim. (young ones).
1900. Hurry-Inlet	50 —	Clay. 5 — (young ones).
1900. The mouth of Forsblad-Fjord .	3—14 —	1 — (young one).
1900. Forsblad-Fjord	90—50 —	Clay with stones and gravel. 4 specim. (2 empty).
1900. SE. of Sabine-Island	110 —	Fine clay with stones and gravel. 4 specim. (1 empty).

The Kolthoff-Expedition of 1900 took it in the following localities: Mackenzie-Bay, N. of Franz Joseph-Fjord, $6^1/_2$—19 fms., muddy ground (1 specimen, young one); the mouth of Franz Joseph-Fjord, 106—$158^1/_2$ fms., muddy ground (5 specimens and 1 valve); Franz Joseph-Fjord, inner part of Myskoxe-Fjord, 53 fms., clay (3 specimens, one empty) (Hägg l. c. p. 53).

In the nomenclature I have followed H. Friele who considers *Neaera glacialis* G. O. Sars a gigantic form of *N. obesa* Lovén [1]).

Among the specimens from Sabine-Island one is of a very considerable size viz., as follows:

Length 29 mm.; height 18·5 mm.; breadth 15·5 mm.

Addition.

During the printing of this, I received from the author a copy of: Mollusca und Brachiopoda gesammelt von der schwedischen zoologischen Polarexpedition nach Spitzbergen, dem nordöstlichen Grönland und Jan Mayen i. J. 1900. II. Scaphopoda, Gastropoda, Placophora und zwei vorher nicht erwähnte Lamellibranchiata. Von Richard Hägg [2]).

These two «not previously mentioned Lamellibranchiata» ought to have been introduced in the present treatise p. 320 and p. 329, for they are:

Portlandia frigida Torell. Franz Joseph-Fjord, the inner end of Myskoxe-Fjord, 53 fms., clay. 3 specimens and 2 valves (all young ones).

Crenella decussata Montagu. Franz Joseph-Fjord, the outer part of Myskoxe-Fjord, $116^1/_2$ fms., clay. 1 specimen (very young).

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[1]) Jahrb. Deutsch. Malakozool. Gesellsch. Bd. 6, 1879, p. 270.

[2]) Arkiv för Zoologi, Bd. 2, Nr 13. Stockholm 1905.

X.

The Insects of East-Greenland.

By

J. C. Nielsen.

1907.

The following Catalogue of the Insect Fauna of East-Greenland, has chiefly been worked out from material collected by the Danish Expeditions.

In recent years, three Expeditions have been sent from Denmark to the East Coast of Greenland. In the years 1883—85, the "Konebaads"-Expedition investigated the coast line from Kap Farvel to Angmagsalik under the direction of Capt[s] G. Holm and V. Garde, on this occasion P. Eberlin collected a few Insects. The main quantity of Insects from the East Coast, however, were collected by H. Deichmann, who took part in the Ryder Expedition to the district round Scoresby Sund in 1891—92, from which place a few Insects were also brought back by H. Bay.

On the Carlsberg Fund Expedition to East-Greenland which in the years 1898—1900, under the direction of Lieutenant G. Amdrup, examined the coast from 66° N. to 72° N. H. Deichmann, together with the late Zoologist Sören Jensen and Dr. Knud Poulsen, also collected a quantity of Insects.

Besides the knowledge that has been gained from these collections, notice is also taken here of all the previously published works on Insects from the East Coast. Of especial interest here is Aurivillius' work on the Lepidoptera and Coleoptera collected by the Swedish Expedition.

The Greenland Insect Fauna resembles to a great extent the European. The greater quantity of the species belongs to the common, North and Central European forms; a few of the species occur as alpine forms in the Central European mountains and the Pyrenees, and are conspicuous by their absence in the intermediate low lying countries. Besides these, the Fauna includes pure arctic forms, that for the greater part have a wide distribution round the Polar Regions, and a proportionally large quantity are described for the first time from Greenland and it is at present unknown whether they occur in other localities; they will most probably be found to have a much greater range, however, when the other Arctic countries are as carefully worked as Greenland.

With the exception of the *Strepsiptera*, all the Orders of Insects are represented, but in a proportionally great difference of numbers. The *Diptera* are by far the largest order, with about 160 species, from this is a large spring to the *Hymenoptera*, *Mallophaga*, *Lepidoptera* and *Coleoptera* with 52, 40, 39 and 26 species respectively; after these follow the *Collembola* and *Neuroptera* with 13 and 6, while the remaining Orders are only represented by very few species.

The East-Greenland Fauna is, to a great extent, the same as the West-Greenlands, the same species occurring in both places. The number of species appears to be lower in the first, than in the last named place; but this difference will, in all probability, be altered when the East coast has been more fully worked. While since Otto Fabricius' time, collections have been made by the Danish inhabitants and Naturalists in West-Greenland, and the only special Entomological Expedition (Lundbeck 1889—90) alone worked the West, all that has been done with the Insects from the East coast, has been done the few times that Expeditions have visited that part of the country.

The order *Coleoptera* is represented in West-Greenland by 26 species, of which 8 (9) occur in the East, which has no species that are specially confined to that portion of the country (with possibly the exception of one species of *Homalota* mentioned later). It is a strange occurrence that the family *Carabidæ*, of which four species (three quite common) are found in the West, should be so wery poorly represented, as only one species, taken in a few specimens has occurred, and it is this family that goes highest North, and localities occur everywhere that are suitable to it. The number of imported Coleoptera in West-Greenland, has, in the course of time, reached no small number, of which two are found in the East (*Cryptophagus validus* and *C. acutangulus*), which have without doubt been brought up with the different Expeditions.

The *Hymenoptera* follow after the *Diptera* with the greatest number of species (52). With the exceptions of two Humble-bees, that are common to both the East and West, and the three saw-flies, of which two are found in the West and one in the East, all the remainder belong to the Ichneumon-forms. All four families of the *Ichneumons* are represented in West-Greenland, but up to the present no representative of the *Proctotrupidæ* has occurred in the East.

Of the 52 species, 14 are common to both Coast lines, whilst 34 are exclusively belonging to the West- and 4 to East-Greenland, and in both localities there are a few species that are at present undetermined.

The *Diptera* has by far the greatest number of representatives in the Greenland fauna, in all about 160 species, of which a proportionally large number are only found in Greenland. Of these only 30 (31) species are common to both the East and West coasts, whilst 14 are only found in East-Greenland and the rest only in the West.

With respect to the order *Suctoria*, at present only 5 species have been found in Greenland, of which 2 are common to both coast lines, 1 to the East only and 2 to the West.

The *Lepidoptera* number 39 species in Greenland, of which 14 are common to both coasts, 22 only in the West- and 3 in East-Greenland. The *Rhopalocera* appear to be more common in the East, for besides the two common species, *Colias hecla* and *Argynnis chariclea* var. *arctica*, two others occur, *Argynnis polaris*, and *Lycæna orbitulus* var. *aquilo*, which appear to be rather common, whilst they have only been found a few times in West-Greenland on the northernmost part of the coast line. The *Heterocera* on the contrary, are much better represented in the West than the East, but as several of the species, for example of the two genera *Agrotis* and *Plusia*, are exceedingly rare and in most cases are only represented by single old specimens, collected over a period of many years, it is possible that they have escaped the attention of the collectors on the East coast.

Of the *Neuroptera*, 7 species are found in West-Greenland, of which only one species *Apatania arctica* also occurs in the East, while *Pseudo-neuroptera* and *Orthoptera* are only represented in the West. Of the Orthoptera, only the larva of a *Blatta* has been found on the West coast.

The *Hemiptera* in West-Greenland reach the total of 12 species (4 *Homoptera* and 8 *Heteroptera*), of the first Group only one specimen has been found in East-Greenland, and of the second Group, two.

Of the *Mallophaga* 40 species have been found, of which only 6 are common to both coasts, but as the birds that are hosts for these parasitic forms are, for the most part, widly distributed in both East- and West-Greenland, it is most probable that the number of species common to both parts will be greatly increased when more material is forthcoming.

Of the *Physopoda* the common European species *Physopus vulgatissimus*, is in all probability found commonly both in the East and West.

Of the *Collembola* the Greenland fauna includes 13 species of which 6 occur only in the West, two in the East and 5 are common to both coasts.

Catalogue of the Greenland Insects with special reference to their geographical distribution.

In the following list of the Insect fauna of Greenland the distribution given with each species is partly taken from the following list of Scientific Works, partly from a small collection of Insects from West-Greenland made by Dr Meldorff in the neighbourhood of Julianehaab and partly from Vanhöffen's [1] list of Greenlands Fauna. The mention of the occurrence of *Hemerobius orotypus* in West-Greenland, is due to Mr. Esben Petersen, who received a specimen from Godthaab.

Professor O. G. Reuter of Helsingfors, who has received specimens of the Greenland Hemiptera from the Zoological Museum of Copenhagen, has kindly sent me the names of the species.

Coleoptera.

		W.-Gr.	E.-Gr
1.	Nebria Gyllenhalii Schönh.	x	
2.	Bembidium Grapei Gyll.	x	x
3.	Patrobus septentrionalis Dej.	x	
4.	Bradycellus Deutschii Sahlb.	x	
5.	Hydroporus atriceps Crotch.	x	x
6.	Colymbetes dolabratus Payk	x	x
7.	Gyrinus marinus Gyll.	x	
8.	Homalota islandica Kraatz	x	x ?
9.	— fungi Grav.	x	
10.	Qvedius mesomelinus Marsh.	x	
11.	— boops Grav.	x	
12.	Lathrobium fulvipenne Grav.	x	
13.	Micralymma brevilingue Schiö.	x	x
14.	Homalium excavatum Stph.	x	
15.	— concinnum Marsh.	x	
16.	Anthobium Sorbi Gyll.	x	

[1]) Grönland Expedition d. Gesellschaft f. Erdkunde z. Berlin 1891—93 unter Leitung v. E. v. Drygalski. II. Bd. I. Theil. 1897. p. 155.

		W.-Gr.	E.-Gr.
17.	Lathridius minutus L.	x	x
18.	— Bergrothi Reitt.	x	
19.	Byrrhus fasciatus Oliv.	x	
20.	Simplocaria metallica Sturm.	x	
21.	Otiorhynchus maurus Gyll.	x	x
22.	— arcticus O. Fabr.	x	x
23.	Hypera elongata Payk	x	
24.	Rhytidosomus globulus Herbst	x	
25.	Coccinella transversoguttata Faldm.	x	x
26.	Scymnus Redtenbacheri Muls.	x	

Hymenoptera.

1.	Nematus obductus Htg.	x	
2.	— borealis Marlatt	x	
3.	— sp.		x
4.	Ichneumon lariæ Curt.	x	x
5.	— bucculentus Wesm.	x	
6.	— groenlandicus Lbck.	x	x
7.	Cryptus arcticus Schiö.	x	x
8.	— Fabricii Schiö.	x	x
9.	Phygadeuon cylindraceus Ruthe	x	x
10.	— solidus Lbck.	x	
11.	— bicolor Lbck.	x	
12.	Hemiteles septentrionalis Hlgr.	x	
13.	— clypeator Lbck.	x	
14.	— sp.		x
15.	Pezomachus terebrator Ratzb.	x	
16.	Pimpla Nordenskiöldii Hlgr.	x	x
17.	— Kolthoffii Auriv.	x	
18.	Bassus ornatus Grav.	x	
19.	— groenlandicus Hlgr.	x	x
20.	— melanogaster Hlgr.	x	
21.	Orthocentrus sp. sp.	x	x
22.	Euryproctus transfuga Hlgr.	x	
23.	Plectiscus bistriatus Thoms.	x	x
24.	— collaris Grav.	x	
25.	— luridus Först.	x	
26.	Ophion luteus L.	x	x
27.	Anomalon pubescens Zett.	x	
28.	Limneria extrema Hlgr.	x	
29.	— Deichmanni n. sp.		x
30.	— frigida Lbck.	x	x
31.	— exareolata Ratzb.	x	
32.	Atractodes aterrimus Hlgr.	x	x
33.	— arcticus Hlgr.	x	
34.	— tenebricosus Grav.	x	
35.	Mesochorus gibbulus Hlgr.	x	x

		W.-Gr.	E.-Gr.
36.	Banchus monileatus Grav.	x	
37.	Aphidius picipes Nees.	x	
38.	Praon objectus Halid.	x	
39.	Meteorus islandicus Ruthe.	x	
40.	Hormius monileatus Nees.		x
41.	Microgaster mediator Halid.	x	
42.	— coactus Lbck.	x	
43.	— fulvipes Halid.	x	
44.	— Halii Packard.	x	
45.	— sp. sp.		x
46.	Alysia manducator F.	x	
47.	Encyrtus interpunctus Dalm.	x	
48.	Isocratus vulgaris Walk.	x	
49.	Dicyclus sp.	x	
50.	Sphegigaster sp.	x	
51.	Pachyneuron groenlandicum Hlgr.	x	
52.	Zygota americana Aschm.	x	
53.	Bombus hyperboreus Schm.	x	x
54.	— balteatus Dahlb.	x	x

Diptera.

1.	Scatopse notata L.	x	
2.	Simulia reptans L.	x	
3.	— vittata Zett.	x	
4.	Campylomyza atra Meig.	x	
5.	Sciara attenuata Rübs.	x	
6.	— tridentata Rübs.	x	
7.	— forcipulata Lbck.	x	
8.	— fucata Meig.	x?	
9.	— groenlandica Hlgr.	x	
10.	— cochleata Rübs.	x	
11.	— nigripes Meig.	x?	
12.	— fumatella Lbck.	x	
13.	— iridipennis Zett.	x	
14.	— flavipes Panz.	x	
15.	— aprilina Meig.	x	
16.	— humicola Lbck. (glacialis Rübs.?)	x	
17.	— pallidiventris Hlgr.	x?	
18.	— permutata Lbck.	x	
19.	— pulicaris Meig.	x?	
20.	— biformis Lbck.	x	
	— sp. sp.		x
21.	Lasiosoma hirta Meig.	x	
22.	Boletina groenlandica Stæg.	x	
23.	— arctica Hlgr.	x	
24.	— sciarina Stæg.	x	
25.	Gnoriste groenlandica Lbck.	x	

		W.-Gr.	E.-Gr.
26.	Brachycampta unicolor Lbck.	x	
27.	Trichonta obesa Winn.	x	
28.	Phronia rustica Winn.	x	
29.	Exechia interrupta Zett.	x	
30.	— fungorum De Geer	x	x
31.	Mycetophila punctata Meig.	x	
32.	Sciophila apicalis Winn.		x
33.	Pachyrrina lineata Scop.	x	
34.	— Lundbecki n. sp.		x
35.	Tipula arctica Curtis	x	x
36.	— Besselsii Osten Sacken	x	
37.	— Parii Kirb.	x	
38.	Rhypholophus fascipennis Zett.	x	x
39.	— affinis Lbck.	x	
40.	Goniomyia caudata Lbck.	x	x
41.	Trichocera maculipennis Meig.	x	
42.	— regelationis L.	x	
43.	— hiemalis De Geer	x	x
44.	Limnobia modesta Meig.	x	
45.	Ceratopogon sordidellus Zett.	x	
46.	— scutellatus Meig.	x	
47.	— lacteipennis Zett.	x	
48.	Coryneura atra Winn.	x	
49.	— celeripes Winn.	x	
50.	Chironomus Stægeri Lbck.	x	
51.	— hyperboreus Stæg.	x	
52.	— riparius Meig.	x	
53.	— brevitibialis Zett.	x	
54.	— brunneipes Zett.	x ?	
55.	— byssinus Schrk.	x	
56.	— velutinus Lbck.	x	
57.	— parvus Lbck.	x	
58.	— extremus Lbck.	x	
59.	— pumilio Hlgr.	x	
60.	— stercorarius de Geer	x	
61.	— graminicola Lbck.	x	
62.	— basalis Stæg.	x	
63.	— frigidus Zett.	x	
64.	— pubitarsis Zett.	x	
65.	— variabilis Stæg.	x	
66.	— sordidellus Zett.	x ?	
67.	— minutus Zett.	x	
68.	— claripennis Lbck.	x	
69.	— difficilis Lbck.	x	
70.	— atomarius Zett.	x	
71.	— Junci Meig.	x	
72.	— tenuis Meig.	x	

		W.-Gr.	E.-Gr.
73.	Chironomus ursinus Hlgr.	x	
74.	— fuscipes Meig.	x	
75.	— incomptus Zett.	x	
76.	— atratulus Zett	x	
77.	— nanus Meig.	x ?	
78.	— debilipennis Lbck.	x	
	— sp. sp.		x
79.	Diamesa aberrata Lbck.	x	
80.	— chorea Lbck.	x	
81.	Tanypus pictipennis Zett.	x	
82.	— pulchripennis Lbck.	x	
83.	— crassinervis Zett.	x	
84.	— tibialis Stæg.	x	
85.	— posticalis Lbck.	x	
	— sp. sp.		x
86.	Culex nigripes Zett.	x	x
87.	Clinocera stagnalis Halid.	x	
88.	Rhamphomyia nigrita Zett.	x	x
89.	— hirtula Zett.	x	x
90.	Dolichopus groenlandicus Zett.	x	x
91.	— plumipes Scop.	x	
92.	Melanostoma ambigua Fall.	x	x
93.	Platycheirus hyperboreus Stæg.	x	x
94.	Syrphus torvus Ost. Sack.	x	x
95.	— lunulatus Meig.	x	
96.	— tarsatus Zett.	x	x
97.	— arcuatus Fall.	x	
98.	Melithreptus strigatus Stæg.	x	
99.	Eristalis pilosus Loew.	x	
100.	Helophilus groenlandicus O. Fabr.	x	x
101.	— borealis Stæg.	x	
102.	Echinomyia ænea Stæg.	x	x
103.	Peteina stylata Brauer & Bergenst.		x
104.	Eutachnia larvarum L.		x
105.	Cynomyia mortuorum L.	x	x
106.	Graphomyia maculata Scop.	x	
107.	Calliphora erythrocephala Meig.	x	
108.	— azurea Fall.		x
109.	— groenlandica Zett.	x	x
110.	Aricia subfuscinervis Zett.		x
111.	— plumbea Meig.	x	
112.	— serva Meig.	x	
113.	Hydrobia divisa Meig.	x	x
114.	— brunneifrons Zett.	x	x
115.	Limnophora triangulifera Zett.	x	x
116.	— trigonifera Zett.	x	
117.	— contractifrons Zett.	x	

		W.-Gr.	E.-Gr.
118.	Limnophora Almqvistii Hlgr.		x
	— sp. sp.	x	x
119.	Acroptera frontata Zett.	x	x
120.	Chortophila icterica Hlgr.	x	x
121.	— florilega Zett.		x?
122.	— cilicrura Rond.	x?	x
123.	— parva Zett.		x
124.	— cinerella Fall.	x	
125.	Ophyra groenlandica Lbck.	x	
126.	Anthomyia radicum L.	x	
127.	— sp.	x	
128.	Phorbia fugax Meig.	x	
129.	— Fabricii Hlgr.	x	
130.	— moesta Hlgr.	x	
131.	Pegomyia conformis Fall.	x	
132.	— segnis Hlgr.	x	
133.	Trichopticus decolor Fall.		x
134.	Homalomyia canicularis L.	x	
135.	— armata Meig.	x	
136.	Coenosia triangula Fall.	x	
137.	Cleigastra haemorrhoidalis Meig.	x	
138.	Fucellia pictipennis n. sp.		x
139.	— fucorum Fall.	x	
140.	— intermedia Lbck.	x	
141.	— ariciformis Hlgr.	x	x
142.	Scatophaga lanata Lbck.	x	x
143.	— sqvalida Meig.	x	x
144.	— litorea Fall.	x	
145.	— nigripalpis n. sp.		x
146.	Pselaphephila arctica n. sp.		x
147.	Leria humeralis Zett.	x	
148.	— tibialis Zett.	x	x
149.	— geniculata Zett.	x	
150.	Piophila casei L.	x	
151.	— affinis Meig.	x	
152.	— pilosa Stæg.	x	
153.	— nigerrima Lbck.	x	
154.	Philygria vittipennis Zett.	x?	
155.	Scatella stagnalis Fall.	x	x
156.	— sp.		x
157.	— cribrata Stenh.	x	
158.	Agromyza arctica Lbck.	x	x
159.	Phytomyza obscurella Fall.	x	x
160.	— nigritella Zett.	x	
161.	— affinis Fall.	x	
162.	— Zetterstedtii Schin.	x	
163.	Limosina sp.	x	

		W.-Gr.	E.-Gr.
164.	Phora groenlandica Lbck.	x	
165.	— sp.		x

Suctoria.

1.	Pulex irritans L.	x	x
2.	— vulpes Rits.	x	x
3.	— gallinæ Bouché		x
4.	— glacialis Taschb.	x	
5.	— globiceps Taschb.	x	

Lepidoptera.

