

THE DANISH
INGOLF-EXPEDITION.

VOL. II, PART 5.

CONTENTS:

AD. S. JENSEN: LAMELLIBRANCHIATA, PART I.

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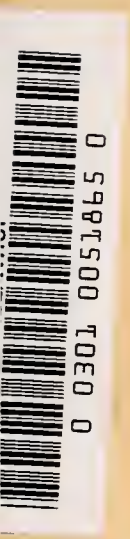


COPENHAGEN.

H. HAGERUP.

PRINTED BY BIANCO LUNO.

1912



THE DANISH INGOLF-EXPEDITION.

VOLUME II.

5.

LAMELLIBRANCHIATA.

(PART I.)

BY

AD. S. JENSEN.

WITH 4 PLATES AND 5 FIGURES IN THE TEXT.



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Introduction.

The Danish Ingolf-Expedition of 1895—96 brought home a very considerable material of Mollusca from the waters round the Færoes, Iceland and South Greenland. The Expedition was planned on the lines of a deep-sea investigation and the greater part of the material collected comes therefore from great depths; of the 144 stations investigated no less than 125 have depths of over 100 fathoms.

This material is naturally of great interest; the area investigated was but little known before and an extension of our knowledge of the deep-sea fauna must be classed among the relatively rare occurrences.

Whilst working up this material I felt appreciably the lack of information regarding the distribution of the Mollusca in the coastal regions round a great part of the area. This does not apply however to Greenland; on the west coast of that country collections have been made for many years and the material has been worked up by H. J. Posselt, and from the east coast the gatherings of the expeditions of recent years have been worked up by Posselt, R. Hägg, Ad. S. Jensen and J. Grieg. From Iceland and the Færoes, on the other hand, we had, just as previously for Greenland, but incomplete and short lists of the species and, as these, mainly drawn up by O. A. L. Mörch.

This deplorable absence of material from the coastal region of Iceland and the Færoes has now been made good. In 1892 and 1893 already Mag. scient. Will. Lundbeck had collected a great number of Mollusca in the north-western fjords of Iceland during his voyage with the fishing-cutter "Prinsesse Marie" and in recent years a number of the younger naturalists, who have visited the Færoes and Iceland, have willingly met my wishes and made a special effort to collect the Molluscs of those regions.

I may thus mention in particular, that in the summers of 1898, 1899 and 1901 Mag. sc. R. Hörring made considerable collections at the Færoes and along the east and south-west coasts of Iceland during his cruises with the fishery-inspection ship the "Diana"; further, that Dr. A. C. Johansen in 1900 brought home a large collection from the east and south coasts of Iceland, also made during a summer cruise with the cruiser "Diana". In 1902 Mag. scient. A. Ditlevsen was sent out with the "Diana", in 1903 Mag. scient. C. V. Otterström with the new inspection-ship "Beskytteren", in 1904 Cand. magist. H. J. Gemzøe ("Beskytteren"), in 1905 Cand. F. Johansen ("Beskytteren") and in 1907 Cand. magist. O. Börup ("Beskytteren"); all of these brought home collections, which helped to throw light on the Molluscan fauna of the Færoes and Iceland.

Information with regard to the Molluscan fauna of our North Atlantic islands was also obtained from another side. The Icelandic botanist, Dr. Helgi Jónsson, who was dredging for algae at the Færoes and Iceland during the years 1897, 1898 and 1901, in response to my request, preserved the Molluscs collected at the same time and with great liberality presented them to the Zoological Museum of Copenhagen University. His countryman, the zoologist Bjarni Sæmundsson, has also assisted me, among other ways, by lending material from the Natural History Collection at Reykjavik.

A very considerable collection has been brought home from the Færoes by Dr. Th. Mortensen, who in 1899 carried out a series of dredgings from the gunboat "Guldborgsund" partly in the fjords, partly on the banks down to a depth of ca. 150 fm.

Lastly, Dr. Johs. Schmidt, the leader of the cruises with the research-steamers "Thor", has during several years made collections at the Færoes and Iceland and brought home a considerable and very valuable material, from the littoral right down to the abyssal region, which he has preserved for science by presenting it to the Zoological Museum of Copenhagen.

For the sake of completeness I may further mention, that during my participation in the 1902 cruise of the research-steamers "Michael Sars" under the direction of Dr. Johan Hjort, I was given the opportunity of collecting a quantity of Mollusca on the banks round about the Færoes, on the east coast of Iceland as well as north and south of the Wyville Thomson Ridge. During my voyages in West-Greenland in 1906, 1908 and 1909 I also collected a great number of Molluscs.

The present part of the work on the entire material will show, that my endeavours have been directed first and foremost to the disentangling of the species. The determinations have been made as carefully as possible; that we can not be sufficiently critical regarding the determinations made by our predecessors, even of common and apparently well-known species, I have already shown in my small papers on *Mya* and *Tellina*.

With respect to Greenland, I have restricted myself to give a brief review of the distribution, as the works of Posselt and others have already discussed the details. For Iceland and the Færoes, on the other hand, each single place of occurrence has been mentioned, as there is a need here for all the information we can obtain — better to have too much detail than the reverse.

With regard to the synonymy lists I may remark here, that they have been intentionally divided into two sections, the first referring to the most necessary, systematic literature, whilst the second contains references to the principal, local fauna-lists.

The region dealt with here — the "bridge" between Europe and America across the North Atlantic Ocean and the slopes down to two deep-sea basins very different in hydrographical regards — offers more than ordinary interest, and many and varied problems have presented themselves for discussion as the work advanced. But the treatment of these and other conditions I shall postpone meantime, until the systematic elaboration of the material is completed.

*Copenhagen, Zoological Museum,
October 1911.*

Ad. S. Jensen.