1.	Colias hecla Lefbr.	x	x
2.	Argynnis chariclea var. arctica Zett.	x	x
3.	— polaris Bois.	x	x
4.	Lycæna orbitulus var. aqvilo Bois.	x	x
5.	Dasychira groenlandica Wocke	x	x
6.	Agrotis clandestina Harr.	x	
7.	— quadrangula Zett.	x	
8.	— Westermanni Staud.	x	
9.	— Drewsenii Staud.	x	
10.	— islandica Staud.	x	
11.	— occulta var. implicata Lefbr.	x	
12.	Hadena exulis Lefbr.	x	x
13.	— Sommeri Lefbr.	x	
14.	Plusia gamma L.	x	
15.	— parilis Hübn.	x	
16.	— u-aureum Guén	x	
17.	— diasema var. borea Auriv.	x	
18.	Anarta Richardsonii Curt.	x	x
19.	— Zetterstedtii var. Kolthoffii Auriv.	x	x
20.	— leucocycla Staud.	x	
21.	— lapponica Thunb.	x	x
22.	— tenebricosa Möschl	x	
23.	Cheimatobia brumata L.	x	
24.	Cidaria frigidaria Guén	x?	x
25.	— polata Dup.	x	x
26.	Eupithecia gelidata Mösch.	x	x
27.	— alternaria Staud.?	x	
28.	— nanata var. hyperboreata Staud.	x	
29.	Botys torvalis Möschl	x	x
30.	— hybridalis Hübn.	x	
31.	Pempelia fusca Haw.	x	x
32.	Rhacodia effractana Froel	x	
33.	Sericoris mengelana Fern	x	
34.	Teras maccana var. basalticola Staud.	x	
35.	Penthina groenlandicana Bang Haas		x
36.	— septentrionana Möschl		x

		W.-Gr.	E.-Gr.
37.	Tinea fuscipunctella Haw.	x	
38.	Plutella seninella Zett.	x	x
39.	Endrosis lactella Schiff.	x	
40.	Mimaesioptilus islandicus Staud.		x

Neuroptera.

1.	Hemerobius nervosus F.	x	
2.	— orotypus Wallgr.	x	
3.	Grammotaulius interrogationis Zett.	x	
4.	Halesus radiatus Curt.	x	
5.	Limnophilus griseus L.	x	
6.	Apatania arctica Boh.	x	x

Pseudoneuroptera.

1.	Libellula virgo L.	x?	
2.	Baëtis culiciformis Zett.	x	
3.	Atropos pulsatoria L.	x	

Orthoptera.

1.	Blatta sp.	x	

Physopoda.

1.	Physopus vulgatissimus Hal.	x	x

Hemiptera.

1.	Nysius groenlandicus Zett.	x	
2.	Chlamydatus pulicarius Fall.	x	x
3.	Reduviulus flavomarginatus Scholtz	x	
4.	Acanthia lectularia L.	x	
5.	Deltocephalus lividellus Zett.	x	
6.	Psyllia salicicola Först.?	x	
7.	— alni L.	x	
8.	Orthesia cataphracta Ol.	x	x
9.	Aphis punctipennis Zett.	x	
10.	Tychea sp.	x	
11.	Cladobius sp.	x	
12.	Coccus sp.		x

Siphunculata.

1.	Pediculus humanus L.	x	
2.	Pthirius pubis L.	x	
3.	Hæmatopinus piliferus Burin	x	
4.	— trichechii Boh.	x	
5.	Echinopthirius sericans Burin	x	
6.	— setorus Burin	x	

Mollophaga.

1.	Docophorus celebrachys N.	x	
2.	— atratus N.	x	
3.	— atratus var. ocellatus N.		x

		W.-Gr.	E.-Gr.
4.	Docophorus communis N.	x	x
5.	— fusciformis Denn.	x	
6.	— pustulorus N.	x	
7.	— melanocephalus N.	x	x
8.	— semisignatus N.	x	
9.	— gonothorax Burin.?	x	
10.	— celedoxus N..	x	
11.	— icterodes N.	x	x
12.	— merguli D.		x
13.	Nirmus brachythorax D.	x	
14.	— cameratus D.	x	x
15.	— holophæus N.	x	
16.	— subcingulatus N.	x	
17.	— interruptus Piag.	x	
18.	— phaeopi D.		x
19.	— bicuspis N.	x	
20.	— zonarius N.	x	
21.	— triangulatus N.	x	
22.	— lineolatus N.	x	
23.	— cingulatus N.	x	
24.	— phaenotus N.	x	
25.	Goniodes truncatus D.	x	
26.	— chelicornis N.	x	
27.	— heterocerus N.?	x	
28.	Lipeurus grandis Piag.?	x	
29.	— sqvalidus N.	x	
30.	— lacteus N.	x	
31.	— jejunus N.	x	x
32.	Ornithobius goniopleurus D.	x	x
33.	Trichodectes latus N.	x	
34.	Menopon grandiceps Piay.	x	
35.	— gonocephalum Brown.	x	
36.	Ancistroma gigas Piag.	x	
37.	Colpocephalum subæquale N.	x	
38.	— grandiceps P.	x	
39.	Trinoton conspurcatum		x
40.	Physostomum nitidissimum N.?		x

Collembola.

1.	Smynthurus concolor Mein.	x	x
2.	Lepidocyrtus elegantulus Mein.	x	
3.	Isotoma viridis Gmel	x	x
4.	— fimentaria L.	x	
5.	— Besselsii Pack.	x	
6.	— qvadrioculata Tullb.		x
7.	Achorutes humicola O. Fabr.	x	x
8.	— armatus Nic.	x	x

		W.-Gr.	E.-Gr.
9.	Achorutes unguiculatus Tullb.		x
10.	Xenylla maritima Tullb.	x	
11.	Lipura ambulans O. Fabr.	x	x
12.	Anura muscorum Templ.	x	
13.	Podura hyperborea Boh.	x	

List of the Literature that contains Notices on Greenlands Insects.

1. Will. Scoresby jr.: 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.

This work is the first that contains notices of the insects from the East-Coast. Two species of Lepidoptera, *Papilio palæno* L. (*Colias hecla*) and *Papilio dia* L. (*Argynnis chariclea* var. *arctica*), are mentioned as found in numbers at Jamesons Land, Cape Lister and at Cape Hope. Besides these Gnats and Humble-bees are mentioned.

2. Die zweite deutsche Nordpolarfart in den Jahren 1869 und 1870 unter Führung des Kapitän Koldeway. 2. Bd. Wissenschaftliche Ergebnisse. Leipzig 1874. II. Zoologie.

Of the collections made by the Expedition, the Hymenoptera and Diptera were worked out by A. Gerstäcker p. 403—405. Of Hymenoptera are mentioned *Bombus pratorum* (most probably *B. hyperboreus*), *Cryptus sponsor* (*C. arcticus*), *Limneria difformis*, and of *Diptera*, *Echinomyia aenea*, *Cynomyia alpina* and *Calliphora groenlandica*. v. Hofmeyer p. 407—409 has made a list of the Lepidoptera that includes *Argynnis polaris*, *A. chariclea*, *Colias hecla*, *Larentia polaris*, *Geometra* sp. and *Dasychira groenlandica*.

3. Chr. Aurivillius: Grønlands Insektfauna I. Lepidoptera, Hymenoptera (Bih. till Svenska Vet.-Akad. Handlingar Band 15, Afd. IV. No. 1. Stockholm 1890.)

This work contains both West- and East-Greenlands Insect Fauna. The material used as the basis of this work was conservator G. Kolthoffs Collections made during Nordenskiölds Greenland Expedition in 1883. From the East coast he mentions *Argynnis chariclea* v. *arctica*, *Colias hecla*, *Dasychira groenlandica*, *Cidaria polata* and *Bombus hyperboreus*.

4. H. Deichmann and W. Lundbeck: Østgrønlandske Insekter (Meddelelser om Grønland XIV. Hefte, 1895, p. 97).

In the first part of this work Deichmann mentions the methods of collecting used on Ryders Expedition, together with biological observations especially with reference to hibernation. Lundbeck adds to this a provisional List of the Insects that were brought home, but for the greater part only the genera are given. The List of the Lepidoptera, Mallophaga, Pseudoneuroptera, Thysanura, Mallophaga, Collembola, Suctoria, and Siphunculata contain the same species as mentioned in the below mentioned works of Bang-Haas and Meinert.

5. Fr. Meinert: Neuroptera, Pseudoneuroptera, Thysanopoda, Mallophaga, Collembola, Suctoria, Siphunculata Groenlandica (Vid. Medd. fra den Naturhist. Forening i København 1896, p. 154).

The list includes, besides the West-Greenland species, the species of these orders collected on Ryders Expedition. As no new material of the last named five Orders has been brought back, this list must be taken as complete, and in the present work the list given has been taken direct from Meinerts list for the names and localities. No East-Greenland species occur of the Pseudoneuroptera.

6. A. Bang-Haas: Lepidoptera Groenlandica (ibid. p. 178).

This work also includes the collections made by the Ryder-Expedition. From the East coast the following Insects are enumerated: *Colias hecla, Argynnis chariclea* var. *arctica, A. polaris, Dasychira groenlandica, Plusia parilis, Anarta Richardsoni, A. lapponica, A. Kolthoffii, Cidaria polata, C. frigidaria, Eupithecia gelidata, Pempelia fusca, Penthina groenlandicana, P. septentrionana, Tinea fuscipunctella, Plutella senilella* and *Mimaeseoptilus islandicus.*

7. Will. Luudbeck: Coleoptera Groenlandica (ibid. p. 196).

This and following works of the same author is chiefly based upon the great collections made by himself in West-Greenland, supplemented by the collections in the Zoological Museum from earlier dates. Occasional remarks are made to the fauna of East-Greenland, of which the following species are mentioned: *Hydroporus atriceps, Colymbetes dolabratus, Otiorhynchus maurus* and *Coccinella transversoguttata.*

8. Will. Lundbeck: Hymenoptera Groenlandica (ibid. p. 220).

From the East coast are mentioned: *Ichneumon groenlandicus, Cryptus arcticus, Limneria frigida* and *Bombus hyperboreus.*

9. Will. Lundbeck: Diptera Groenlandica 1. (Vid. Medd. Nat. For. 1898, p, 236). 2. (ibid. 1900, p. 281).

In this work a short mention is made of the occurrence of *Tipula arctica, Echinomyia œnea* and *Scatophaga lanata* on the East coast.

10. Chr. Aurivillius: Lepidoptera och Coleoptera indsamlade under Professor A. G. Nathorst's arktiska expeditioner 1898 och 1899, under den svenska expedition till Beeren Eiland och under Konservator G. Koltoffs expedition till Grönland (Öfvers. kgl. Vet. Akad. Förh. 1900 p. 1135).

The following Lepidoptera are mentioned from the East coast: *Argynnis chariclea* var. *arctica, A. polaris, Lycæna aquilo, Colias hecla, Dasychira groenlandica, Hadena exulis, Anarta Richardsoni, A. Zetterstedtii* var. *Kolthoffii, Plusia parilis, Cidaria polata, Ptychophora Sabinei, Botys torvalis* and two undetermined *Sericoris*-species. Only one little species of *Homolata* is mentioned of the Coleoptera.

List of the Localities mentioned in the Text.

Angmagsalik	65° 30′ N.
Clavering Ö	74° 10′ N.
Danmarks Ö	70° 27′ N.
Dronning Augustas Dal	74° 25′ N.
Eskimo Ö	66° 14′ N.
Forsblad Fjord	72° 17′ N.
Franz Joseph Fjord	73° N.
Gaaseland	70° 5′ N.
Hekla Havn	70° 27′ N.
Hold with Hope	73° 30′ N.
Hurry Inlet	70° 50′ N.
Ikerasausak	60° 2′ N.
Jameson Land	70° 25′ N.
Kangerdlugsuatsiak	66° 18′ N.
Kangerdluerak	60° 35′ N.
Kap Bennet	73° 22′ N.
Kap Borlase Warren	74° 17′ N.
Kap Dalton	69° 24′ N.
Kap Dan	65° 32′ N.
Kap Franklin	73° 15′ N.
Kap Stewart	70° 25′ N.
Mackenzie Bugt	73° 30′ N.
Manby	69° 50′ N.
Nagtoralik	60° 32′ N.
Nordre Bræfjord	60° 19′ N.
Nordvestre Fame Ö	70° 50′ N.
Nordostbugt	71° 20′ N.
Pendulum Ö	74° 38′ N.
Röde Ö	70° 30′ N.
Sabine Ö	74° 30′ N.
Serketnoua	60° 58′ N.
Smalsund	65° 59′ N.
Tasiusak	65° 37′ N.
Wahls Fjord	66° 22′ N.

Coleoptera.

Carabidæ.

1. *Bembidium Grapei* Gyll.

Appears to be very rare in East-Greenland; two specimens were brought back with the Amdrup Expedition, found together with larvæ under stones on the shore at Ikerasausak 12. 8. 99.

Geographical distribution: The species is common in the southern portion of West-Greenland, and is also known from Lapland, Finland and North America.

Dytiscidæ.

1. *Hydroporus atriceps* Crotch.

Several specimens from Serketnoua and Angmagsalik; from the last named place in numbers in a pond at the coast 24. 8. 99.

Geographical distribution: On the West coast this species is found very commonly in larger or smaller water holes, at least up to 70° N. This species is also known from Finland, Lapland, the greatest part of Scandinavia, England, Siberia, North Amerika, and occurs as alpine in the Pyrennes.

2. *Colymbetes dolabratus* Payk.

Very common and found in many places along the east coast, Tasiusak 24. 8. 99; Hekla Havn 8. 5. 91, 12. 6.-18. 6. 92; Angmagsalik 16. 9. 92; Nordostbugt 14. 8. 00; Hurry Inlet 3. 7. 00 (larvæ); Eskimo Ö 3. 8. 99; Jameson Land 8. 1. 00.

At Hurry Inlet it was found in a pond cowered with thick ice 12. 10. 99.

Geographical distribution: At West-Grenland it is also very common. The Greenland specimens belong to the form

C. groenlandicus Aubé, which has the sculpture of the females elytra finer. This form is also known from Iceland and is probably also found in northern Scandinavia. The type form is found in Sweeden, Lapland, Finland, Siberia and North America.

Staphylinidæ.

1. *Homalota* sp.

Aurivillius (10. 1140) mentioned a little species of *Athela* (*Homalota*) found on Pendulum Ö 6. 7. 99. He believes it to be the same species as Lundbeck (7. p. 204 called *H. islandica* Kraatz.

Geographical distribution: It is very possible that *H. islandica* occurs on the East coast; as it can hardly be called rare in West-Greenland. Besides Greenland it is known from Iceland, Finland, Sweeden, Norway, Scotland and quite recently also from Denmark.

2. *Micralymma brevilingue* Schiødte.

Appears to be common, it is known from Hekla Havn 9. 6. 00 and Smalsund 17. 9. 00.

Geographical distribution: The species is very common in West-Greenland but is unknown from any other locality out of this country.

Lathridiidæ.

1. *Lathridius minutus* L.

Only two specimens are known from East-Greenland, one from Hekla Havn 9. 6. 92 and one from Tasiusak, found at the top of a hill 200 ft. amongst moss.

Geographical distribution: This species has only been found a few times in West-Greenland. Lundbeck (7. 209) states that he supposes that it has most probably been originally imported into Greenland. As, however, specimens have been found in the open in East-Greenland, it would appear that the species also had its home here. It is otherwise a cosmopolitan.

Byrrhidæ.

1. *Byrrhus fasciatus* Oliv.

Single specimens from Tasiusak 3. 5. 99 and Smalsund 26. 6. 99, from the first named place it was found amongst grass roots.

Geographical distribution: Common in West-Greenland and in North and Middle Europe, also in North Asia and America.

Curculionidæ.

1. *Otiorhynchus maurus* Gyll.

Only one specimen from Kangerdluerak (1883). It has not been found by the later Expeditions.

Geographical distribution: Somewhat rare on the West coast of Greenland, occurs also in northern Scandinavia, Iceland, Færoe Islands, England, Denmark, and as an alpine form in the mountains in Middle Europe.

2. *O. arcticus* O. Fabr.

Common; Tasiusak 10. 5. 99, 1. 6. 99—18. 8. 99, amongst grass and dead leaves or under stones, Kap Dan 15. 9. 99.

Geographical distribution: Common on the West coast, especially in the south, also known from Finland, Lapland, Scandinavia, Iceland and Færoe Islands and also as an alpine form in the mountains of Central Europe.

Coccinellidæ.

1. *Coccinella transversoguttata* Fald.

Röde Ö, Tasiusak 24. 5. 99, 1. 6. 99 on willow, Kap Dan 19. 5. 99.

Geographical distribution: Common in West-Greenland, especially in the southern portion. It occurs besides in Siberia and North-America, and also in Lapland with the variety *qvinquenotata* Kirb.

Hymenoptera.

Tenthredinidæ.

1. *Nematus* (*Amauronematus*) sp. [1])

A specimen of Amauronematus was brought from Hekla Havn that is not any of the described species. As only a single female exists in the collections at present, the species is not described. It is allied to *A. borealis* Marlatt which was founded upon a male from Disco (Proceedings of the Acad. of Science of Philadelphia 1892 p. 133.)

Ichneumonidæ.

1. *Ichneumon lariæ* Curtis.

A single specimen was found at Hekla Havn in Vaccinium, 23. 5. 92.

Geographical distribution: Occurs in West-Greenland but has not been found further north than 62° N. It appears therefore to go further north in East-Greenland. Out of Greenland the species is only known from Arctic Amerika.

2. *I. groenlandicus* Lbck.

Since the four males from Hekla Havn and the one specimen from West-Greenland mentioned by Lundbeck have been found, no other specimens have been brought from Greenland.

Geographical distribution: The species is unknown from other localities.

3. *Cryptus arcticus* Schiødte.

Appears not to be rare in East-Greenland, it has been found at Hekla Havn, Sabine Ö 7. 1900, Jameson Land 3. 8. 91; 8. 8. 91; 19. 7. 92; 22. 7. 92. A specimen was bred from a Lepidopterous pupa 16. 5. 1892.

Geographical distribution: The species is also common in West-Greenland, but is not found out of the country.

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[1]) Mr. Fr. Konow, Teschendorff has kindly determined it for me.

4. *C. Fabricii* Schiødte.

Only one specimen is known from East-Greenland, a female taken at Jameson Land.

Geographical distribution: This species is just as common as the foregoing in West-Greenland, and like it, it is not known out of the country.

5. *Phygadeuon cylindraceus* Ruthe.

A series bred from Dipterous pupæ (each of which contained only a single parasite) was brought from East-Greenland.

Geographical distribution: Common and widly distributed along the whole of the West coast of Greenland. Lundbeck (7. 225) found them chiefly under seaweed along the coast, where he supposed they attacked *Fucellia* pupæ. Besides Greenland it is found in Sweeden, Iceland and the Færoe Islands.

6. *Hemiteles* sp.

A moderate thick and robust species, of which a single specimen was taken at Kap Stewart, is most probably new.

7. *Pimpla Nordenskiöldii* Holmgr.

Several specimens from Hekla Havn 1. 4. 91, Kap Dalton 7. 1900. Röde Ö 14. 7. 92, a male was bred from an *Argynnis* pupa 16. 5. 92.

Geographical distribution: Common in West-Greenland. As Aurivillius and Lundbeck have already mentioned, this species is certainly the same as *P. longiceps* Thoms. If this is correct the species also occurs in Lapland, but is unknown from other localities.

8. *Bassus groenlandicus* Holmgr.

Only one male is known from East-Greenland, that was found at Hekla Havn in August 1891.

Geographical distribution: Single specimens have been found in West-Greenland but it is unknown out of the country.

Orthocentrus Grav.

Many species appear to occur of this genus in the arctic regions. Several arctic species have been enumerated, but the descriptions are not good and the species difficult to determine. As the genus wants a revision, and my material is not large, I refrain from describing any new species. The one species mentioned below I think is correctly determined.

9. *O. hilaris* Holmgr.

One specimen from Hekla Havn 11. 8. 91.

Geographical distribution: Also found in West-Greenland.

10. *Plectiscus bistriatus* Grav.

Hekla Havn, Røde Ö 14.-17. 7. 91, 11. 8. 91, 19. 6. 92, Gaaseland 7. 3. 92, 27. 7. 92.

Geographical distribution: Common in West-Greenland; also found in Sweeden.

11. *Ophion luteus* L.

Only one specimen is known from East-Greenland, taken at Nagtoralik 19. 8. 83.

Geographical distribution: Not mentioned in the list of West-Greenlands Insects, but has been found at Igaliko July 1897, and at Julianehaab July and August 1902. The species occurs over a greater portion of Europe.

12. *Limneria frigida* Lbck.

Several specimens from Hekla Havn 25. 5. 92, 17. 6. 92, Hold with Hope 20. 8. 92, Røde Ö 17. 7. 92 and Sabine Ö 7. 1900.

Geographical distribution: Up to now this species has only been known from South-Greenland, where it appears to be rare, as only nine specimen are known. It is a parasite on Noctua larvæ.

13. *L. Deichmanni* n. sp.

Black, head narrower than thorax, contracted behind the eyes, which are feebly concave, antennæ, mandibles and palpi quite black. Thorax rugosely punctured, parapsidæ somewhat evanescent, metathorax area superomedia fivesided, open below and confluent together with area posteromedia. Abdomen shining, black. Second segment slightly longer than third. Legs red, femora and trochanters black, terebra short, not, or only very slightly excerted. Tegulæ black, wings hyaline, areola rather small, closed.

Length 8—10 mm.

This species is easily known by its black colour, and by the colour of the legs which are red from the trochanters. It is allied to *L. frigida*, but differs besides by its size by its black palpi and tegulæ, and by the colour of the hind tibiæ.

It is this species that Deichmann alludes to when mentioning parasites on the larva of *Dasychira groenlandica* (4. 102).

The larva of *L. Deichmanni* lives as an internal parasite in the larva of *Dasychira*. When the parasitic larva is fullgrown, the host is quite emptied and the parasite does not come out of the hosts skin but makes its cocoon inside it, which contracts somewhat but otherwise keeps its form. The cocoon fills the entire larva skin, which is stretched tight over it, and is of a pointed oval shape and parchmentlike, and of a brownish colour. The parasite larva also bores a hole through the Lepidopterous larva underside and attaches it to the surface with a white spin.

When the parasite is fully developed it bores a hole on the upper side of the cocoon and hosts skin, and then emerges. Ratzeburg[1]) mentions the larva of *L. carbonaria* Ratz., that is parasitic on *Orgyia antiqua* L., and spins its cocoon in the same way to the surface.

A large number of specimens have been brought from Hekla Havn, all or the most have been bred, 14. 5.-7. 6. 92.

Geographical distribution: Only known from Greenland.

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[1]) Ichneumonen d. Forstinsecten I, 1844, p. 93.

14. *Atractodes aterrimus* Holmgr.

Several specimens, a few from Sabine Ö 27. 7. 92, and 7. 1900 and several without locality.

Geographical distribution: Rare in West-Greenland, also known from Nova Zembla.

15. *Mesochorus gibbulus* Holmgr.

Only one specimen is known from the East coast, Sabine Ö, found 22. 7. 92.

Geographical distribution: Only one specimen also known from West-Greenland, the species is otherwise only known from Sweeden.

Besides the above mentioned Ichneumonidæ, there are a few others in the East-Greenland collection, that for several reasons cannot as yet be determined.

Braconidæ.

1. *Hormius moniliatus* Nees.

A little series of this species has been taken at Hekla Havn 25. 5. 92, 19. 6. 92, 12. 7. 92, 11. 8. 91 in the flowers of Vaccinium.

Geographical distribution: Unknown from West-Greenland, but occurs over the greater part of Europe.

Microgaster Latr.

Single specimens of species belonging to this genus have been taken, but cannot definitely be placed with any of the species at present described.

Pteromalidæ.

Lundbeck mentions in his provisional list of insects from Ryders Expedition a single specimen from Hekla Havn. This specimen, however, is not to be found in the Greenland collection at the Zoological Museum, it is therefore impossible to say what it is.

Apidæ.

1. *Bombus hyperboreus* Schön.

Hekla Havn 8.91, 11.6.92, 19.6.92, Jameson Land 3.8.91.

Geographical distribution: Occurs along the whole of West-Greenlands coast and is found round the polar regions.

2. *B. balteatus* Dahlb.

Hekla Havn 16.8.92, Jameson Land 7.1.1900, Forsblad Fjord, Kap Dalton 7.7.02.

Geographical distribution: Distributed as with the foregoing.

Diptera.

Mycetophilidæ.

Sciarinæ.

Sciara Meig.

Two species of this genus are in the East-Greenland Collections, that are at present unnamed.

Mycetophilinæ.

1. *Sciophila apicalis* Winn.

Gaaseland 12.7.92, two specimens.

Geographical distribution: This species is at present unknown from West-Greenland, but occurs down to the southern part of Central Europe.

2. *Exechia fungorum* De Geer.

A short series from Hekla Havn 2.7.92; 23.7.92; Gaaseland 12.7.92, and Röde Ö 14.8.92.

Geographical distribution: Not common in West-Greenland, where it occurs as far North as 69°. It is also known from North and Central Europe.

Tipulidæ.

1. *Tipula arctica* Curt.

Very common on the East coast; a large number of specimens are found in the collections from Kap Dalton 18.7.,

20. 7. 1900; Hold with Hope 20. 7. 91; Sabine Ö 7. 1900; Hekla Havn 27. 6. 92, 19. 7. 92; Jameson Land, Kap Borlase Warren 16. 7. 1900; Kap Stewart 5. 8. 91, 17. 7. 92.

Geographical distribution: Very common in West-Greenland, and also found at Grinnel Land, Boothia Felix and Nova Zembla.

2. *Pachyrrhina Lundbecki* n. sp.

Male. Head black, yellow only at the insertion of the antennæ, and with the eye margins more or less indistinctly yellow; snout shining black, somewhat yellowish at the anterior margin. Palpi black; antennæ greyish black. Thorax black, shining, humerus greyish black, with a narrow yellow stripe on each side, streaching from the humerus backwards to or near to the scutellum, these stripes are sometimes very indistinct. The upper part of the pleura, from the humerus to the wing root, yellow; pleura greyish pruinose, with a couple of small, usually indistinct, yellow spots below the wing root, and a yellowish spot on each side of the postscutellum; the postalar callus is also more or less yellowish. Abdomen greyish black, slightly shining, greyish to greyish-white pruinose, the dorsal central line, when seen from above, is dark brownish; at the side margins are some larger or smaller rufous spots, which are sometimes confluent, forming a side-stripe. Venter greyish black. The upper, claw-shaped, genital lamellæ yellow. Abdomen clothed with short yellow pubescence. Legs with the coxæ grey; femora yellow to rufous, becoming darker towards the apex; tibiæ and tarsi brown, or brownish black to black. The legs taken as a whole light at the base and becoming darker towards the apex. Coxæ clothed with somewhat longish, pale hairs. Wings hyaline, veins blackish-brown, stigma brown, the two upper veins rising from the discal cell connected at the base. Halters yellow, peduncle brownish.

Female. Similar to the male with the ovipositor shining ferrugineous.

L. 10—16 mm.

This species, which I have been unable to identify as any of the previously described species, is somewhat closely allied to *P. pratensis* L. but is darker. This, however, could be due to the latitude. It also differs, however, in having the wings quite hyaline, and the two upper veins rising from the discal cell connected at the base, whereas in *pratensis* the wings are tinged with brown, and the two veins, in question, widly separated at the base.

Geographical distribution: Hitherto only known from East-Greenland.

3. *Rhypholophus fascipennis* Zett.

Gaaseland 12. 7. 92.

Geographical distribution: Two specimens have been found in West-Greenland, it occurs also in Lapland, Arctic Norway, Iceland and the Central European Mountains.

4. *Gonyomyia caudata* Lbck.

Hekla Havn 8. 91 one specimen.

Geographical distribution: One specimen, Lundbecks type, known from West-Greenland. At present unknown from other places.

5. *Trichocera hiemalis* De Geer.

Several specimens from Hekla Havn 8. 91, Gaaseland 12.7.92, Kap Stewart 5. 8. 91 and Kap Dalton 8. 7. 1900.

Geographical distribution: Rather rare in West-Greenland; common in the greatest part of Europe and on the Faroe Islands.

Chironomidæ.

Chironomus Meig.

Tanypus Meig.

About ten species of these two genera, together, have been collected, but are at present unnamed.

Culicidæ.

1. *Culex nigripes* Zett.

Common on the East coast; Hekla Havn 15.-19. 7. 92; Röde Ö 17. 8. 92 and Jameson Land 3. 8. 91.

Geographical distribution: A widely distributed arctic species; as to the supposed occurrence of this species in Denmark I refer to Lundbeck (9. 1898. p. 296).

Empidæ.

1. *Rhamphomyia nigrita* Zett.

Hekla Havn 19. 6. 92; 19. 7. 92; August 91 Hold with Hope, a moderatly large series.

Geographical distribution: Only known from Greenland. Of recent years, this species has only been found north of 68° N. Lundbeck, however, takes Otto Fabricius' species *Empis borealis* to be identical with *R. nigrita* in which case it is also found in South-Greenland.

2. *R. hirtula* Zett.

Hekla Havn 15. 7.—8. 91 and Hold with Hope.

Apparently as common as the foregoing.

Geographical distribution: Only known from Greenland, where it is quite common on the West coast from the southern point up to 70° N.

Dolichopodidæ.

1. *Dolichopus groenlandicus* Zett.

Tasiusak 8. 98. 2 specimens.

Geographical distribution: Only known from Greenland. Common on the West coast.

Syrphidæ.

1. *Melanostoma ambigua* Fall.

Kap Stewart 5. 8. 91; Gaaseland 12. 7. 92.

Two badly preserved specimens, as previously determined by Lundbeck (4. 112), belong most probably to this species.

Geographical distribution: If the Greenland *Melanostoma* that are quite common in West-Greenland, really is *M. ambigua* Zett., or a closely allied species, is at present uncertain, vide Lundbeck (10. I, 300). *M. ambigua* occurs somewhat commonly in Northern and Central Europe.

2. *Platycheirus hyperboreus* Stæg.

East-Greenland. 2 specimens, 65° 75′ N.

Geographical distribution: Rather common in West-Greenland, and also occurs in North-America, Pennsylvania and Virginia.

3. *Syrphus torvus* Ost. Sack.

Kap Dalton July 1900 and Röde Ö August 1891, a single specimen from both localities.

Geographical distribution: Is found in North Europe, on the Central European Mountains and in North America, Canada, Massachusetts, etc.

4. *S. tarsatus* Zett.

Hekla Havn. 21. 5. 92; 12. 6. 92; 18. 6. 92. Gaaseland.

All the specimens are dark with indistinct markings.

Geographical distribution: Common in West-Greenland, also occurs on Spitzbergen, Nova Zembla, Northern Scandinavia and as an alpine form on the Central European Mountains.

5. *S. arcuatus* Fall.

One specimen from Kap Dalton July 1900.

Geographical distribution: This species has only been found sparingly in West-Greenland, but occurs in North and Central Europe, Nova Zembla and North-America.

6. *Helophilus groenlandicus* O. Fabr.

Hekla Havn and Röde Ö. July and August 1801.

Geographical distribution: Rather common in West-Greenland, especially in the North, also occurs in Northern

Scandinavia, Lapland, Nova Zembla and the Northern regions of America.

Muscidæ.

Tachininæ.

1. *Echinomyia œnea* Stæg.

Several specimens from Hekla Havn taken in July and August.

Geographical distribution: Only known from Greenland, where it has also been found singly on the West coast.

2. *Peteina stylata* Brauer & Bergnst. [1])

A rather large number of specimens have been bred from the larvæ of *Dasychira groenlandica*, May—June. Hekla Havn.

Geographical distribution: The species is described by Brauer and Bergenstamm upon specimens from Greenland, and is not known from other places. Only specimens from the East coast are in the Danish collection. Brauer and Bergnst. only quote Greenland, without definite locality.

3. *Eutachina larvarum* L.

Several specimens from Hekla Havn, bred as the foregoing species from the larvæ of *Dasychira groenlandica.*

Geographical distribution: The whole of Europe.

Sarcophaginæ.

4. *Cynomyia mortuorum* L.

A few specimens from Hekla Havn 8.91; 15.5.92; 17.5.92.

Geographical distribution: Rather common in West-Greenland; common in North and Central Europe, and probably also occurs in Siberia.

Muscinæ.

5. *Calliphora groenlandica* Zett.

Very common. A large number of specimens were collected at Hekla Havn and Röde Ö, May—August.

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[1]) Mr. H. Kramer in Ninderoderwitz bei Zittau has kindly determined this and the following species.

Geographical distribution: Very common on the West coast; occurs also over the whole of Northern Europe.

6. *C. azurea* Fall.

A single specimen from Hekla Havn 11. 6. 92.

Geographical distribution: Unknown from West-Greenland, but occurs in Northern and Central Europe.

Anthomyinæ. [1])

7. *Aricia subfuscinervis* Zett. A few specimens from Hekla Havn June—July 1892.

Geographical distribution: Unknown from West-Greenland; occurs in Northern Sweeden.

8. *Hydrophoria divisa* Meig.

Röde Ö 17. 8. 92. 2 specimens.

Geographical distribution: 2 specimens have been found in West-Greenland; otherwise widly distributed over the whole of Northern and Central Europe.

9. *H. brunneifrons* Zett.

Hekla Havn Juni 1892. 2 specimens.

Geographical distribution: Rare on the West coast of Greenland; also found in the most Northern parts of Europe.

10. *Limnophora triangulifera* Zett.

A large number of specimens from Hekla Havn, August 1891, June—July 1892 and July 1900.

Geographical distribution: Occurs rather commonly in West-Greenland, also found in Arctic Europe.

11. *L. Almquistii* Holmgr.

Hekla Havn one specimen August 1891; Kap Dalton July 1900, 2 specimens.

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[1]) The determination of the Anthomyinæ is due to Professor P. Stein, Treptow a. R. to whom the whole material of Anthomyinæ was submitted for examination.

Geographical distribution: Unknown from West-Greenland; occurs also on Nova Zembla and Spitzbergen.

Besides the above are a rather large number of undetermined *Limnophora* in the East-Greenland collection.

12. *Acroptena frontata* Zett.

Appears to be quite common; a large number of specimens have been collected at Hekla Havn, Röde Ö and Gaaseland, May to October.

Geographical distribution: Also found in West-Greenland, in Northern Scandinavia and Spitzbergen, and also at Steyermark.

13. *Chortophila icterica* Holmgr.

About ten specimens collected at Hekla Havn July 1892.

Geographical distribution: Only known from Greenland where it also occurs on the West coast.

14. *C. florilega* Zett.?

A large number of specimens from Hekla Havn and Kap Dalton. May—June.

Geographical distribution: *C. florilega* is stated to occur in Sweeden and North Germany.

15. *C. cilicrura* Rond.

3 specimens from Hekla Havn, June—July 1892.

Geographical distribution: Occurs over the whole Northern Europe and America.

With respect to its occurrence in West-Greenland, I refer to Lundbecks notes (9. 1900 p. 288 Anm.). His suggestion that the species referred to by Stæger (Natur. Tidsskr. udg. af Kröyer 2. R., Bd. I, p. 366, 43) under the name "*Anthomyia ruficeps* Meig." of which the last named Author only had a single specimen, now unfortunately lost, is identical with *cilicrura* Rond., would go to prove that the species in all probability occurs in West-Greenland.

16. *C. parva* Zett.

Hekla Havn and Gaaseland June—July 1892.

Geographical distribution: Unknown from West-Greenland but occurs in Scandinavia.

17. *Pegomyia segnis* Holmgr.

Hekla Havn 18. 6. 92 and one other specimen without Locality.

Geographical distribution: Unknown from West-Greenland; occurs in Nova Zembla.

18. *Trichopticus decolor* Fall.

Hekla Havn, June—July 1892.

Geographical distribution: Not yet discovered in West-Greenland, but occurs in Sweeden.

Scatophaginæ.

19. *Fucellia arciiformis* Holmgr.

A short series collected at Hekla Havn, between the middle of June to the middle of July 1891.

Geographical distribution: Only known from Greenland; common in the Northern part of West-Greenland. Lundbeck found the larvæ and pupæ, of this species, in numbers under Seaweed on the coast (9. 1900. 293).

20. *F. pictipennis* n. sp.

Hekla Havn 1. 6. 92, 12. 6. 92. The description of this species will be found in the appendix by Th. Becker.

21. *Scatophaga lanata* Lbck.

Probably not rare in East-Greenland, about a score were found at Hekla Havn and Gaaseland 7. 6. 92, 18. 7. 92.

Geographical distribution: Only known from Greenland; a single old specimen from the West coast.

22. *S. sqvalida* Meig.

A large number of specimens have been collected at Hekla Havn and Kap Stewart in August and September.

Geographical distribution: Common in West-Greenland, North and Central Europe and North America.

23. *S. litorea* Fall.

A single specimen captured on Røde Ö 14. 8. 92.

Geographical distribution: Common in West-Greenland, occurs over almost the whole of Europe and also on Spitsbergen.

24. *S. nigripalpis* n. sp.

Hekla Havn 12. 6. 92, 17. 6. 92.

The description of this species will be found in the appendix.

Cordylurinæ.

25. *Pselaphephila arctica* n. sp.

Hekla Havn 9. 6. 92, 2. 7. 92, 12. 7. 92, 29. 7. 92.

For description, see appendix.

Helomyzinæ.

26. *Leria tibialis* Zett.

Hekla Havn 15. 7. 92, Gaaseland 12. 7. 92, a single specimen in both localities.

Geographical distribution: West-Greenland, Scandinavia, Finmarken and Nova Zembla.

Ephydrinæ.

27 *Scatella stagnalis* Fall.

Røde Ö 17. 8. 92; Gaaseland 12. 7. 92, Hekla Havn 14. 5. 92.

Geographical distribution: Very common in West-Greenland, also occurs over the whole of Europe.

28. *S.* sp.

Gaaseland 12. 7. 92. A single specimen of a small species with unspotted wings, but on account of its somewhat bad condition it is not described here.

Agromyzinæ.

29. *Agromyza arctica* Lbck.

Several specimens from Hekla Havn 20. 5. 92, and one single specimen from Röde Ö 17. 8. 92.

Geographical distribution: Only known from Greenland, where it is common on the West coast in Sallow Copses.

30. *Phytomyza obscurella* Fall.

Several specimens from Hekla Havn from June to August 1892.

Geographical distribution: About ten specimens have been found on the West Coast; it also occurs in North and Central Europe.

Phoridæ.

1. *Phora* sp.

À single specimen of a rather large species of *Phora* was taken at Hekla Havn 1. 3. 92. The species is not found in the West-Greenland collections.

Suctoria.

Pulicidæ.

1. *Pulex irritans* L.

Hekla Havn 1 specimen.

Geographical distribution: Cosmopolitan.

2. *P. vulpes* (Motsch) Rits.

1 specimen from East-Greenland.

Geographical distribution: Germany, Holland and Russia (?) on *Canis vulpes.*

3. *P. gallinæ* Bouché.

Several specimens were brought back from East-Greenland, together with several larvæ and pupæ found in the nest of *Emberiza nivalis* 4. 8. 92.

Geographical distribution: Europe attached to several birds.

Lepidoptera.

Pieridæ.

1. *Colias hecla* Lefbr.

This Greenlands largest Butterfly does not appear to be rare in East-Greenland; in Scoresby's Travells it is mentioned as common at Jameson Land, Kap Lister and Kap Hope. The Danish Expedition found it at Hold with Hope 26. 6. 1900, Jameson Land, July and August 1900, Kap Dalton 1. 8. 92, and Sabine Ø.

Aurivillus mentions (10. 1137), that the Sweedish Expeditions found it at Kap Bennet, Franz Joseph Fjord, Hurry Inlet Mackenzie Bugt 3. 7., 9. 8., 25. 8. 99 and Kap Franklin 24. 8. 00.

Geographical distribution: The species is common on Greenlands West coast, and also occurs at Grinnell Land, and also in Lapland and Finland in the form *C. hecla* var. *sulitelma* Auriv.

Nymphalidæ.

1. *Argynnis chariclea* Schn. ver. *arctica* Zett.

Mentioned by Scoresby as common with the foregoing species.

Kap Dalton 7. 1900, Jameson Land 1. 8. 1900, Sabine Ö 11. 7. 1900, Kap Borlase Warren 11.-14. 7. 1900, Wahls Fjord 30. 7. 99, Nordre Bræfjord 1. 8. 99.

Aurivillius (10. 1135) mentions it from Hurry Inlet, Kap Stewart, Dronning Augustas Dal, Clavering Ö, Mackenzie Bugt and Kap Franklin. One of these specimens, according to Aurivillius, is closely allied to the Labrador form *A. chariclea* var. *Boisduvali* Dup.

Geographical distribution: The type form *A. chariclea* belongs to Northern Europe. The form *arctica* is found commonly both in East- and West-Greenland, at Nova Zembla, and on the Islands North of America, and the form *Boisduvali* originates from Labrador.

2. *A. polaris* Bois.

Besides the specimens mentioned by Bang Haas (4. 180) taken on Ryders Expedition at Hekla Havn 7. 93, and Jameson

Land 3. 8. 91, a few specimens have been brought back from Jameson Land 1. 8. 1900.

It does not appear to be rare on the East coast, from which place Aurivillius (10. 1135) also mentions that it was found at Clavering Ö, Kap Bennet, Dronning Augustas Dal, Mackenzie Bugt 3. 7. 1900 and Kap Franklin 24. 8. 1900.

Geographical distribution: In the Danish collection the species is only represented from East-Greenland, but Mc. Lachlan[1]) also mentions it hawing been found in West-Greenland between 81° 20′ and 81° 50′ N. Besides Greenland it is also known from Labrador, Northern Lapland and Finmarken.

Aurivillius mentions and describes two *Argynnis* larvæ from East-Greenland; as neither were bred it is impossible to say to which species they belong. Both belong to that group of *Argynnis* larvæ which have the spines on the first segment not longer than those on the following segments. The larva which Aurivillius believes to be *A. chariclea* var. *arctica* is faibly marked with brown and has five light lines.

The other larva which is believed to be *A. polaris* is also marbled with brown and has a fine light medial line. At the spines on the two first segments are two small black spots and along the sides below the spiracles is a broad light side line.

Lycænidæ.

1. *Lycæna orbitulus* Praun. var *aquilo* Bois.

Two specimens from Forsblad Fjord.

The Swedish Expedition found a specimen at Hurry Inlet 3. 8. 99 and one at Mackenzie Bugt 31. 7. 1900. (Aurivillius 10. 1136.)

Geographical distribution: H. Skinner and L. W. Mengel[2]) mention specimens of this species from West-Green-

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[1]) Linn. Soc. Journal. Zoology V. 14. 1879. p. 98.

[2]) Proceedings of the Academy of Natural Science of Philadelphia 1892, p. 157.

land in a collection from Herbert Ö, Mc. Cormick Bugt and Disco. The type form *L. orbitulus* Pr. occurs in the mountains of Central Europe, and is also known from Asia Minor, Colorado and California. The form *aquilo* Bois. occurs in Arctic Europe and America and the form *Wosnesenskii* Ménétr., is described from Kamtschatka.

Liparidæ.

1. *Dasychira groenlandica* Wocke.

Hekla Havn and Hold with Hope; a few butterflies and several larvæ which contained the before mentioned parasite *Limneria Deichmanni.*

The Kolthoff Expedition bred some specimens between 19. and 23. July from cocoons collected on Pendulum Ö 6. July and at Kap Bennet 14. July. As the Expedition found at the same time half and full grown larvæ Aurivillius came to the conclusion that Dasychira larvæ hibernate two or three times and that they spin their cocoons immediately after the last hibernation. (10. 1137.)

Geographical distribution: The species is not rare on the East Coast of Greenland and also occurs on Grinnell Land.

Noctuidæ.

1. *Hadena exulis* Lefebr.

A crippled specimen from Jameson Land 7. 1. 1900. Aurivillius mentions a male from the interior of Forsblad Fjord 11. 8 99. (10. 1138.).

Geographical distribution: Is found somewhat commonly in West-Greenland and is also known from Finmarken, Scotland, Iceland and Labrador.

2. *Plusia parilis* Hübn.

Jameson Land, one specimen.

The Kolthoff Expedition brought back a few specimens from Mackenzie Bugt 9. 8. 1900 and Kap Franklin 24. 8. 1900.

Geographical distribution: Rare in West-Greenland, also known from Lapland, Finmarken, Frau Island, Grinnell Land and Labrador.

3. *Anarta Richardsonii* Curt.

Karraakungniut August 1883, Hekla Havn and Jameson Land, a longer series from the last mentioned place, collected 29. May and 3. August.

Aurivillius mentions this species from Clavering Ö 16.7. 99, Nordvestre Fame Ö 4. 8. 99 and Mackenzie Bugt 31. 7. 1900.

Geographical distribution: The species is common in West-Greenland and is probably found round the polar region.

4. *A. Zetterstedtii* Staud. var *Kolthoffii* Aur.

One specimen from Hekla Havn taken between 23. 7. and 2. 8. 92. The Kolthoff Expedition found a few specimens at Kap Franklin and Mackenzie Bugt (Aurivillius 10. 1138).

Geographical distribution: The form *Kolthoffi* is only known from Greenland, where it is found on both the East and West coasts. The type form occurs in Lapland, North America and Labrador.

5. *A. lapponica* Thunb.

Kap Dalton 27. 6. 99 and 7. 1900 found flying on a slope towards South at a height of 200′.

Geographical distribution: Is found in West-Greenland, Lapland and Labrador.

Geometridæ.

1. *Cidaria polata* Dup.

Many specimens were taken by the Danish Expedition at Kap Dalton 7. 1900, Hekla Havn 1.-23. 7. 1900, Kap Stewart 5. 8. 1900, Hold with Hope 20. 7. 91 and Wahls Fjord 30. 7. 99.

The Swedish Expedition found it in large numbers at Hurry Inlet, Franz Joseph Fjord and Mackenzie Bugt 31. 7.—25. 8. 1900 (Aurivillius 10. 1139).

Staudinger separated the Greenland specimens as a separate form var. *Brüllei*, on account of its darker colour, but later on, he again abandoned it; Bang Haas also separated them later in his *Lepidoptera Groenlandica* 1896 p. 188.

Geographical distribution: Common in West-Greenland, and also mentioned from Finmarken, Arctic Lapland, Belle Isle Street, Caribou Island and Labrador.

2. *C. frigidaria* Guén.

Five males were taken at Hold with Hope 20. 7. 92 and Röde Ö 17. 8. 92. Aurivillius mentions a specimen of *Psychophora Sabinei* Kirb. from Clavering Ö; it is most probable that this species is identical with *C. frigidaria*. (10. 1139.)

Geographical distribution: Packard[1]) names *Glaucopteryx sabinaria* from Polaris Bay and Mc. Lachlan[2]) also mentiones it from West-Greenland. Bang Haas states that this species is the same as *C. frigidaria*, that according to the foregoing, also occurs in West-Greenland.

C. frigidaria is also known from Finmarken and Northern Lapland.

3. *Eupithecia gelidata* Mösch.

Hekla Havn 19. 6. 92 and Gaaseland 7. 12. 92.

Geographical distribution: Several specimens of this species are known from West-Greenland, where it is most probably common; it occurs also in Labrador.

Botidæ.

1. *Botys torvalis* Mösch.

Hekla Havn 20. 7. 91, 23. 7. 91, 2. 8. 91.

The Swedish Expedition found it at Sabine Ö 9. 7. 99, Pendulum Ö 7. 7. 99, Clavering Ö 16. 7. 99, Mackenzie Bugt 7. 8. 1900 and Kap Franklin 24. 8. 1900. (10. 1139.)

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[1]) Ent. Mo. Mag. XIII. 1897. p. 229 (quoted from Bang Háas).

[2]) l. c. p. 82,

Geographical distribution: Common in West-Greenland, also occurs in Labrador and the Pyrenees.

Phycidæ.

1. *Pempelia fusca* Haw.

Hekla Havn 19. 6., 23. 7., 2. 8., 1. 8. 92, Gaaseland 1.-12. 7. 92, Röde Ö 14.-17. 7. 92, 7. 1900 and Kap Dalton.

Geographical distribution: Common in West-Greenland, and also occurs in North and Central Europe, Asia Minor, Caucasus and Catalonia.

Tortricidæ.

1. *Penthina groenlandicana* Bang Haas.

Only the three type specimens are known from East-Greenland, taken at Hekla Havn and Hold with Hope 1891—92.

Geographical distribution: Only known from East-Greenland.

2. *P. septentrionana* Mösch.

Hekla Havn 19. 7. 92.

Geographical distribution: The species has not as yet been found in West-Greenland, but is known from Labrador.

Tineidæ.

1. *Tinea fuscipunctella* Haw.

A single specimen was brought back of the Ryder Expedition from the East coast but without locality.

Geographical distribution: Not found in West-Greenland, but occurs in Europe, Asia Minor and Persia.

Plutellidæ.

1. *Plutella seninella* Zett.

A single specimen was taken in the spring of 1892, at Hekla Havn.

Geographical distribution: Found in numbers in West-Greenland and also known from North-Europe.

Pterophoridæ.

1. *Mimaeseoptilus islandicus* Staudgr.

Gaaseland 7.-12. 7. 92; Sabine Ö 7. 1900.

Geographical distribution: Besides the East coast of Greenland, the species is only known from Iceland.

Besides the above, Aurivillius (10. 1139) mentiones from East-Greenland, a species of *Sericoris* and a species og *Sericoris* or *Penthina*, but on account of the bad condition of the specimens it was impossible to determine them.

Neuroptera.

Limnophilidæ.

1. *Apatania arctia* Bohem[1].

Manby, one specimen.

Geographical distribution: About ten specimens have been found in West-Greenland. The species is also known from Spitzbergen, and probably from Iceland.

Hemiptera.

Capsidæ.

1. *Chlamydatus pulicarius* Fall.

Röde Ö, one specimen taken in the middle of August 1892.

Geographical distribution: Common in West-Greenland, and widly distributed over the whole of Europe.

Coccidæ.

1. *Orthesia cataphracta* Ol.

Gaaseland 7.-12. 7. 92. Tasiusak 19. 5. 99, amongst moss and grass; Kap Dalton 17. 4. 99; Nordre Bræfjord 1. 8. 99; most probably common.

Geographical distribution: Common in West-Greenland, occurs also on Iceland and the Faroe-Islands.

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[1]) Mr. Esben Petersen has kindly named this species for me.

2. *Coccus* sp.

The females of a species was discowered in numbers on the branches of sallow, but as no males have been taken as yet, it is impossible to say definitely to what species they belong.

Mallophaga.

Philopteridæ.

1. *Docophorus atratus* var. *ocellatus* N.

Hekla Havn on *Corvus corax.*

Hosts: Different species of *Corvus* (*C. cornix*, *C. corone*).

2. *D. communis* N.

Hekla Havn on *Emberiza nivalis.*

Hosts: *Motacilla alba*, *Acrocephalus turdinus* and *Hypolais icterina*, and various species of *Fringilla.*

3. *D. melanocephalus* N.

Gaaseland on *Sterna macrura* 10. 8. 91.

Hosts: *Sterna cantiaca*, *Larus cirrhocephalus.*

4. *D. icterodes* N.

Gaaseland 10. 8. 91 on *Anser albifrons.*

Host: Different species of *Anser.*

5. *D. merguli* Denny.

Greenland Sea on *Arctica alle.*

Hosts: *Arctica alle* is the only mentioned host.

6. *Nirmus cameratus* Denny.

Danmarks Ö on *Strepsilas interpres* 11. 3. 92.

Hosts: *Lagopus alpinus*, *Tetrao urogallus* and *T. tetrix.*

7. *N. phaeopi* Denny.

Jameson Land on *Tringa* sp. 3. 8. 91.

Hosts: *Limosa rufa*, *Numenius phaeopus*, *Tringa subarquata.*

8. *Lipeurus jejunus* N.

Gaaseland on *Anser albifrons* 10. 8. 91.

Hosts: *Anser domesticus* and other species of *Anser.*

9. *Ornithobius goniopleurus* Denny.

Gaaseland 10. 8. 91.

Hosts: *Anser canadensis*, *Mergus merganser*.

Liotheidæ.

1. *Trinotron conspurcatum* N.

Gaaseland on *Anser albifrons* 11. 8. 91.

Hosts: *Cygnus olor* and *C. musicus*, *Anser domesticus*.

2. *Physostomum nitidissimum* N.?

Hekla Havn, in siftings, 3. 1892.

Hosts: *Emberiza citrinella*.

Physopoda.

Thripidæ.

1. *Physopus vulgatissimus* Uzel.

Taagefjord 6. 92, Gaaseland 12. 7. 92, Röde Ö 14. 8. 92.

Geographical distribution: Several places in West-Greenland; also known from England, Germany, Bohemia, Austria and Finland.

Collembola.

Smynthuridæ.

1. *Smynthurus concolor* Meinert.

A short series from Kap Stewart 5. 8 91.

Geographical distribution: Two specimens found at Frederikshaab, West-Greenland; unknown from other localities.

Deegeriadæ.

1. *Isotoma virides* Gml.

Hekla Havn 3. 91, Kap Stewart 5. 8. 91, Hold with Hope 20. 7. 91.

Geographical distribution: Common in West-Greenland; widly distributed over the whole North and Central Europe, and North America.

2. *I. quadrioculata* Tullb.

Hekla Havn 3. 92.

Geographical distribution: Unknown from West-Greenland; occurs on Nova Zembla, Hvidöen, Finland, Germany, and Bohemia.

Poduridæ.

1. *Achorutes humicola* O. Fabr.

Hekla Havn 3. 4. 92, Jameson Land 3. 8. 91, Kap Stewart 5. 8. 91, 22. 8. 91.

Geographical distribution: Common in West-Greenland; also in North Europe and North America.

2. *A. armatus* Nic.

Hekla Havn 3. 92.

Geographical distribution: Taken a few times in fungus in West-Greenland; also known from Europe, North America and Sumatra.

3. *A. uniunguiculatus* Tullb.

Kap Stewart 5. 8. 91 in numbers in an old deserted house.

Geographical distribution: Not known from West-Greenland; but once found at Upsala and in Finland.

Lipuridæ.

1. *Lipura ambulans* O. Fabr.

Kap Stewart 5. 8. 91, 22. 8. 91 in an old deserted house.

Geographical distribution: Several places in West-Greenland; also known from most of the countries of Europe.

Appendix.

Beschreibung von 3 neuen Dipteren aus Ost-Grönland.

Von **Th. Becker.**

Fucellia pictipennis n. sp. ♂♀.

Diese Thiere gehören zur Gruppe der Fucellinen wegen ihrer borstigen Thorakalbehaarung, der runden Kopfform, der breit getrennten Augen, der Kreuzborsten auf der Stirn, der kurzen Fühler mit der nackten Borste. Die Hinterschenkel der ♂ sind allerdings nicht, wie bei unserer bekannten *F. fucorum* auf der Unterseite ihrer Wurzel noch durch besondere Borsten ausgezeichnet, unsere Art hat hierin vielmehr Aehnlichkeit mit der *F. griseola* Fall. Die Flügel sind am Vorderrande etwas rauh bewimpert, nicht aber mit einer besonderen Borstenreihe am Aussenrande der Randader versehen wie bei *F. fucorum* Fall. und wie wir diese Borsten auch bei *F. griseola* Fall. wenn auch nur auf der Wurzelhälfte der Flügel wahrnehmen. Angesichts der Thatsache, dass die Randader-Beborstung bei verschiedenen Arten sich in verschiedener Ausdehnung zeigt, kann man meiner Ansicht nach das Fehlen solcher Randader Borsten bei unserer Art bei sonstiger vollkommener Uebereinstimmung nicht als Gattungsmerkmal alleine auffassen; ich stelle daher diese Art zur Gattung *Fucellia.*

♂♀. *Fucelliae griceolae* Fall. affinis, sed alarum macula magna apicali fusca diversa. Long. corp. 4 mm.

Kopf und die nackten Augen gerundet, grau; die Stirne ist fast so breit wie der halbe Kopf, oben braun, über den

Fühlern etwas rothbraun, mit 2 Kreuzborsten und ungefähr je 5 Frontorbitalborsten. Untergesicht gelbgrau; Fühler schwarz, grau bereift, drittes Glied unten abgerundet, ungefähr zweimal so lang als breit, Borste schwarz nackt, auf der Wurzelhälfte verdickt. Backen halb so breit wie das Auge hoch; Mundborsten deutlich, der untere Backenrand ist einreihig beborstet und setzt sich diese Reihe am Hinterkopfe fort. Taster rothbraun, etwas vortretend. Thorax und Schildchen aschgrau bereift, ersterer mit $2 + 3$ Dorsocentralborsten, letzteres mit 4 Randborsten und 2 etwas schwächeren mitten auf der Schildfläche, die übrigens sonst ohne Haare bleibt. Akrostikalbörstchen grob, zweireihig; Mesopleuren behaart mit einer Borstenreihe an der Vertikalnaht; Sternopleuren behaart, mit 2 Hauptborsten in den oberen Ecken; Pteropleuren nackt. Schwinger und Schüppchen gelbbräunlich. Hinterleib mit 5 deutlichen Ringen, der letzte unten vom Hypopygium durchbrochen, matt aschgrau; die schwarze Behaarung hat borstlichen Karakter. Beine schwarzgrau; die Schenkel zeichnen sich durch eine Reihe schwarzer Borsten aus, die auf der Unterseite stehen und namentlich deutlich an den Hinterbeinen hervortreten. Vorderschienen mit 2 Einzelborsten auf der Endhälfte ihrer Vorderseite; an den Aussen- und Hinterseiten der Mittel- und Hinterschienen stehen 2—3 Borsten in 2 Reihen. Die Flügel sind von weisslichem Ton, der am Hinterwinkel allerdings in Grau übergeht; an der Spitze ist das Flügeldrittel bis etwa zur hinteren Querader schwarz-bräunlich gefärbt, auch sind beide Queradern sowie das Ende der ersten Längsader deutlich schwarzbraun gefärbt. Bei den Weibchen ist die Flügelfärbung etwas schwächer.

Pselaphephila arctica n. sp. ♂.

Diese Art entspricht der von mir in der Berl. Ent. Z. XXXIX 122 (1894) gegebenen Gattungsdiagnose, nur das Schildchen hat bei unserer Art ausser den beiden mittleren Borsten noch

2 ebenso stark ausgebildete Endborsten, während letztere bei der einzigen Art *Ps. Loewi* Beck. nur haarförmig sind; von letzterer Art unterscheidet sich die unsrige ferner noch durch dunklere Stirn, andere Bein-Färbung und Behaarung.

♂. Nigro-grisea opaca; capite flavo, palpis longis dilatatis concoloribus; fronte nigro-rufa, antennis longis nigris, seta crassa nuda nigra; setis mystacinis utrinque subbinis validis. Oculi oblongi; Scutellum setis quattuor; Abdomen griseum. Pedes flavi; femoribus basi, tarsis plus minusve infuscatis. Long. corp. 5 mm.

Das lange Untergesicht ist gelbgrau; Taster breit, flach, gelb mit feinen gelben und an der Spitze auch mit einigen schwarzen Haaren; Hinterkopf grau; Stirn dunkelroth-braun; das zweite Fühlerborstenglied verlängert und mit dem dritten etwas gekniet. Thorax und Schildchen aschgrau, matt, mit der normalen Beborstung; das Schildchen jedoch mit 4 gleich starken Randborsten. Schwinger und Schüppchen gelbbraun. Hinterleib matt aschgrau, ziemlich rauhhaarig; am Bauche treten am vierten Ringe 2 ovale Lamellen hervor. Beine rostgelb; alle Hüften und Schenkel, letztere bis zu $^{2}/_{3}$ ihrer Länge mehr oder weniger schwarzgrau. Tarsen rothbraun bis schwarz, der Metatarsus etwas heller. Flügel schwach grau gefärbt mit dunklen normalen Adern.

Scatophaga nigripalpis n. sp. ♂.

Unter den specifisch nordischen und arktischen Scatophagen wie: *arctica* Beck., *cordylurina* Holmgr., *dasythrix* Beck., *erythrostoma* Holmgr., *incola* Beck., *islandica* Beck., *lanata* Lundb., *litorea* Fall., *maculipes* Zett., *mollis* Beck., *obscurinervis* Beck., *scatomyzoides* Zett., *Stuxbergi* Holmgr., *varipes* Holmgr., *villipes* Zett. ist keine Art, welche bei dunkel aschgrauer Färbung des ganzen Körpers auch ganz schwarze Taster aufweist; meistens sind diese gelb oder roth und auch höchstens and der Spitze gebräunt, oder Körper und Beine sind heller gefärbt.

♂. Nigro-cinerea opaca, fronte antice rufa, facie flavo-grisea, antennis palpisque nigris, antennarum seta nigra nuda. Thoracis dorso et pleuris pilis setisque longis, filiformibus nigris. Abdomen nigro pilosum. Pedes nigri, femoribus tibiisque pilis longis nigris et pallidis ornatis, femoribus posticis non setosis. Alae griseae, nervis nigris. Long. corp. 4—5 mm.

Thorax, Hinterleib, Kopf und Beine dunkelaschgrau, matt; nur ganz vorne an der Stirn sieht man eine röthliche Fleckung. Die Borsten am Kopfe wie am ganzen Körper sind nur schwach, haarförmig, jedoch von entsprechender Länge; auf den breiten grauen Orbiten stehen viele Haare, kaum etwas reihenförmig geordnet. Die beiden ersten Glieder der schwarzen Fühler sind etwas grau bereift, die Fühlerborste ganz nackt, auf der Wurzelhälfte deutlich verdickt. Taster ganz schwarz, wie die untere und hintere Seite des Kopfes nur spärlich und überwiegend hell behaart. Thorax mit vielen schwarzen und langen Haaren; die karakteristischen Borsten der Gattung sind kaum durch grössere Stärke erkennbar. Schildchen mit 4 langen dünnen Randborsten. Brustseiten lang und fein und überwiegend schwarz behaart. Schwinger braun, Schüppchen hellbräunlich mit dunklem Saum und hellen Wimperhaaren. Hinterleib wie der Thorax, ohne besonders hervortretende Randborsten, ziemlich lang schwarz behaart. Beine ganz schwarz mit langer, hell und dunkel gemischter Behaarung an Schenkeln und Schienen; es überwiegen jedoch die dunkleren Haare. Hinterschenkel ohne Borsten, Schienenborsten lang und dünne. Flügel etwas graubraun mit schwarzen normalen Adern.

Liegnitz 15. Oktober 1907.

XI.

Note on the Crustacea.

By

H. J. Hansen.

1909.

Several years ago it has been decided that the material of the orders of Crustacea secured by the two Amdrup Expeditions shall be worked out together with the animals of the same groups collected by the "Ingolf" and other Danish expeditions or voyages to Greenland, Iceland and the Færoes. In 1908 the first part of the report on the Crustacea Malacostraca from the "Ingolf" has been published; this part (The Danish Ingolf-Expedition, Vol. III. 2., by H. J. Hansen), comprises three orders: Decapoda, Euphauciacea, and Mysidacea). In that paper every species hitherto found in the seas around our northern dependencies has been enumerated, and a perusal of the paragraph „occurrence" under each species will show whether it is known from East Greenland or Jan Mayen, and if so, whether it has been taken there by the Amdrup Expeditions. The following account, which is a full list of the forms of the three orders mentioned brought home by the Amdrup Expeditions, is only an extract from my paper.

I. Decapoda.

1. *Lithodes Maja* L. — Denmark Straits, off Angmagsalik.
2. *Sclerocrangon boreas* Phipps. — Angmagsalik; four localities in northern East Greenland between 69° 44′ N. L. and 74° 30′ N. L.
3. *Sclerocrangon ferox* G. O. Sars. — Northern East Greenland, at 71° 51′ N. L., and 72° 27′ N. L.
4. *Nectocrangon lar* Owen. — Angmagsalik; northern East Greenland at Cape Tobin and in Forsblad Fjord.

5. *Sabinea septemcarinata* Sab. — Jan Mayen; six localities in northern East Greenland between 69° 44′ N. L. and $74^1/_2$° N. L.
6. *Spirontocaris Gaimardii* H. M.-Edw. — Jan Mayen; Angmagsalik.
. *Spirontocaris spinus* Sow. — Angmagsalik.
8. *Spirontocaris turgida* Kr. — Angmagsalik.
9. *Spirontocaris polaris* Sab. — Angmagsalik; a score of times in northern East Greenland, between $69^1/_2$° N. L. and $74^1/_2$° N. L.
10. *Spirontocaris groenlandica* J. C. Fabr. — Angmagsalik; three localities in northern East Greenland, from 69° 44′ N. L. to $74^1/_2$° N. L.
11. *Bythocaris simplicirostris* G. O. Sars. — East Greenland at ca. $74^1/_3$° N. L.
12. *Pandalus borealis* Kr. — Angmagsalik.
13. *Hymenodora glacialis* Buchh. — Taken three times: in the stomach of *Procellaria glacialis* from 69° 51′ N. L., 11° 18′ W. L., in the stomach of the same species of bird from $74^1/_3$° N. L., $9^2/_3$° W. L., and at 74° 12′ N. L., 12° W. L., in ice.

II. Euphausiacea.

1. *Rhoda inermis* Kr. — Jan Mayen; at ca. $73^1/_2$° N. L., 4° W. L. and ca. $73^1/_3$° N. L., $8^1/_2$° W. L.
2. *Thysanoëssa longicaudata* Kr. — Jan Mayen; at ca. $73^1/_2$° N. L., 4° W. L.

III. Mysidacea.

1. *Boreomysis nobilis* G. O. Sars. — 70° 09′ N. L., 22° 02′ W. L.
2. *Erythrops erythrophthalma* Goës. — Jan Mayen.
3. *Mysis oculata* O. Fabr. — Angmagsalik and a little north of this to 66° 15′ N. L.; two localities in northern East Greenland, viz. at 70° 50′ N. L. and $74^1/_2$° N. L.; Jan Mayen.

4. *Mysis mixta* Lilljeb. — Northern East Greenland, at 70° 50′ N. L. and 72° 28′ N. L.

The remainder of the Crustacea Malacostraca collected by the first Amdrup Expedition comprises 2 species of Isopoda and 23 species of Amphipoda, all from shallow water at the district of Angmagsalik. The material of Amphipoda secured by the second Expedition is of course much larger, but has not yet been named. This second Expedition collected besides a number of Cumacea, Isopoda and Tanaidacea; the material of Cumacea comprises 12 species, 2 of which seem to be new to science; the majority of the Isopoda and Tanaidacea, viz. 15 species, have been determined, but several species are still unnamed, and at least two among them are new.

It may be added that some years ago Cand. mag. C. J. With began to separate the pelagic Copepoda from the samples of plankton taken by the "Ingolf", the second Amdrup Expedition, etc.; he has determined a part of this vast material, contemporaneously working out the report. The second Amdrup Expedition brought home numerous bottles with plankton, but Mr. With being abroad it is impossible to give further communication on the matter.

It may be added that same years ago I discovered a new type of Cirripedia Rhizocephala in the marsupium of an Isopod, *Calathura brachiata* Stimps., taken by the second Amdrup Expedition in Forsblad Fjord, East Greenland. The parasite (three specimens on the same host) has been described as a new genus and species, *Duplorbis calathuræ*, by Geoffrey Smith in his Monograph on the Rhizocephala (Fauna und Flora des Golfes von Neapel, 29. Mon. 1906). The author says that the genus is "highly interesting but in some respects problematical."

20—2—1909.

XII.

The Porifera of East-Greenland.

By

William Lundbeck.

1909.

The following paper is chiefly based on the collections of the Amdrup-expeditions to East-Greenland, as these collections were rather rich, but also the collections of the Ryder-expedition have been included into the paper, and mentions are also made of the species otherwise known from the region; thus the paper intends to give an enumeration of all the species of *Porifera* hitherto known from East-Greenland.

The Ryder-expedition took place in the years 1891—92, and the Amdrup-expeditions in 1898—99 and in 1900, therefore the material, collected by the Ryder-expedition, and belonging to the *Homorrhaphidae, Heterorrhaphidae* and the first part of the *Desmacidonidae* was included in "The Danish Ingolf-Expedition", Porifera, Part I, 1902 (containing *Homorrhaphidae* and *Heterorrhaphidae*), and Part II, 1905 (containing the first Part of the *Desmacidonidae*), and the material from the Amdrup-expeditions, belonging to the mentioned first part of the *Desmacidonidae* was included in Part II of the Ingolf-work; the species in question are therefore here only enumerated; the material from the Amdrup-expeditions, belonging to the *Homorrhaphidae* and *Heterorrhaphidae* on the other hand was received too late to be included in the first Part of the Ingolf-work, and this material is therefore now treated here; it contains one species, *Gellius varius*, not hitherto known from the regions in question.

I shall here make the remark, that of the stations of the Ingolf-expedition I have only taken station 94, 64° 56′ lat. N., 36° 19′ long. W. with a depth of 204 fathoms into consideration, while I have not considered the other stations, lying in the western part of the Denmark-Strait, as belonging to the region treated here, but here there is some inconsequence as a few collections were made by both the mentioned expeditions in places lying more eastern, and these are treated here.

Some genera and species of the groups, not published hitherto in the Ingolf-work, are not yet worked out, and some new species not yet described, and they are therefore in the following only mentioned somewhat summarily. — The material from both expeditions, belonging to the families and orders not yet treated in the Ingolf-work, will be finally treated there, together with the other arctic material.

The following species are at present known to occur at East-Greenland:

Monaxonida.

Fam. **Homorrhaphidae.**

Chalina groenlandica Frstdt.
Halichondria panicea Pall.
Halichondria fibrosa Frstdt.
Halichondria osculum Ldbck.
Halichondria oblonga Arm. Hans.
Eumastia sitiens O. S.
Reniera folium Ldbck.?
Reniera clavata Levins.
Reniera cinerea Grant.
Reniera tubulosa Frstdt.
Reniera sp.
Reniera sp.

Fam. **Heterorrhaphidae.**

Gellius varius Bow.
Gellius arcoferus Vosm.
Gellius porosus Frstdt.

Gelliodes plexa Ldbck.
Oceanapia robusta Bow.
Biemma rosea Frstdt.
Desmacella Peachii Bow.
Desmacella hamifera Ldbck.
Desmacella groenlandica Frstdt.
Hamacantha Bowerbanki Ldbck.

Fam. **Desmacidonidae.**

Esperiopsis villosa Cart.
Esperiopsis typichela Ldbck.
Mycale placoides Cart.
Mycale lingua Bow.
Mycale thaumatochela Ldbck.
Mycale intermedia O. S.
Asbestopluma pennatula O. S.
Asbestopluma cupressiformis Cart.
Asbestopluma lycopodium Levins.
Chondrocladia gigantea Arm. Hans.
Artemisina arcigera O. S.
Artemisina apollinis R. and D.
Myxilla incrustans Johnst.
Myxilla perspinosa Ldbck.
Lissodendoryx Sophia Frstdt.
Lissodendoryx indistincta Frstdt.
Lissodendoryx complicata Arm. Hans.
Jophon piceus Vosm.
Jophon frigidus Ldbck.
Jotrochota oxeata Ldbck.
Jotrochota rotulancora Ldbck.
Jotrochota affinis Ldbck.
Forcepia fabricans O. S.
Forcepia groenlandica Frstdt.
Melonanchora elliptica Cart.

Melonanchora emphysema O. S.
Tedania suctoria O. S.
Histoderma physa O. S.
Cornulum textile Cart.
Grayella pyrula Cart.
Hymedesmia Dujardini Bow.
Hymedesmia sp.
Hymedesmia sp.
Hymedesmia sp.
Hymedesmia sp. all new.
Hymedesmia sp.
Hymedesmia sp.
Ectyodoryx foliatus Frstdt.
Ectyodoryx sp.
Pocillon sp.
Stylostichon hospitalis O. S.
Hymeraphia sp.
Crella sp.
Crella sp.
Crella sp.
Echinoclathria sp.
Plocamia sp.
Plocamia sp.

Fam. **Axinellidae.**

Phakellia ventilabrum Johnst.
Phakellia Bowerbanki Vosm.
Phakellia rugosa Bow.
Tragosia Sluiteri Vosm.
Bubaris vermiculata Bow.

Fam. **Spirastrellidae.**

Latrunculia sp.

Fam. **Polymastiidae.**

Polymastia uberrima O. S.

Polymastia mammillaris Müll.
Polymastia paupera Frstdt.
Trichostemma hemisphæricum Sars.
Quasillina brevis Bow.
Tentorium semisuberites O. S.

Fam. **Suberitidae.**

Prosuberites sp.
Ficulina ficus L.
Suberites carnosus Johnst.
Suberites sp.

Tetractinellida.

Fam. **Tetillidae.**

Craniella cranium Müll.

Fam. **Theneidae.**

Thenea muricata Bow.

Fam. **Geodiidae.**

Geodia Barretti Bow.

Hexactinellida.

Fam. **Rossellidae.**

Schaudinnia rosea Frstdt.
sp. of *Rossellinae.*

Calcarea.

Fam. **Asconidae.**

Leucosolenia coriacea Mont.
Leucosolenia Lamarckii Haeck.
Leucosolenia Nanseni Breitfss.
Ascandra complicata Mont.
Ascandra Fabricii O. S.
Ascandra variabilis Haeck.

Fam. Syconidae.

Sycon ciliatum Risso.
Grantia arctica Haeck.
Grantia mirabilis Frstdt.
Grantia capillosa O. S.
Grantia pennigera Haeck.
Grantia utriculus O. S.
Amphoriscus glacialis Haeck.
Ebnerella Schulzei Breitfss.

Fam. Leuconiidae.

Leuconia Egedii O. S.

Myxospongida.

Fam. Halisarcidae.

Halisarca Dujardinii Johnst.

Besides the species, mentioned in the following from: "Die zweite deutsche Nordpolarfahrt", still a few sponges have been recorded by O. Schmidt in this work, but they are indetermined and indeterminable; they are the following:

Cacospongia sp.
Chalinula sp. (may be some Axinellid, as Schmidt says it has "einspitzige Nadeln".)
Reniera sp.
Isodictya infundibuliformis (probably = *Tragosia Sluiteri* Vosm.)
Desmacidon anceps.

With regard to this latter species, Thiele has shown (Arch. für Naturgesch., 1903, 388) that *Desmacidon anceps* in reality not exists, but is a mixtum of different species; judging from the spicules figured by Schmidt (l. c. Pl. I) none for East-Greenland new species seems to be represented in it.

Monaxonida.

Halichondrina.

Fam. Homorrhaphidae.

Chalina Grant.

C. groenlandica Frstdt.

1887. *Chalina groenlandica* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 417, Pl. 23, fig. 19.
1902. — — , Lundbeck, The Danish Ingolf-Exp. VI, 1, 13.

This species was taken at East-Greenland, depth 140 fathoms, on the Swedish arctic expedition 1883 (Fristedt l. c.).

Halichondria Flem.

H. panicea Pall.

1842. *Halichondria panicea* Johnston, Brit. Spong. and Litoph. 114, Pl. X, Pl. XI, fig. 5.

Of this common and cosmopolitan species there are in the collections some small specimens, growing on Bryozoa and Hydroids; the largest specimen is somewhat massive, of a greatest extent of about 30 mm; some of the specimens growing on the Hydroids are of a quite ovular shape, much resembling specimens of *Mycale ovulum*; these specimens have a size of only 8 mm. The oxea are of quite the typical shape, of a length of up to 0·50 mm.

Tasiusak $^{23}/_{5}$ and $^{1}/_{6}$ 1899, depth 25—30 fathoms (The Amdrup-expedition 1898—99); Hurry Inlet $^{21}/_{7}$ 1900, depth 20 fathoms (The Amdrup-expedition 1900). The species was hitherto not known from East-Greenland.

H. fibrosa Frstdt.

1887. *Amorphina fibrosa* Fristedt, Vega-Exp. vetensk Iakttag., IV, 426, Pl. 24, figs. 11—12.
1902. *Halichondria fibrosa,* Lundbeck, The Danish Ingolf-Exp. VI, 1, 20, Pl. IX, figs. 3 a, b, c.

This species is represented by about ten specimens; they form irregular, often lengthy lumps. The oscula are conically spout-shaped. The specimens show generally very distinctly marked parts of the surface where the small oxea are more or less closely packed without forming a reticulation and other, generally more restricted parts where there is a reticulation.

Tasiusak $^{19}/_{5}$ 1899, depth 20 fathoms (The Amdrup-expedition 1898—99), Tasiusak $^{22}/_{8}$ 1902, depth 30—35 fathoms (Kruuse).

H. osculum Ldbck.

1902. *Halichondria osculum* Lundbeck, The Danish Ingolf-Exp. VI, 1, 23, Pl. III, figs. 3—7, Pl. IX, figs. 7—9.

At the south end of Jamesons Land, depth 10—60 fathoms. (The Ryder-expedition 1891—92) (Lundbeck l. c.).

H. oblonga Arm. Hans.

1885. *Reniera oblonga* Armauer Hansen, The Norwegian North-Atl. Exp. XIII, 4, Pl. II, fig. 5A, Pl. VI, fig. 2.

1902. *Halichondria oblonga*, Lundbeck, The Danish Ingolf-Exp. VI, 1, 24, Pl. II, fig. 4, Pl. IX, fig. 10.

Of this species the Amdrup-expedition has brought home a rather great number of fragments and some more or less damaged specimens; these latter are chiefly of the shape known for this species, whereas some of the fragments show, that the species may also assume the shape of a thick leaf; the largest of these leaf-shaped fragments has a greatest length of 9 cm.

72° 40′ lat. N., 19° 42′ long. W., depth 130 fathoms, at the south end of Jamesons Land, depth 10—60 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.); Cape Brewster $^{22}/_{8}$ 1900, depth about 250 fathoms (The Amdrup-expedition 1900).

Eumastia O. Schmidt.

E. sitiens O. Schmidt.

1870. *Eumastia sitiens* O. Schmidt, Grundzüge einer Spongienfauna des atlant. Gebiet, 42, Tab. V, Fig. 12.

1902. — — , Lundbeck, The Danish Ingolf-Exp. VI, 1, 31, Pl. IV, figs. 1—6, Pl. X, figs. 9—12.

Angmagsalik $^{22}/_{3}$ 1901 (Søren Nielsen); Forsblad-Fjord $^{30}/_{8}$ 1900, depth 50—90 fathoms (The Amdrup-expedition 1900). The specimens from Angmagsalik are for the larger part irregular, massive lumps with much bottom material imbedded, only one of the specimens has distinct papillæ. The specimens from Forsblad-Fjord are fragments, probably of the lower part of the sponge, as they show no papillæ; the latter specimens have very large spicules, of a length up to 1·2 mm.

Reniera Nardo.

R. folium Ldbck.?

1902. *Reniera folium* Lundbeck, The Danish Ingolf-Exp. VI, 1, 39, Pl. V, fig. 5, Pl. XI, fig. 5.

From Cape Dalton $^{20}/_{7}$ 1900, depth 9—11 fathoms (The Amdrup-expedition 1900) we have a small fragment of a *Reniera* which in every respect seems to agree with *Reniera folium*, the spicules are of the same shape and likewise of a length of 0·19—0·21 mm, but the fragment is too small to allow a quite sure determination.

R. clavata Levins.

1886. *Reniera clavata* Levinsen, Dijmphna Togtets zool. bot. Udbytte, 351, 10, Pl. XXIX, fig. 5, Pl. XXX, fig. 3.

1992.? — — , Lundbeck, The Danish Ingolf-Exp. VI, 1, 43, Pl. XI, fig. 9.

As mentioned in "The Danish Ingolf-Exp." l. c. we have two small specimens from East-Greenland, 72° 40′ lat. N., about 20° long. W., depth 100 fathoms (The Ryder-expedition 1891—92), but these have spicules, which are a little longer than those of the original specimen, so that the identity is not sure. Later on a specimen is brought home from Tasiusak, $^{22}/_{8}$ 1902, depth 30—50 fathoms (Kruuse); this specimen is quite agreeing with that described by Levinsen; the spicules have a length of 0·23—0·27 mm, and a diameter of about 0·015 mm. The specimen has a length of 50 mm; it shows an osculum at the summit.

R. cinerea Grant.

Pl. XIV. Fig. 2.

1827. *Spongia cinerea* Grant, Edinb. New Philos. Journ. II, 204.

1902. *Reniera cinerea*, Lundbeck, The Danish Ingolf-Exp. VI, 1, 43, Pl. XI, fig. 10.

We have some specimens which I determine with rather great certainty as *R. cinerea.* They have an unispicular skeleton, and the spicules are of a length of 0·15 mm, with an average diameter of 0·006 mm. The specimens grow on seaweed and on Hydroids, they are not small, the largest specimen has a greatest extent of 55 mm; they are of a lobate shape, with oscula-bearing cones. The colour is grey, in some of the specimens with a yellowish or rosy tinge, in others quite grey.

Jan Mayen $^{25}/_{6}$ 1900, depth 50—60 fathoms (The Amdrup-expedition 1900); Angmagsalik $^{23}/_{3}$ 1901 (Søren Nielsen).

R. ***tubulosa*** Frstdt.

1887. *Reniera tubulosa* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 419, Pl. 24, fig. 1.

1902. — — , Lundbeck, The Danish Ingolf-Exp. VI, 1, 44, 8, Pl. II, fig. 5, Pl. XI, figs. 11 a—c, fig. 12.

Some in all respects typical specimens.

Tasiusak $^{22}/_{5}$ 1899 depth 20—30 fathoms (The Amdrup-expedition 1898—99).

R. sp.

In «The Danish Ingolf-Exp.» VI, 1, 49, Pl. XI, fig. 17 a species of *Reniera* is mentioned, indicated as *Reniera* sp. a, which was taken in Scoresby Sund, depth between 10 and 60 fathoms (The Ryder-expedition 1891—92). Later on a specimen has been brought home which quite resembles the mentioned species, it is likewise lengthily pyriform and of the same size; also the spicules are quite agreeing, so that these specimens are no doubt identical. The specimen was taken in Angmagsalik Fjord $^{7}/_{8}$ 1902 (Kruuse).

R. sp.

In the Ingolf-work quoted (50, Pl. XII, fig. 2) another *Reniera* species is mentioned, indicated as *Reniera* sp. c; it shows some affinity to *R. Voeringii* Ldbck. (= *R. simplex* Arm. Hans.), but the spicules are a little different. The specimens were taken in Hekla Havn (The Ryder-expedition 1891—92).

Fam. Heterorrhaphidae.

Gellius Gray.

G. varius Bow.

Pl. XIV. Fig. 3 a, b.

1875. *Halichondria varia* Bowerbank, Proc. Zool. Soc. 292.
1884. *Gellius varius*, Ridley, Rep. of Zool. Coll. made during the Voy. of H. M. S. "Alert" 1884, 424.

We have a small specimen, probably only a fragment, which I identify as *G. varius* Bow. Its greatest extent is only 17 mm. The colour (in spirit) is brown.

It is very difficult for the present to determine with certainty a *Gellius* species belonging to the group with the spiculation consisting only of oxea and sigmata, because the species of this group have hitherto neither been thoroughly described nor figured. When I determine the present species as *varius* Bow., I do so chiefly because the sizes of the spicules agree best with this species, while *G. couchi* Bow. and *G. fibulatus* O. S. have thinner oxea (se Ridley l. c.). The oxea of the specimen in hand are evenly curved, sometimes the curve is localized more or less distinctly in the middle; they are of the same thickness in the whole length, the points are short and bounded by curved lines, the very apex bears a little mucro. The length of the oxea is 0·26—0·3 mm and the thickness 0·014 mm. The ends of the oxea are connected by a distinct mass of spongin. The sigmata are of common shape and they are plane, their length is 0·036 mm and the thickness is 0·0015 mm.

Cape Tobin, depth 57 fathoms (The Amdrup-expedition 1900).

G. arcoferus Vosm.

1885. *Gellius arcoferus* Vosmaer, Bijdrag. tot de Dierk. 12te Afl. 3die Gedeelt. 29, Pl. IV, fig. 18, Pl. V, figs. 87—90.
1902. — —, Lundbeck, The Danish Ingolf-Exp. VI, 1, 62, Pl. XII, figs. 11 a, b, c.

Only a small fragment.

72° 40′ lat. N., 20° long. W., depth 100 fathoms (The Ryder expedition 1891—92) (Lundbeck l. c.).

G. porosus Frstdt.

1887. *Desmacella porosa* Fristedt., Vega-Exp. vetensk. Iakttag. IV, 440, Pl. 24, figs. 36—37, Pl. 28, figs. 15.

1902. *Gellius porosus*, Lundbeck, The Danish Ingolf-Exp. VI, 1, 73, Pl. XIV, figs. 2 a—c.

Of this species we have some specimens or fragments, all of the brittle consistens which is earlier noted for this species; the largest specimen has a greatest extent of 60 mm and is of an irregular massive shape.

Angmagsalik $^{18}/_{9}$ 1900, depth 140 fathoms; Cape Tobin $^{21}/_{8}$ 1900, depth 57 fathoms; Forsblad-Fjord $^{30}/_{8}$ 1900, depth 50—90 fathoms (The Amdrup-expedition 1900).

Gelliodes Ridley.

G. plexa Ldbck.

1902. *Gelliodes plexa* Lundbeck, The Danish Ingolf-Exp., VI, 1, 75, Pl. V, figs. 3—4, Pl. XIV, figs. 3 a—d, 4—5.

Of this interesting species some fragments have been taken, no doubt all belonging to one individual. They are in all respects conform to the original specimens, and may have formed a flabelliform or a large cup-shaped specimen; the largest fragment which has the upper edge undamaged and thus proves to be a piece of the upper part of the sponge, has a horizontal extent of 100 mm. With regard to the oscula and pores the specimen shows the same structures which are described in the place quoted.

Turner Sund $^{26}/_{7}$ 1900, depth 120 fathoms (The Amdrup-expedition 1900).

Oceanapia Norman.

O. robusta Bow.

1866. *Isodictya robusta* Bowerbank, Mon. Brit. Spong. II, 304, 20.

1874. *Desmacidon Jeffreysii* Bowerbank, ibid. III, 157, Pl. LXII.

1887. — —, Fristedt, Vega-Exp. vetensk. Iakttag. IV, 442.

1902. *Oceanapia robusta*, Lundbeck, The Danish Ingolf-Exp. VI, 1, 78, Pl. XV, figs. 1 a—c, 2—4.

This species is not represented in our collections, but it was taken at the East-coast of Greenland, depth 130 fathoms by the Swedish arctic expedition 1883 (Fristedt l. c.).

Biemma Gray.

B. rosea Frstdt.

1887. *Desmacella rosea* Fristedt, Vega-Exp. vetensk. Iakttag IV, 439, Pl. 24, figs. 32—35, Pl. 28, fig. 13.

1902. *Biemma rosea*, Lundbeck, The Danish Ingolf-Exp. VI, 1, 82, Pl. VI, figs. 1—2, Pl. XV, figs. 5 a—d, 6—9.

The East-coast of Greenland, depth 125 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

Desmacella O. Schmidt.

D. Peachii Bow.

1866. *Desmacidon Peachii* Bowerbank, Mon. Brit. Spong. II, 349, 3, and 1874, III, Pl. LXIII, figs. 1—7.

1902. *Desmacella Peachii*, Lundbeck, The Danish Ingolf-Exp. VI, 1, 90, Pl. IV, figs. 10—13, Pl. XVI, figs. 2 a—l.

One specimen, taken at the East-coast of Greenland 65° 39′ lat. N., 28° 25′ long. W., depth 553 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.).

D. hamifera Ldbck.

1902. *Desmacella hamifera* Lundbeck, The Danish Ingolf-Exp. VI, 1, 93, Pl. VII, figs. 4—6, Pl. XVII, figs. 1 a—l.

Some more or less fan-shaped pieces are found in the collections, they are in all respects quite typical.

Angmagsalik $^{18}/_{9}$ 1900, depth 140 fathoms, at Cape Tobin $^{21}/_{8}$ 1900, depth 57 fathoms (The Amdrup-expedition 1900).

D. groenlandica Frstdt.

1887. *Desmacella Peachii* var. *groenlandica* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 441, Pl. 24, figs. 38—45, Pl. 28, fig. 14.

1902. *Desmacella groenlandica* Lundbeck, The Danish Ingolf-Exp. VI, 1, 95, Pl. VI, fig. 14, Pl. VII, fig. 7, Pl. XVII, figs. 7 a—b.

A small fragment of this species was taken at East-Greenland, depth 130 fathoms (The Swedish arctic-expedition 1883; Fristedt l. c.).

Hamacantha Gray.

H. Bowerbanki Ldbck.

1902. *Hamacantha Bowerbanki* Lundbeck, The Danish Ingolf-Exp. VI, 1, 99, Pl. VII, figs. 2—3, Pl. XVIII, figs. 1 a—k, 2—3.

Of this species we have a small, incrusting specimen, growing on a stone.

The Ingolf-expedition, station 94, 64° 56′ lat. N., 36° 19′ long. W., depth 204 fathoms.

Remarks. Topsent (Résultats des camp. scient. du Prince de Monaco, Fasc. XXV, 1904, 216) says, that he thinks this species identical with *H. Johnsoni* Bow., thinking this latter species identical with *H. Johnsoni* Cart. (Ann. Mag. Nat. Hist. 5, IX, 297, Pl. XI, figs. 20 a—e). I can not follow him in this interpretation, then I se, as I have declared at length in the place quoted, no sufficient reason for the identification of Bowerbank's and Carter's species; therefore I thougth it necessary to give Carter's species a new name, and to leave the *H. Johnsoni* Bow. out of question.

Fam. Desmacidonidae.

Esperiopsis Cart.

E. villosa Cart.

1874. *Esperia villosa* Carter, Ann. Mag. Nat. Hist. 4, XIV, 213, Pl. XIII, figs. 13—15, Pl. XV, fig. 36.

1887. — — , Fristedt, Vega-Exp. vetensk. Iakttag. IV, 451, Pl. 25, figs. 33—39, Pl. 29, fig. 19.

1905. *Esperiopsis villosa*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 9, Pl. I, fig. 4, Pl. VIII, figs. 1 a—i.

65° 39′ lat. N., 28° 25′ long. W., depth 553 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.); East-coast of Greenland, depth 140 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

E. typichela Ldbck.

1905. *Esperiopsis typichela* Lundbeck, The Danish Ingolf-Exp. VI, 2, 22, Pl. I, fig. 3, Pl. IX, figs. 2 a—c, 3—4.

The only hitherto known specimen of this interesting species was taken in Forsblad-Fjord $^{30}/_{8}$ 1900, depth 50—90 fathoms (The Amdrup-expedition 1900) (Lundbeck l. c.).

Mycale Gray.

M. placoides Cart.

1876. *Esperia placoides* Carter, Ann. Mag. Nat. Hist. 4, XVIII, 316, Pl. XIII, fig. 12, Pl. XV, fig. 32.
1905. *Mycale placoides,* Lundbeck, The Danish Ingolf-Exp. VI, 2, 24, Pl. IX, figs. 5 a—l.

65° 39′ lat. N., 28° 25′ long. W., depth 553 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.).

M. lingua Bow.

1866. *Hymeniacidon lingua* Bowerbank, Mon. Brit. Spong. II, 187, 24.
1905. *Mycale lingua,* Lundbeck, The Danish Ingolf-Exp. VI, 2, 29, Pl. IX, figs. 6 a—f.

72° 53′ lat. N., 20° 36′ long. W., depth 96 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.); it was also taken near the southern point of Greenland on 59° 33′ lat. N., 43° 25′ long. W., depth 120 fathoms. (The Swedish arctic expedition 1883; Fristedt).

M. thaumatochela Ldbck.

1905. *Mycale thaumatochela* Lundbeck, The Danish Ingolf-Exp. VI, 2, 39, Pl. X, figs. 2 a—g.

Of this interesting species which is at present only known from both coasts of Greenland, one specimen was taken off Cape Dalton $^{20}/_{7}$ 1900, depth 9—11 fathoms (The Amdrup-expedition 1900) (Lundbeck l. c.).

M. intermedia O. Schmidt.

1874. *Esperia intermedia* O. Schmidt, Die zweite deutsche Nordpolarfahrt, II, 433, Taf. I, Fig. 40.
1903. *Mycale intermedia,* Thiele, Arch. für Naturgesch. 1903, 381, Taf. 21, Fig. 12.
1905. — — , Lundbeck, The Danish Ingolf-Exp. VI, 2, 43.

This curious species, the only one known of this genus with diactinal megascleres, is not represented in our-collections.

At North-Shannon (Die zweite deutsche Nordpolarfahrt; Schmidt l. c.).

Asbestopluma Norman.

A. pennatula O. Schmidt.

1875. *Cladorhiza pennatula* O. Schmidt, Jahresber. der Comm. zur Unters. deutsch. Meere in Kiel für 1872—73, 119, Taf. I, Fig. 14—16.

1887. *Cladorhiza Nordenskiöldii* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 455, Pl. 25, figs. 56—59, Pl. 31, fig. 55.

1905. *Asbestopluma pennatula*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 44, Pl. II, figs. 1—6, Pl. X, figs. 4a—o, 5—7.

One specimen was taken on the Swedish arctic expedition 1883 at the East-coast of Greenland, depth 130 fathoms (Fristedt l. c.), and one specimen and some fragments were taken by the Ingolf-expedition on station 94, 64° 56′ lat. N., 21° 36′ long. W., depth 204 fathoms (Lundbeck l. c.).

A. cupressiformis Cart.

1874. *Esperia cupressiformis* Carter partim, Ann. Mag. Nat. Hist. 4, XIV, 215, Pl. XIV, figs. 16a—f, 17—18, Pl. XV, fig. 37.

1905. *Asbestopluma cupressiformis*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 58, Pl. II, figs. 11—14, Pl. XI, figs. 4a—f, 5.

72° 40′ lat. N., 20° long. W., depth 100 fathoms, 72° 27′ lat. N., 19° 50′ long. W., depth 120 fathoms, and at the south end of Jameson Land, depth 10—60 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.).

A. lycopodium Levins.

1886. *Esperella cupressiformis* var. *lycopodium* Levinsen, Dijmphna-Togtets zool. bot. Udbytte, 364, Tab. XXIX, figs. 12—13, Tab. XXX, figs. 15, 16d.

1905. *Asbestopluma lycopodium*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 62, Pl. II, figs. 15—17, Pl. XI, figs. 6a—d, 7.

70° 32′ lat. N., 8° 10′ long. W., depth 470 fathoms (The

Ryder-expedition 1891—92) (Lundbeck l. c.). The species is a native of cold water.

Chondrocladia Wyv. Thoms.

C. gigantea Arm. Hans.

1885. *Desmacidon giganteum* Armauer Hansen, The Norweg. North-Atlant. Exp. XIII, Spongiadæ 14, Pl. II, figs. 12—13, Pl. VII, fig 8.
1887. *Cladorhiza nobilis* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 456, Pl. 25, fig. 60—65, Pl. 31, fig. 26.
1905. *Chondrocladia gigantea*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 102, Pl. IV, fig. 1, Pl. XIII, figs. 2a—l.

A specimen of this beautiful arctic sponge was taken by the Swedish arctic expedition 1883 at the East-coast of Greenland, depth 130 fathoms (Fristedt l. c.).

Artemisina Vosm.

A. arcigera O. Schmidt.

1870. *Suberites arciger* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 47, Taf. V, Fig. 6.
1905. *Artemisina arcigera*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 110, Pl. I, figs. 9—11, Pl. XIII, figs. 3a—f.

One specimen from East-Greenland without more particular locality (The Ryder-expedition 1891—92); Forsblad-Fjord $^{30}/_{8}$ 1900, depth 50—90 fathoms, Hurry-Inlet $^{11}/_{8}$ 1900, depth 50 fathoms, one specimen on each locality (The Amdrup-expedition 1900) (Lundbeck l. c.).

A. apollinis R. and D.

1887. *Amphilectus apollinis* Ridley and Dendy, Challeng. Rep. Monaxonida, XX, 124, Pl. XIX, figs. 3, 3a—c.
1905. *Artemisina apollinis*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 114, Pl. XIII, figs. 4a—g.

Two fragments without other locality than East-Greenland (The Ryder-expedition 1891—92) (Lundbeck l. c.).

Myxilla O. Schmidt.

M. incrustans Johnst.

1842. *Halichondria incrustans* Johnston, A Hist. of Brit. Spong. and Litoph. 122, Pl. XII, fig. 3, Pl. XIII, fig. 5.

1905. *Myxilla incrustans,* Lundbeck, The Danish Ingolf-Exp. VI, 2, 132, Pl. IV, figs. 6—7, Pl. XIV, figs. 3a—h.

Of this common and widely distributed species one specimen has been taken at Jan Mayen, depth 55 fathoms (The Amdrup-expedition 1900) (Lundbeck l. c.).

M. perspinosa Ldbck.

1905. *Myxilla perspinosa* Lundbeck, The Danish Ingolf-Exp. VI, 2, 147, Pl. V, fig. 1, Pl. XIV, figs. 7a—e.

One specimen of this species was taken at Jan Mayen $^{25}/_{6}$ 1900, depth 50—60 fathoms (The Amdrup-expedition 1900) (Lundbeck l. c.).

Lissodendoryx Tops.

L. Sophia Frstdt.

1887. *Esperia Sophia* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 451, Pl. 25, figs. 30—32.

1905. *Lissodendoryx Sophia,* Lundbeck, The Danish Ingolf-Exp. VI, 2, 156, Pl. V, fig. 6, Pl. XV, fig. 5.

One specimen was taken by the Swedish arctic expedition 1883 at the East-coast of Greenland, depth 130 fathoms (Fristedt l. c.).

L. indistincta Frstdt.

1887. *Hastatus indistinctus* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 444, Pl. 25, figs. 13—19.

1905. *Lissodendoryx indistincta,* Lundbeck, The Danish Ingolf-Exp. VI, 2, 162, Pl. V, fig. 10, Pl. XVI, figs. 3a—h.

Two specimens taken at Hekla Havn, depth 5—12 fathoms (The Ryder-expedition 1891—92) (Lundbeck l c.).

L. complicata Arm. Hans.

1885. *Reniera complicata* Armauer Hansen, The Norweg. North-Atlantic Exp. XIII, Spongiadæ, 7, Pl. I, fig. 8, Pl. VI, fig. 8.

1905. *Lissodendoryx complicata,* Lundbeck, The Danish Ingolf-Exp. VI, 2, 166, Pl. V, fig. 11, Pl. XVI, figs. 4a—g.

Some fragments have been taken south of Jan Mayen 70° 32′ lat. N., 8° 10′ long. W $^{27}/_{6}$ 1891, depth 470 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.). The species is a native of the cold area.

Iophon Gray.

I. piceus Vosm.

1881. *Alebion piceum* Vosmaer, Niederl. Arch. für Zool. Suppl. Band I, 42, Pl. I, fig. 19, Pl. III, figs. 75—78, 81—82.
1887. *Esperia nigricans*, Fristedt, Vega-Exp. vetensk. Iakttag. IV, 448.
1905. *Iophon piceus*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 175, Pl. VI, figs. 1—2, Pl. XVII, figs. 3 a—l.

At Angmagsalik $^{18}/_{9}$ 1900, depth 140 fathoms (The Amdrup-expedition 1900) (Lundbeck l. c.), and towards south on 59° 33′ lat. N., 43° 25′ long. W., depth 120 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

I. frigidus Ldbck.

1886. *Esperella picea*, Levinsen, Dijmphna-Togtets zool. bot. Udbytte, 360, Tab. XXXI, figs. 1, 2 a—d.
1905. *Iophon frigidus* Lundbeck, The Danish Ingolf-Exp. VI, 2, 183, Pl. XVII, figs. 5 a—f.

72° 25′ lat. N., 19° 33′ long. W., $^{27}/_{7}$ 1891, depth 140 fathoms (The Ryder-expedition 1891—92) (Lundbeck l. c.).

Iotrochota Ridley.

I. oxeata Ldbck.

1905. *Iotrochota oxeata* Lundbeck, The Danish Ingolf-Exp. VI, 2, 186, Pl. VI, fig. 6, Pl. XVIII, figs. 2 a—f.

One specimen. The Ingolf-expedition station 94, 64° 56′ lat. N., 36° 19′ long. W., depth 204 fathoms (Lundbeck l. c.).

I. rotulancora Ldbck.

1905. *Iotrochota rotulancora* Lundbeck, The Danish Ingolf-Exp. VI, 2, 191, Pl. XVIII, figs. 6 a—g.

One specimen from Rathbone Ø off the Liverpool-Kyst, 70° 40′ lat. N., depth 94 fathoms (The Amdrup-expedition 1900) (Lundbeck l. c.).

I. affinis Ldbck.

1905. *Iotrochota affinis* Lundbeck, The Danish Ingolf-Exp. VI, 2, 194, Pl. XVIII, figs. 8 a—e.

One specimen was taken at Cape Tobin, 70° 23′ lat. N., 22° long. W., depth 57 fathoms (The Amdrup-expedition 1900) (Lundbeck l. c.).

Forcepia Cart.

F. fabricans O. Schmidt.

Pl. XIV. Fig. 5.

1874. *Esperia fabricans* O. Schmidt, Die zweite deutsche Nordpolarfahrt, II, 2, 433.

1905. *Forcepia fabricans*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 201, Pl. XIX, figs. 3 a—g.

East-Greenland, without more particular locality (The Ryder-expedition 1891—92); Forsblad-Fjord, depth 50—90 fathoms, two specimens (The Amdrup-expedition 1900) (Lundbeck l. c.). The original specimen was taken at East-Greenland at North-Shannon (Die zweite deutsche Nordpolarfahrt; Schmidt l. c.).

F. groenlandica Frstdt.

1887. *Forcepia groenlandica* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 452, Pl. 25, figs. 40—46.

1905. — — , Lundbeck, The Danish Ingolf-Exp. VI, 2, 209, Pl. XX, figs. 3 a—e.

This species was taken during the Swedish arctic expedition 1883 at East-Greenland, depth 125 fathoms (Fristedt l. c.).

Melonanchora Cart.

M. elliptica Cart.

1874. *Melonanchora elliptica* Carter, Ann. Mag. Nat. Hist. 4, XIV, 216, Pl. XIII, figs. 6—12, Pl. XV, figs. 35 a—b.

1905. — — , Lundbeck, The Danish Ingolf-Exp. VI, 2, 212, Pl. VII, figs. 4—6, Pl. XX, figs. 1 a—o.

This species was taken on the Swedish arctic expedition 1883 at East-Greenland, depth 130 fathoms (Fristedt l. c.). As I have mentioned in the place quoted, Thiele (Arch. für Naturgesch. 1903, I, 392) was of opinion, that Fristedt's species was not *elliptica*, but *emphysema* O. Schmidt, and this was also highly indicated by Fristedt's description and figures, but when I examined one of Fristedt's specimens, this proved to be *elliptica*.

M. emphysema O. Schmidt.

1875. *Desmacidon emphysema* O. Schmidt, Jahresber. der Comm. zur wissensch. Unters. der deutsch. Meere in Kiel für 1872—73, 1875, 118.

1905. *Melonanchora emphysema*, Lundbeck, The Danish Ingolf-Exp. VI, 2, 216, Pl. XX, figs. 2 a—d.

Two small specimens of this species were taken by the Ingolf-expedition on station 94, 64° 56′ lat. N., 36° 19′ long. W., depth 204 fathoms (Lundbeck l. c.).

Tedania Gray.

T. suctoria O. Schmidt.

1870. *Tedania suctoria* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 43, Taf. V, Fig. 11.

One specimen from East-Greenland, depth 100 fathoms (The Ryder-expedition 1891—92); moreover it was taken by the Ingolf-expedition on station 94, 64° 56′ lat. N., 36° 19′ long. W., depth 204 fathoms.

Histoderma Cart.

H. physa O. Schmidt.

1875. *Desmacidon physa* O. Schmidt, Jahresber. der Comm. zur wissensch. Unters. deutsch. Meere in Kiel für 1872—73, 118, Taf. I, Fig. 8—9.

1887. *Cornulum ascidioides* Fristedt, Vega-Exp. vetensk. Iakttag. 445, Pl. 25, figs. 1—2, Pl. 29, fig. 21.

This species has been taken by the Ingolf-expedition on station 94, 64° 56′ lat. N., 36° 19′ long. W., depth 204 fathoms. An examination of the type species of *Cornulum ascidioides* Frstdt. proved this to be identical with the present species.

Cornulum Cart.

C. textile Cart.

1876. *Cornulum textile* Carter, Ann. Mag. Nat. Hist. 4, XVIII, 309, Pl. XII, fig. 9, Pl. XV, figs. 28 a—b.

One specimen of this interesting sponge was taken on 74° 17′ lat. N., 15° 20′ long. W., depth 127 fathoms (The Ryder-expedition 1891—92).

Grayella Cart.

(*Yvesia* Tops.)

G. pyrula Cart.

1876. *Cometella pyrula* Carter, Ann. Mag. Nat. Hist. 4, XVIII, 388, Pl. XIV, fig. 20, Pl. XV, fig. 38.

This curious species was taken by the Ingolf-expedition on station 94, 64° 56′ lat. N., 36° 19′ long. W., depth 204 fathoms.

Hymedesmia Bow.

(*Leptosia* Tops.)

H. Dujardinii Bow.

1866. *Hymeniacidon Dujardinii* Bowerbank, Mon. Brit. Spong. II, 224, 38, et ibid. 1874, III, Pl. XXXVIII, figs. 1—4.

A specimen, growing on a shell of *Pecten imbrifer*, Forsblad-Fjord, depth 50—90 fathoms (The Amdrup-expedition 1900).

Besides this well known species there are in the collections still six species, all new and not yet described; this genus is thus represented at East-Greenland by seven species in all.

Ectyodoryx n. g.

In "Kieselschwämme von Ternate", II (Abhandl. der Senckenberg. nat. Gesell. XXV, 953) Thiele has shown, that the genus formerly called *Dendoryx* must have the name *Myxilla* with the typical species *rosacea* Lieberkühn, and *Dendoryx* is thus a synonym to *Myxilla*. In "The Danish Ingolf-Exp." VI, 2, 154, I have emended the genus *Lissodendoryx* in such a way, that *Myxilla* comprises species with ancoræ and *Lissodendoryx* species with chelæ. Both these genera belong to the subfamily *Mycalinae*; but in the subfamily *Ectyoninae* we then have the genus hitherto known as *Myxilla* i. e. a genus answering to *Myxilla* and with the skeleton reticulate, but with accessory spicules (the ectyonine character). This genus also must be divided in two, one with ancoræ and the other with chelæ, the first thus answering to *Myxilla* and the other to *Lissodendoryx*. — It is possible, that some old species in a Bowerbankian or other genus will be found to belong to those genera, and perhaps in such a way, that we therefrom should get the necessary names for the genera, but I am not able to decide this from the literature, and for the rest I think it not at all probable. I then se no other way than the creating of new genera for the mentioned two groups of species. — The genus with chelæ I give the name *Ectyodoryx*, and for the genus with ancoræ, which is not represented in the material treated here, I propose the name *Ectyomyxilla*.

The generic diagnosis for the genus *Ectyodoryx* may then be the following:

Sponges with a reticulate skeleton, echinated (more or less sparingly) by accessory spicules. The skeleton spicules spined or smooth styli, the accessory spicules smaller, spined styli; the dermal spicules diactinal; microscleres isochelæ arcuatæ solely or together with other forms.

E. foliatus Frstdt.

1887. *Hastatus foliatus* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 443, Pl. 25, figs. 7—12.

This species of which I have examined the type specimen, is an *Ectyodoryx*, as it has accessory spicules (l. c. fig. 8) echinating the fibres, but the accessory spicules are few in number.

East-coast of Greenland, depth 130 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

E. sp.

We have another species of this genus, not yet described, from Rathbone Ø, depth 94 fathoms, and from Angmagsalik, depth 140 fathoms (The Amdrup-expedition 1900).

Pocillon Tops.

P. sp.

A species of this genus has been taken at Angmagsalik, in shallow water (Kruuse).

Stylostichon Tops.

The views of the two genera *Plumohalichondria* Cart. and *Stylostichon* Tops. have been somewhat confused so that I shall say some words about them. — In 1892 Topsent has (Résultats des camp. scient. du Prince de Monaco, Fasc. II, 111) divided Carter's genus *Plumohalichondria* in two genera, one with the fibres formed of smooth, diactinal spicules, echinated by spined spicules, and the other with the fibres formed of spined, monactinal spicules and echinated by similar spicules. For the first genus, with the fibres formed of smooth, diactinal spicules, he maintained Carter's name *Plumohalichondria*, but unfortunately he placed Carter's type of the genus, *P. microcionides* in the other genus; evidently he had not examined this species, and thus he mistook it as having the fibres formed of spined styli, while it in reality has them composed of long, smooth oxea; as a consequence the genus with the fibres formed of smooth, diactinal spicules must have the name *Plumohalichondria* Cart., with the type *microcionides* Cart.

To the other genus, with the fibres composed of spined styli, Topsent gave the name *Stylostichon*, and as he at the same place described a new species *S. Dendyi*, I se no reason why this should not be the type of his genus, to which also *plumosum* Mont. and *frondosum* R. and D. seem to belong. Thiele (Arch. für Naturgesch. 1903, 387) declares, that Topsent's genus *Stylostichon* can only be a synonym to *Plumohalichondria*, as he placed the type of this, *microcionides* in *Stylostichon*, but as Topsent, as said, at the same time described the species *Stylostichon Dendyi*, I do not se why his simple mistake with regard to the species *microcionides* should cause his genus to fall; on the contrary it seems natural, that when *microcionides* is removed from *Stylostichon* to *Plumohalichondria*, the former genus stands with the type *Dendyi*.

In the place quoted Thiele thinks it not necessary to divide the old genus *Plumohalichondria*, but I think the dividing character, the difference in the spicules composing the fibres, is of no small value. Thiele seems also to think only on the species *microcionides* and *mammillata* Cart. = *incrustans* Cart., and both these species have the fibres formed of smooth diactinals, but *mammillata*, which has spined dermal spicules, seems not to belong here, and is by Thiele, I think quite correctly, referred to the genus *Pytheas* Tops = *Crella* Gray. *Stylostichon* and *Plumohalichondria* both have smooth dermal spicules.

S. hospitalis O. Schmidt.

1870. *Cribrella hospitalis* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 56, Taf. IV, Fig. 12.
1876. — — , Carter, Ann. Mag. Nat. Hist. 4, XVIII, 313, Pl. XIII, fig. 18, Pl. XV, figs. 36a—b.
1887. — — , Fristedt, Vega-Exp. vetensk. Iakttag. IV, 453, Pl. 25, figs. 47—50, Pl. 29, fig. 20.

Besides the above mentioned species of this genus there is still one more known, the *Cribrella hospitalis* mentioned by Fristedt being, after my examination of the type specimen, a *Stylostichon*. I can for the present not with certainty decide, wether the *Cribrella hospitalis* described by Carter (l. c.) is identical with the present species, but it is very probable; should this prove to be the case, it will be probable that also *C. hospitalis* Schmidt is the same, as Carter says, that he has compared his species with a slide of the original specimen, and then *C. hospitalis* Schmidt which is at present taken to be a *Grayella* (*Yvesia* Tops.) will be in reality a *Stylostichon*.

A fine, pedicellated specimen has been taken at East-Greenland, depth 125 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

Hymeraphia Bow.

H. sp.

At Angmagsalik, depth 140 fathoms. (The Amdrup-expedition 1900).

Crella Gray.

(*Pytheas* Tops.)

Of this genus three species have been taken, at Angmagsalik, depth 140 fathoms, and at Rathbone Ø, depth 94 fathoms (The Amdrup-expedition 1900, and Kruuse).

Echinoclathria Cart.

E. sp.

From Angmagsalik, depth 140 fathoms, the Amdrup-expedition 1900 has brought home a large, flabelliform species which present the characteristic honeycombed structure. It appears to be undescribed.

Plocamia O. Schmidt.

Two species of this genus have been collected at Cape Tobin, depth 57 fathoms, and at Angmagsalik, depth 140 fathoms (The Amdrup-expedition 1900). Further we have it from the East-coast, without particular locality (The Ryder-expedition 1891—92).

Fam. Axinellidae.

Phakellia Bow.

P. ventilabrum Johnst.

1842. *Halichondria ventilabrum* Johnston, Brit. Spong. and Lithophyt., 107, Pl. VII.

1864. *Phakellia ventilabrum*, Bowerbank, Mon. Brit. Spong. I, 186, et ibid. 1866, II, 122, et 1874, III, Pl. XXII, figs. 1—7.

We have two specimens of this species, both of flabelliform shape, but somewhat irregular; the skeleton has rather strong fibres, composed in the common way of long and strong "vermicular" spicules. The largest specimen has a height of 110 mm.

The Ingolf-expedition, station 94, 64° 56′ lat. N., 36° 19′ long. W., depth 204 fathoms.

P. Bowerbanki Vosm.

1885. *Phakellia Bowerbanki* Vosmaer, Bijdrag. tot de Dierk. 12te Afl. 3die Gedeelte, 24, Pl. V, figs. 45—47.

We have of this sponge two pieces, one being a lower and the other an upper part, both parts certainly belonging to one individual; below there is a short and robust stalk, to which some bottom material still adheres; from the stalk the sponge rises into a funnel-shaped part, but this shape disappears a little way above the stalk, and only one side of the funnel continues its growth, the sponge thus assuming a fan-shaped exterior. The specimen in hand is rather large, it has a height of 42 cm, and the plate has a greatest breadth of about 30 cm, the sponge is rather thin, the thickness is 3 mm as an average. The spicules quite agree with those figured by Vosmaer.

At Angmagsalik $^{18}/_{9}$ 1900, depth 140 fathoms (The Amdrup-expedition 1900).

P. rugosa Bow.

1866. *Dictyocylindrus rugosus* Bowerbank, Mon. Brit. Spong. II, 119; ibid. 1874, III, Pl. XX, figs. 1—4.
1887. *Axinella rugosa*, Fristedt, Vega-Exp. vetensk. Iakttag. IV, 461.

I have seen a fragment of Fristedt's specimen, but from this I am not able to judge with certainty about the determination.

East-coast of Greenland, depth 130 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

Tragosia Gray.

T. Sluiteri Vosm.

1882. *Cribrochalina Sluiteri* Vosmaer, Niederl. Arch. für Zool. Suppl. Band I, 36, Pl. I, figs. 16—17, Pl. III, figs. 67—69, Pl. IV, figs. 145—147.
1885. — — Vosmaer, Bijdrag. tot de Dierk. 12te Afl., 3die Gedeelte, 22, Pl. I, fig. 10, Pl. IV, figs. 4—6.
1886. — —, Levinsen, Dijmphna-Togtets zool bot. Udbytte, 352, Pl. XXIX, figs. 6—9. Pl XXX, fig. 6.

Of this species there is a fine, funnel-shaped specimen in the collection; it has a total length of 120 mm, the stalk being 50 mm long.

Jan Mayen $^{28}/_{6}$ 1900, depth 55 fathoms (The Amdrup-expedition 1900).

Bubaris Gray.

B. vermiculata Bow.

1866. *Hymeraphia vermiculata* Bowerbank, Mon. Brit. Spong. II, 141, et ibid. 1874, III, Pl. XXV, figs. 1—3.
1887. — — var. *erecta* Cart., Fristedt, Vega-Exp. vetensk. Iakttag. IV, 461.

A small specimen, growing on a *Retepora*.

Angmagsalik, $^{18}/_{9}$ 1900, depth 140 fathoms (The Amdrup-expedition 1900). Further it has been taken at the East-coast of Greenland, depths 130 fathoms and 350 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.). Our specimen is a small, flate specimen; the specimens mentioned by Fristedt on the contrary are erect, branched or unbranched, thus belonging to Carter's var. *erecta*; the largest of Fristedt's specimens reaches a hight of 100 mm. Topsent declares (Résultats des camp. scient. du Prince de Monaco, Fasc. XXV, 1904, 145) that he thinks these forms, the encrusting and the erect, to be specifically identical, and I shall for the present not enter into the question.

Hadromerina.

Fam. Spirastrellidae.

Latrunculia du Bocage.

L. sp.

A species of this genus has been taken on 70° 32′ lat. N., 8° 10′ long. W., depth 470 fathoms (The Ryder-expedition 1891—92).

Fam. Polymastiidae.

Polymastia Bow.

P. uberrima O. Schmidt.

Tab. XIV. Fig. 4.

1870. *Rinalda uberrima* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet., 51, Taf. VI, Fig. 3.

Of this species we have seven specimens from East-Greenland. Most specimens are somewhat different from the common form as to their exterior, being rather high and more or less globular, one specimen is quite globular and has even a short stalk (Pl. XIV, fig. 4), thereby getting a somewhat curious appearance. The skeleton and the spicules on the other hand are quite of the common construction and shape.

70° 32′ lat. N., 8° 10′ long. W., 27/6 1891, depth 470 fathoms; Hekla-Havn 21/9 1892 (The Ryder-expedition 1891—92); Forsblad-Fjord 30/8 1900, depth 50—90 fathoms; at Angmagsalik 18/9 1900, depth 140 fathoms (The Amdrup-expedition 1900).

P. mammillaris O. F. Müll.

1806. *Spongia mammillaris* O. F. Müller, Zool. Dan. IV, 44, Tab. CLVIII, Fig. 3—4.
1866. *Polymastia mammillaris*, Bowerbank, Mon. Brit. Spong. II, 71, et ibid. 1874, III, Pl. XII, figs. 1—11.
1887. *Polymastia penicillus*, Fristedt, Vega-Exp. vetensk. Iakttag., IV, 434.

Of this species we have only a very small specimen, only measuring 4 mm in diameter, and with only one papilla; yet I think the determination is sure.

70° 32′ lat. N., 8° 10′ long. W., depth 470 fathoms (The Ryder-expedition 1891—92); further it has been taken at the East-coast of Greenland, depth 130 fathoms (The Swedish arctic expdition 1883; Fristedt l. c.).

Remarks: I am very inclined to think, that *Spongia mammillaris* of Müller is in reality identical with *Rinalda uberrima* Schmidt, as already noted by Levinsen (Dijmphna Togtets zool. bot. Udbytte, 346), but as we have only the figure to judge from, and as we can therefore only speak of probability but not of certainty, I shall here make no alteration in the use of the names.

P. paupera Frstdt.

1887. *Polymastia paupera* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 434, Pl. 24, fig. 21.

I have seen a small fragment of the type of this species, but I am not able from this to say anything certain about it.

East-coast of Greenland, depth 130 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

Trichostemma Sars.

T. hemisphaericum Sars.

1872. *Trichostemma hemisphæricum* Sars, On some remark. forms of animal life, I, 62, Pl. VI, figs. 1—15.
1887.? *Radiella spinularia* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 435.

We have four specimens; the smallest one which has a diameter of 12 mm is very conical downvards, but flat above; the largest specimen, of a diameter of about 40 mm, is hemisphærical above and somewhat hollowed below. — I have seen a small fragment of Fristedt's specimen of *Radiella spinularia*, and I think it is *Trichostemma.*

Forsblad-Fjord 30/8 1900, depth 50—90 fathoms (The Amdrup-expedition 1900); East-coast of Greenland, depth 130 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

Quasillina Norman.

Q. brevis Bow.

1861. *Euplectella brevis* Bowerbank, List. Brit. Marine Invert. Faun. (Brit. Assoc.) 71.

1866. *Polymastia brevis* Bowerbank, Mon. Brit. Spong. II, 64, et ibid. 1874, III, Pl. XI, figs. 1—9.

Of this species we have a single, small specimen.

74° 17′ lat. N., 15° 20′ long. W., depth 127 fathoms (The Ryder-expedition 1891—92).

Tentorium Vosm.

T. semisuberites O. Schmidt.

1870. *Tecophora semisuberites* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 50, Taf. VI, Fig. 2.

1874. — — O. Schmidt, Die zweite deutsche Nordpolarfahrt, II, 2, 430.

1887. — — , Fristedt, Vega-Exp. vetensk. Iakttag. 433.

This common and nearly cosmopolitan species is present in the collections in rather great numbers; there are specimens of all sizes from a height of 30 mm down to only 3 mm.

At Sabine-Island 10/7 1900, depth 110 fathoms; Forsblad-Fjord 30/8 1900, depth 50—90 fathoms; Hurry-Inlet 11/8 1900, depth 50 fathoms; Cape Tobin 21/8 1900, depth 57 fathoms (The Amdrup-expedition 1900); East-Greenland, without particular locality (The Ryder-expedition 1891—92); at Angmagsalik, depth 50 fathoms (Kruuse); East-coast of Greenland (The

Swedish arctic expedition 1883; Fristedt l. c.); at North-Shannon (Die zweite deutsche Nordpolarfahrt; Schmidt l. c.).

Fam. Suberitidae.

Prosuberites Tops.

P. sp.

We have two specimens of a not yet determined species of this genus.

At Angmagsalik, depth 140 fathoms (The Amdrup-expedition 1900).

Ficulina Gray.

F. ficus L.

1767. *Alcyonium ficus* Linné, Systema Natura, Ed. XII, 1295.
1867. *Ficulina ficus*, Gray, Proc. Zool. Soc. 1867, 523.
1887. *Suberites montalbidus*, Fristedt, Vega-Exp. vetensk. Iakttag. IV, 428.

Of this common and widely distributed species a large, massive specimen is brougth home; it has a greatest extent of 10 cm.

Angmagsalik $^{22}/_{3}$ 1901 (Søren Nielsen); 65° 40′ lat. N., 35° 32′ long. W., depth 25—40 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

Suberites Nardo.

S. carnosus Johnst.

Pl. XIV. Fig. 1.

1842. *Halichondria carnosa* Johnston, Brit. Spong. and Lithophyts, 146, Pl. XIII, figs. 7—8.
1900. *Suberites carnosus*, Topsent, Arch. de zool. exp. et gén. VIII, 233, Pl. VII, figs. 1—5.
1885. *Suberites* sp. Vosmaer, Bijdrag. tot de Dierk. 12te Afl. 3die Gedeelte, 21, Pl. I, figs. 9a—b, Pl. II, fig. 33.

Several specimens of this species have been taken; the specimens are all of an erect, cylindric shape, and more or less ramose, thus they agree well with the figures given by Vosmaer l. c. The oscula are scattered on the surface, they are somewhat conical, spout-shaped. With regard to the skeleton the fibres form in the middle a kind of axis, and from here the fibres go to the surface; these facts are also noted by Vosmaer. I think it certain that the specimens belong to *S. carnosus*, it is quite agreeing with the form *ramosus* of this species, and with regard to this form of the sponge Topsent l. c. declares, that the skeleton is constructed in a similar way as described above. Thus *Suberites carnosus* seems to occur in the arctic seas only in the form *ramosus*.

At Angmagsalik 18/9 1900, depth 140 fathoms (The Amdrup-expedition 1900).

S. sp.

We have a small specimen of a not yet determined species of *Suberites*.

74° 17′ lat. N., 15° 20′ long. W., depth 127 fathoms (The Ryder-expedition 1891—92).

Tetractinellida.

Sigmatophora.

Fam. Tetillidae.

Craniella O. Schmidt.

C. cranium O. F. Müll.

1789. *Alcyonium cranium* Müller, Zool. Dan. IV, 42, Tab. CLVII, Fig. 1—2.
1885. *Craniella Mülleri* Vosmaer, Bijdr. tot de Dierk. 12te Afl. 3die Gedeelte, 6, Pl. II, figs. 9—15, Pl. V, figs. 1—2.
1888. *Craniella cranium*, Sollas, Challeng. Rep. XXV, 51.

Of this species there has been collected a rather great material; the specimens are very varying in size; the largest one, which is of ellipsoidal shape, is 60 mm high, and then there are all sizes down to not more than 1 mm in diameter.

70° 32′ lat. N., 8° 10′ long. W. 27/6 1891, depth 470 fathoms; 72° 25′ lat. N., 19° 33′ long. W., 27/7 1891, depth 140 fathoms (The Ryder-expedition 1891—92); East-Greenland, depth about 350 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

Astrophora.

Fam. Theneidae.

Thenea Gray.

T. muricata Bow.

1858. *Tethea muricata* Bowerbank, M. S. Phil. Trans., 148, II, 308, Pl. XXV, fig. 18.
1887. *Tethya muricata,* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 436.
1888. *Thenea muricata,* Sollas, Challeng. Rep. XXV, 95, Pl. VII, fig. 3.

This species, which is very common and widely distributed in the arctic and North-Atlantic ocean, is likewise common at East-Greenland and has been brought home in rather great numbers.

72° 25′ lat. N., 19° 35′ long. W. $^{27}/_{7}$ 1891, depth 140 fathoms; 70° 21′ lat. N., 8° 25′ long. W., $^{26}/_{6}$ 1891, depth 160 fathoms (The Ryder-expedition 1891—92); south-east of Sabine-Island $^{10}/_{7}$ 1900, depth 110 fathoms, a great many specimens (The Amdrup-expedition 1900); the East-coast of Greenland, depth 130 fathoms (The Swedish arctic expedition 1883; Fristedt l. c).

Fam. Geodiidae.

Geodia Lamarck.

G. Barretti Bow.

1858. *Geodia Barretti* Bowerbank, Phil. Trans. Roy. Soc., 279.
1882. — — , Vosmaer, Niederl. Arch. für Zool. Suppl. Band I, 23, Pl. III, figs. 50—51, Pl. IV, figs. 120—122.
1887. — — , Fristedt, Vega-Exp. vetensk. Iakttag. IV, 463.
1888. — — , Sollas, Challeng. Rep. XXV, 250.

Of this species we have a somewhat damaged specimen, it measures 10 cm in greatest diameter.

At Angmagsalik $^{18}/_{9}$ 1900, depth 140 fathoms (The Amdrup-expedition 1900); further it has been taken at East-Greenland, depth 130—140 fathoms (The Swedish arctic expedition; Fristedt l. c.).

Hexactinellida.

Hexasterophora.

Fam. Rossellidae.

Schaudinnia Schulze.

S. rosea Frstdt.

1887. *Hyalonema rosea* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 411, Pl. 23, figs. 1—11, Pl. 25, fig. 5.

Of this species we have an entire specimen which is elongately sack-shaped; it has a length of 90 mm and a diameter of about 30 mm, the body wall is at most 5 mm thick; above it is somewhat constricted towards the osculum which has a diameter of scarcely 15 mm and is provided with a marginal fringe. Further we have som fragments of a larger specimen in which the body wall is considerably thicker, up to 14 mm. The description which Fristedt gives of his *Hyalonema rosea* shows that he has only had fragments, and therefore he has got a wrong idea of the shape of the sponge. The spicules in my specimens agree completely with those described and figured by Fristedt. — I think it also beyond doubt, that the species is identical with *Shaudinnia arctica* Schulze (Faun. Arctica, I, 1900, 87, Tab. I, Fig. 1—6, Tab. II—III); the author declares (l. c. 108), that besides the three species of arctic Hexactinellids described in the work cited, only two other arctic species are known, collected on the Albatross-expedition; he thus evidently has overlooked the work of Fristedt. — The only thing which does, that I am not quite sure in my identification of the two species *rosea* and *arctica* is, that I have not been able to find the discohexasters, and such were not found by Fristedt too; otherwise the description by Schulze is quite agreeing, and f. inst. the pentactine hypodermalia with strong spines on the tangential rays are quite the same, and likewise the various forms of oxyhexasters and derivate-oxyhexactines as also the autodermal diactines.

With regard to the absence of the discohexasters I dare for the present say nothing sure, should they prove to be quite wanting, it seems to me, that the species would belong to the genus *Bathydorus.*

Forsblad-Fjord $^{30}/_{8}$ 1900, depth 50—90 fathoms (The Amdrup-expedition 1900); Fristedt had the species from East-Greenland, depth 125 fathoms (The Swedish arctic expedition 1883). Schulze had his specimens from north of Spitzbergen in a depth of 530 fathoms.

Besides the above mentioned species we have further an indeterminable fragment of a species belonging to the *Rossellinae*, taken at Angmagsalik, depth 140 fathoms (The Amdrup-expedition 1900).

Calcarea.

Homocoela.

Fam. Asconidae.

Leucosolenia Bow.

L. coriacea Mont.

1818. *Spongia coriacea* Montagu, Mem. Wernerian. II, 116.
1872. *Ascetta coriacea*, Haeckel, Die Kalkschwämme, II, 24, Taf. 3, Taf. 5, Fig. 2a—c.
1898. *Leucosolenia coriacea*, Britfuss, Arch. für Naturgesch. 1898, 20.

This species is somewhat richly represented in the material; one specimen is of the *Nardorus*-form the others are of the *Auloplegma*-form; the largest specimen of these latter has a greatest extent of 25 mm. The colour is brown or grey.

Tasiusak $^{1}/_{6}$ 1899, depth 25—30 fathoms (The Amdrup-expedition 1898—99); Tasiusak $^{22}/_{8}$ 1902, depth 30—50 fathoms (Kruuse); 70° 32′ lat. N., 8° 10′ long. W., depth 470 fathoms (The Ryder-expedition 1891—92).

L. Lamarckii Haeck.

1872. *Ascaltis Lamarckii* Haeckel, Die Kalkschwämme, II, 60, Taf. 9, Fig. 5, Taf. 10, Fig 4a—d.
1874. — — Haeckel, Die zweite deutsche Nordpolarfahrt, II, 434.

This species is not represented in our collections; it has been taken at North-Shannon (Die zweite deutsche Nordpolarfahrt; Haeckel l. c.).

L. Nanseni Breitfuss.

1898. *Leucosolenia Nanseni* Breitfuss, Zool. Jahrbüch. XI, 166, Taf. 12, Fig. 1—9.
1898. — — Breitfuss, Arch. für Naturgesch. 1898, 21.

A number of small, cylindric, but only slightly connected individuals, each with an osculum, growing on a Hydroid; the whole has an extent of about 8 mm. I think it probable, that the *Ascaltis coriacea* mentioned by Fristedt (Vega-Exp. vetensk. Iakttag. IV, 405, Pl. 22, figs. 1—2) belongs to the present species, with which the mentioned and figured spicules seem to agree.

Angmagsalik 23/3 1901 (Søren Nielsen). In case Fristedt's *A. coriacea* belongs here, it has also been taken at East-Greenland, depth 350 fathoms (The Swedish arctic expedition 1883).

Ascandra (Haeck) v. Lendenf.

A. complicata Mont.

1818. *Spongia complicata* Montagu, Mem. Wernerian., II, 97.
1872. *Ascandra complicata*, Haeckel, Die Kalkschwämme, II, 93, Taf. 15, Fig. 1 a—k.
1898. — — , Breitfuss, Arch. für Naturgesch. 1898, 22.

Of this species we have a specimen which may be termed a *Soleniscus*-form, creeping on the leaf of a *Fucus*; it is extended along the leaf to a length of 35 mm.

Hekla-Havn, depth 5—12 fathoms (The Ryder-expedition 1891—92).

A. Fabricii O. Schmidt.

1870. *Leucosolenia Fabricii* O. Schmidt, Grundzüge einer Sponginf. des atlant. Gebiet. 73.
1872. *Ascortis Fabricii*, Haeckel, Die Kalkschwämme, II, 71, Taf. 11, Fig. 3, Taf. 12, Fig. 3 a—i.
1898. *Ascandra Fabricii*, Breitfuss, Arch. für Naturgesch. 1898, 22.

Of this species we have two small specimens, both belonging to the *Auloplegma*-form; the largest one grows on a *Lithothamnion* and has a greatest extent of about 15 mm.

East-Greenland, without more particular locality (The Ryder-expedition 1891—92); Tasiusak 4/5 1899, depth 5—19 fathoms (The Amdrup-expedition 1898—99).

A. variabilis Haeck.

1872. *Ascandra variabilis* Haeckel, Die Kalkschwämme, II, 106, Taf. 16, Fig. 4 a—l, Taf. 18.
1898. — — , Breitfuss, Arch. für Naturgesch. 1898, 23.

Of this species we have a small specimen of the *Soleniscus*-form; it has an extent of only 5 mm.

Jan Mayen 26/6 1900, depth 15 fathoms (The Amdrup-expedition 1900).

Heterocoela.

Fam. Syconidae.

Sycon Risso.

S. ciliatum O. Fabr.

1780. *Spongia ciliata* O. Fabricus, Faun. groenl. 448.
1872. *Sycandra ciliata*, Haeckel, Die Kalkschwämme, II, 296, Taf. 51, Fig. 1 a—t, Taf. 59, Fig. 9.
1898. *Sycon ciliatum*, Breitfuss, Arch. für Naturgesch., 1898, 23.

Of this for Greenland classical sponge there are only two specimens in the material, and they are both very small, of a length of only 5 mm.

70° 32′ lat. N., 8° 10′ long. W. 27/6 1891, depth 470 fathoms (The Ryder-expedition 1891—92).

Grantia Flem.

G. arctica Haeck.

1872 *Sycandra arctica* Haeckel, Die Kalkschwämme, II, 353, Taf. 55, Fig. 1 a—v.
1898. *Grantia arctica*, Breitfuss, Arch. für Naturgesch. 1898, 26.

There are several specimens of this species in the material; they are all single persons with a long and fine oscular fringe which reaches a length of up to 10 mm. The largest specimen has a height of 23 mm, including the oscular fringe. The specimens are cylindric or somewhat pyriform.

Hurry-Inlet $^{21}/_{7}$ and $^{7}/_{8}$ 1900, depths 7 and 20 fathoms (The Amdrup-expedition 1900); Tasiusak $^{1}/_{6}$ 1899, depth 25—30 fathoms (The Amdrup-expedition 1898—99) and Tasiusak $^{22}/_{8}$ 1902, depth 30—50 fathoms (Kruuse).

G. mirabilis Frstdt.

1887. *Ascandra mirabilis* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 406, Pl. 22, figs. 3—13, Pl. 26, figs. 1—2.
1898. — — , Breitfuss, Arch. für Naturgesch. 1898, 26.

This species I have not examined; it is strange that Breitfuss l. c. records it as an *Ascandra*, since it is evident from the description by Fristedt, and especially from his figures, that the sponge is a *Grantia*; without examination of the type specimen it is impossible to say anything certain about the species, yet I am somewhat inclined to think it identical with *G. arctica*.

65° 40′ lat. N., 35° 32′ long. W., depth 25—30 fathoms (The Swedish arctic expedition 1883; Fristedt l. c.).

G. capillosa O. Schmidt.

1862. *Ute capillosa* O. Schmidt, Spong. des adriat. Meeres, 17, Taf. I, Fig. 6, 6 b.
1872. *Sycandra capillosa*, Haeckel, Die Kalkschwämme, II, 317, Taf. 51, Fig. 3 a—t.
1898. *Grantia capillosa*, Breitfuss, Arch. für Naturgesch. 1898, 26.

Of this species we have five specimens; they are cylindrical or somewhat compressed, and slightly curved, and they have a shorter or longer oscular fringe; the largest specimen has a height of 20 mm. When the dermal rhabds are not torn off the surface is highly and uniformly hispid. I determine the species as *capillosa*, but I must remark, that the dermal rhabds are not straight but generally somewhat curved.

Jan Mayen $^{26}/_{6}$ 1900, depth 57 fathoms (The Amdrup-expedition 1900); Angmagsalik, depth 10—15 fathoms (Kruuse).

G. pennigera Haeck.

1872. *Sycandra compressa* var. *pennigera* Haeckel, Die Kalkschwämme, II, 362, Taf. 55, Fig. 2 sp.
1898. *Grantia pennigera* Breitfuss, Arch. für Naturgesch. 1898, 27.

To this species I refer with some doubt three cylindrical, tubular specimens without oscular fringe; the specimens are not at all compressed; the largest specimen has a length of about 12 mm, the diameter is up to 2 mm, the body wall is very thin, only 0·25 mm. The surface is only slightly hispid. My reason for determining the species as *pennigera* is the shape of the dermal rhabds which is chiefly agreeing with the figure by Haeckel.

Hurry-Land $^{21}/_{7}$ 1900, depth 20 fathoms (The Amdrup-expedition 1900).

G. utriculus O. Schmidt.

1870. *Ute utriculus* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet., 74, Taf. II, Fig. 27.
1872. *Sycandra utriculus*, Haeckel, Die Kalkschwämme, II, 370, Taf. 55, Fig. 3a—t, Taf. 58, Fig. 4.
1898. *Grantia utriculus*, Breitfuss, Arch. für Naturgesch. 1898, 27.

Of this species there are six specimens in the collections; they are all sack-shaped, cylindrical or compressed, and they have all a single osculum; the osculum is not quite bare but in some of the specimens provided with a short fringe. (Specimens with a fringed osculum are also mentioned by Fristedt: Vega-Exp. vetensk. Iakttag. IV, 1887, 410). The specimens are not large, the largest one has a height of 26 mm. All specimens have the characteristic network, formed of strings of small rhabds, in the gastral cavity. In two respects the specimens seem to be somewhat different from the common description of the species; first the subgastral quadriradiates are present in very small number, and next the distal cones are somewhat visible; on account of these facts the sponge must be very nearly related to *Sycon lingua*, though the two species are for the present placed in different genera. It must be remembered, that the presence of a network of small rhabds in the gastral cavity seems not to be a valid character, since Breitfuss has found the same gastral network in specimens of *Sycon raphanus* (Zool. Jahrbüch. Abth. für Systematik, XI, 1898, 110), and the same author also mentions (Mém. de l'Acad. Imp. de St. Petersb. VI, 1898, 22) specimens of *Grantia capillosa* which showed slight distal cones and which he therefore declares to be nearly related to *Sycon raphanus*.

Jan Mayen 25/6 1900, depth 50—60 fathoms (The Amdrup-expedition 1900); Tasiusak 25/5 1899, depth 15—20 fathoms, and 1/6 1899, depth 25—30 fathoms (The Amdrup-expedition 1898—99); 70° 32′ lat. N., 8° 10′ long. W., depth 470 fathoms (The Ryder-expedition 1891—92).

Amphoriscus v. Lendenf.

A. glacialis Haeck.

1872. *Sycaltis glacialis* Haeckel, Die Kalkschwämme, II, 269, Taf. 45, Fig. 4—7.
1874. — — Haeckel, Die zweite deutsche Nordpolarfahrt, II, 2, 435.
1898. *Amphoriscus glacialis*, Breitfuss, Arch. für Naturgesch. 1898, 28.

This species I have not examined as it is not represented in our material; it was taken at North-Shannon (Die zweite deutsche Nordpolarfahrt; Haeckel l. c.).

Ebnerella v. Lendenf.

E. Schulzei Breitfuss.

1898. *Ebnerella Schulzei* Breitfuss, Zool. Jahrbüch. Abtheil. für Systematik, XI, 113, Taf. 13, Fig. 39—52.

We have of this interesting species only a small, tubular specimen of a length of 6 mm.

Forsblad-Fjord 30/8 1900, depth 50—90 fathoms (The Amdrup-expedition 1900).

Fam. Leuconiidae.

Leuconia Grant.

L. Egedii O. Schmidt.

1870. *Sycinula Egedii* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet., 74.

1872. *Leucandra Egedii,* Haeckel, Die Kalkschwämme, II, 173, Taf. 32, Fig. 1 a—d.
1898. *Leuconia Egedii,* Breitfuss, Arch. für Naturgesch. 1898, 29.

We have two specimens of this species, both single persons, one is somewhat compressed, and with a well developed oscular fringe, the other is of an irregular shape, with a small circular osculum which is turned to one side and has a small fringe. The specimens have a height of about 10 mm.

Jan Mayen $^{25}/_{6}$ 1900, depth 50—60 fathoms (The Amdrup-expedition 1900); Tasiusak $^{19}/_{5}$ 1899, depth 20 fathoms (The Amdrup-expedition 1898—99).

It will be seen, that according to the above list fiften *Calcarea* are at present known to occur in the sea at East-Greenland, wiz:

Leucosolenia coriacea Mont.
Leucosolenia Lamarckii H.
Leucosolenia Nanseni Breitf.
Ascandra complicata Mont.
Ascandra Fabricii O S.
Ascandra variabilis H.
Sycon ciliatum O. Fabr.
Grantia arctica H.
Grantia mirabilis Frstdt.
Grantia capillosa O. S.
Grantia pennigera H.
Grantia utriculus O. S.
Amphoriscus glacialis H.
Ebnerella Schulzei Breitf.
Leucandra Egedii O. S.

Hitherto only four species were known, wiz:
Leucosolenia coriacea (? = *Nanseni* se under this species).
Leucosolenia Lamarckii.

Grantia mirabilis.

Amphoriscus glacialis.

These species were published respectively by Haeckel (Die zweite deutsche Nordpolarfarht 1874), and by Fristedt (Vega-Exp. vetensk. Iakttag. IV, 1887). Breitfuss has published at list of the arctic *Calcarea* in which their distribution in the various subregions are given (Mém. de l'Acad. Imp. de St. Petersb. VI, 1898, 7), and here he has under «Öst-Grönland» sixten species, but this is erroneous, as there were at that time only known the above mentioned four species; Breitfuss has evidently made the error of counting all at that time known species, both from West- and East-Greenland as East-Greenlandic. In the same authors "Katalog der arktischen Kalkschwämme" (Arch. für Naturgesch. 1898, 19) he also gives the locality East-Greenland only to the four species enumerated above.

Myxospongida.

Fam. **Halisarcidae.**

Halisarca Dujardin.

H. Dujardini Johnst.

1842. *Halisarca Dujardini* Johnston, Brit. Spong. and Lithophyt., 192, Pl. XVI, fig. 8.
1874. — — , Haeckel, Die zweite deutsche Nordpolarfahrt, II, 2, 436.

This species is not present in our collections, but it has been taken at East-Greenland, North-Shannon (Die zweite deutsche Nordpolarfahrt; Haeckel l. c.).

Plate XIV.

Fig. 1. *Suberites carnosus* Johnst., a richly branched specimen, several spout-shaped oscula are seen $^1/_1$.

Fig. 2. *Reniera cinerea* Grant, oxea $\times$ 225.

Fig. 3. *Gellius varius* Bow., a. oxea, b. sigmata $\times$ 225.

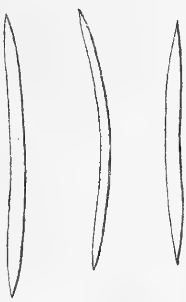
Fig. 4. *Polymastia uberrima* O. S., a curious, globular, stalked specimen. $^1/_1$.

Fig. 5. *Forcepia fabricans* O. S., a fragment; oscular papillæ are seen.

Note.

Besides the divisions of invertebrates from East-Greenland which have been treated in the present volume, there are other more or less rich collections of Chætopoda, Bryozoa, Hydroids, Corals, and Tunicata from East-Greenland which will be discussed successively in "The Danish Ingolf-Expedition".

1



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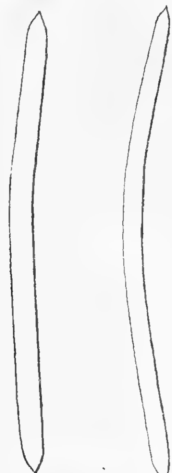

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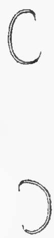
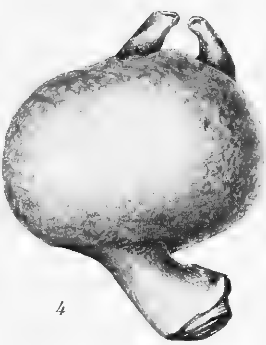


3 b



4

5

E. Bang et Lundbeck del. Pacht & Crone phototyp.

XV. Bidrag til Vest-Grønlands Flora og Vegetation af **N. Hartz** og **L. Kolderup Rosenvinge.** Mosser fra Øst-Grønland af **C. Jensen.** Diatoméer af **E. Østrup.** Forekomst af Cohenit i tellurisk Jern ved Jakobshavn af Dr. **E. Cohen.** Med 2 Tavler. 1898. Kr. 8.

XVI. Undersøgelser i Julianehaabs Distrikt 1893 og 1894. Skjærgaardsopmaaling, Undersøgelse af Indlandsis og Bræer, Misvisning m. m. ved **V. Garde, C. Moltke** og **A. Jessen.** Arkæologiske Undersøgelser af **D. Bruun, F. Petersen** og **V. Boye.** Med 20 Tavler. 1896. Kr. 10.

XVII—XIX. Den østgrønlandske Expedition i Aarene 1891—92 (Scoresby-Sund) ved **C. Ryder, H. Vedel, N. Hartz, E. Bay, H. Deichmann, C. Christiansen, Willaume-Jantzen, Rørdam, S. Hansen, Børgesen, Rostrup, Deichmann Branth, Østrup, Posselt, Lundbeck, H. Hansen, Wesenberg-Lund** og **Lundgren.** Med 40 Tavler. 1895—96. Kr. 25.

XX. Grønlands Alger, Flora og Vegetation af **L. Kolderup Rosenvinge.** Om Steenstrupin af **Joh. Chr. Moberg.** Grønlands gamle Topografi af **Finnur Jónsson.** Brade Ransons Forde af **Frode Petersen.** Med 3 Tavler. 1899. Kr. 6.

XXI, *1ste Afdeling:* Grønlands Fugle af **Herluf Winge.** 1899. Kr. 4,50.
2den Afdeling: Grønlands Pattedyr af **Herluf Winge.** 1902. Kr. 3.

XXII. Under Udarbejdelse.

XXIII, *1ste Afdeling:* Grønlands Brachiopoder og Bløddyr af **Henr. J. Posselt** udgivet efter Forfatterens Død ved Ad. S. Jensen. Med 2 Tavler. 1899. Kr. 4,50.

XXIV. Undersøgelser af Mineraler fra Julianehaab af **G. Flink, N. B. Bøggild** og **Chr. Winther** med indledende Bemærkninger af **N. V. Ussing.** Untersuchungen an den eisenführenden Gesteine der Insel Disko von Dr. **Th. Nicolau.** Beretning om en Undersøgelsesrejse til Øen Disko 1898 af **K. J. V. Steenstrup.** Med 20 Tavler og et særskilt heftet Farvetryk. 1901. Kr. 6,50.

XXV. Om Bestemmelse af Lysstyrke og Lysmængde af **K. J. V. Steenstrup.** Fra en Vaccinationsrejse til Kap Farvel af **G. Meldorf.** On Ilvaite from Siorarsuit by **O. B. Bøggild.** Skildring af Vegetationen paa Disko af **M. Pedersen Porsild.** Med 6 Tavler. 1902. Kr. 6.

XXVI. Undersøgelser og Opmaalinger ved Jakobshavns Isfjord af **M. C. Engell** og **H. Schjørring.** On some Minerals from the Nephelite-Syenite at Julianehaab by **O. B. Bøggild.** Planktonprøver fra Nord-Atlanterhavet (c. 58°—60° N. Br.) af **C. H. Ostenfeld** og **Ove Paulsen.** Tuberkulosens Udbredelse i Grønland af **Gustav Meldorf.** Eskimoernes Indvandring i Grønland af **Schultz-Lorentzen.** On the Tension of Carbonic Acid in Natural Waters; the abnormal CO_2-Percentage in the Air in Greenland, etc., by **August Krogh.** Descriptions de quelques espéces nouvelles de Bryacées de l'île de Disko par **I. Hagen** et **Morten P. Porsild.** Notes on some rare or dubious Danish Greenland plants by **Herman G. Simmons.** Med 15 Tavler. 1904. Kr. 8.

XXVII. Carlsbergfondets Expedition til Øst-Grønland i Aarene 1898—1900, ved **G. Amdrup, N. Hartz, J. P. Koch, Willaume-Jantzen** og **H. Ravn.** Med 8 Tavler. 1902. Kr. 10.

XXVIII, *1ste Afdeling:* Notes on some specimens of rocks collected by C. Kruuse on the East coast of Greenland between lat. 65° 35′ and 67° 22′ N. by Dr. **Otto Nordenskjöld.** Samples of the sea-floor along the coast of East Greenland 74½—70 N. L. by **O. B. Bøggild.** Med 9 Tavler. 1904. Kr. 2,50.

XXIX. *1ste Afdeling:* Mammals observed on Amdrup's journeys to East-Greenland 1898—1900 by **Søren Jensen.** Echinoderms from East-Greenland by **Th. Mortensen.** The Tertiary Fauna at Kap Dalton in East-Greenland by **J. P. J. Ravn.** Birds of East-Greenland by **H. Deichmann.** On Jurassic Fossils from East-Greenland by **Victor Madsen.** The Fishes of East-Greenland by **Ad. S. Jensen.** Weitere Beiträge zur Fauna des Jura von Nordost-Groenland von Prof. Dr. **E. Fraas** in Stuttgart. Med 13 Tavler og 1 Kort. 1904. Kr. 5.50.

2den Afdeling: On the Mollusca of East-Greenland: Lamellibranchiata by **Adolf Severin Jensen.** The Insects of East-Greenland by **J. C. Nielsen**; Appendix: Beschreibung von neuen Dipteren aus Ost-Grönland von **Th. Becker.** Note on the Crustacea by **H. J. Hansen.** The Porifera of East-Greenland by **William Lundbeck.** Med 1 Tavle. 1909. Kr. 4.50.

XXX, *1ste Afdeling:* Botanical exploration of the East-Coast of Greenland between 65° 35′—74° 30′ lat. N. By **Chr. Kruuse.** The Marine Algæ of East-Greenland. By **Helgi Jónsson.** The Freshwater Algæ of East-Greenland. By **E. Larsen.** Fungi Groenlandiæ orientalis in expeditionibus G. Amdrup 1898—1902. Determ. **E. Rostrup.** Lichenes expeditionis G. Amdrup (1898—1902). Enumeravit **Edv. A. Wainio.** List of the phanerogams and vascular cryptogams found on the coast 75°—66° 20′ lat. N. of East-Greenland. By **Chr. Kruuse.** List of Phanerogams and Vascular Cryptogams found in the Angmagsalik-District on the East-coast of Greenland between 65° 30′ and 66° 20′ lat. N. By **Chr. Kruuse.** Species nova Marsupellae, muscorum generis. Auctore **C. Jensen.** List of the Hepaticae and Sphagnales found in East-Greenland between 75° and 65° 35′ lat. N. in the years 1898—1902. By **C. Jensen.** 1907. Kr. 4.

XXXI. A phonetical study of the Eskimo Language based on observations made on a journey in North-Greenland 1900—1901 by **William Thalbitzer.** Med 4 Tavler. 1904. Kr. 8.

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