Lamellibranchiata.

Part I.

Anomiidae.

Anomia.

The genus *Anomia* is represented by 2 species at the Færoes and Iceland: *Anomia squamula* L. and *Anomia patelliformis* L.

As regard the former, I am unable to agree with the prevailing view that *A. squamula* is a variety of *A. cphippium*. The latter is considerably larger and easily distinguished from the fact, that the upper (free) valve of the shell has 3 muscular impressions (one of the adductor, two of the byssus musculature; comp. Pl. I, fig. 3), whilst the upper valve in *A. squamula* only shows two muscular impressions (one of the adductor, one of the byssus muscle).

Anomia aculeata Müller (Pl. I, fig. 2 d) I take to be a variety of *A. squamula*, as there are all transitions between smooth and spinous specimens and they agree exactly in other regards, e. g. in the byssus musculature. G. O. Sars has observed correctly in so far that he only found two muscular impressions in the upper valve of *A. aculeata* and was consequently disinclined to refer *A. aculeata* as a variety to *A. cphippium*, where there are three muscular imprints¹⁾ on the upper valve. But Sars has not noticed at the same time, that *A. squamula* also has only two muscular impressions (Pl. I, fig. 2 c) and consequently cannot be a variety of *A. cphippium* either.

I have sought in vain for the true *A. cphippium* in my material from the Færoes and Iceland. Nor have I found this species among the material which has been collected in the course of years in the Danish waters. It is perhaps even doubtful, if *A. cphippium* occurs at Norway; I do not think it altogether inconceivable that G. O. Sars, starting from the anticipated view that *A. squamula* is a variety of *A. cphippium*, has ascribed to *A. cphippium* a distribution in Norway on this erroneous basis²⁾.

Again, it is difficult enough to distinguish *Anomia patelliformis* from *A. squamula* — and probably not always with certainty; the upper valve shows only two muscular impressions in both species (comp. Pl. I, fig. 1 c with fig. 2 c). The best distinguishing marks are, that the notch in the lower valve is large, almost triangular in *A. patelliformis* (Pl. I, fig. 1 b) and the umbo a little way from the margin (Pl. I, fig. 1 a), whereas in *A. squamula* the notch in the lower valve is small, oval (Pl. I, fig. 2 b) and the umbo entirely or almost on the margin (Pl. I, fig. 2 a).

¹⁾ It is not quite fortunate, when Sars describes the adductor imprint as being bi- or tripartite.

²⁾ Linné also has his two species geographically separated, the main region for *A. cphippium* being given as the Mediterranean, whilst *A. squamula* lives "in Oceano Svecico". Syst. Nat. ed. 12, 1, 2, 1767, p. 1150 and 1151.

Anomia patelliformis Linné.

Pl. I, figs. 1a—c.

Anomia patelliformis Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1151; Jeffreys, Brit. Conch. II, 1863, p. 34, pl. 20, fig. 2; Sars, Moll. Reg. Arct. Norv., 1878, p. 15.

Anomia patelliformis Mörch, Vidensk. Medd. Naturhist. Foren. 1867, p. 99.

Iceland.

At this island, from which it has not been known earlier, the species has been taken in recent years mostly on the south coast, rarely on the southernmost part of the west coast, from the beach down to a depth of ca. 70 fm.

West Iceland:

64°45.8' N. L., 23°55.2' W. L., 30 fm.	1 valve.
64°11'—64°18.5' N. L., 22°30.5'—22°46' W. L., 14—29 fm.	1 —
Reykjavik	1 spec.

South Iceland:

Grindavik	2 valves.
Vestmannaeyjar, shore	2 spec.
— 10—20 fm.	2 —
— ca. 20 fm.	1 —
— 30 fm., gravel with shells	12 valves.
— Heimaey, shore	13 —
63°30' N. L., 20°14' W. L., 42 fm.	6 —
63°21' — , 17°31' — , 69 fm., black sand	1 spec.
63°21' — , 17°15' — , 58 fm.	1 valve.
63°30' — , 17° — , 57 fm.	1 spec. (from stomach of a cod).

The largest specimen has a length of 47^{mm}.

The Færoes.

When Mörch published his list of the molluscan fauna of the Færoes, only one specimen was known, locality not stated; during the latest years it has been taken at the following places:

62°20' N. L., 7°37' W. L., 60 fm., sand and shells	1 spec.
Ejde, 5—6 fm., coarse black sand	1 valve.
Skaalefjord, 4—10 fm.	2 —
Solmund, on <i>Scrpula</i> tubes	5 —
Kongshavn, 12—16 fm.	9 —
Vestmahlavn, 10—30 fm.	1 —
5 miles N. of east point of Myggenæs, 50 fm.	1 spec. & 1 valve.
7 miles N. by E. of east point of Myggenæs, 57 fm.	2 valves.
61°40' N. L., 7°40' W. L., 135 fm.	1 valve.
Akralejte in N. 57 W. 12 miles, ca. 150 fm.	1 —
Færoe Bank, 58 fm.	2 valves.
61° N. L., 8°52' W. L., 90 fm.	1 spec.

The largest specimen measures 35^{mm}. Among a number of specimens collected at an earlier date, the locality not stated more precise than "the Færoes", the largest measures 40^{mm}. The greatest depth at which an adult specimen has been taken is 60 fm.¹⁾

Distribution. Apart from South-West and South Iceland and the Færoes, *Anomia patelliformis* occurs along the Norwegian coast from Lofoten southwards (0–40 fm.), and rarely in the northern and eastern Kattegat (10–25 fm.). It is found on all the British coasts (10–86 fm.), north and west coast of France, at Spain and Portugal, in the Mediterranean and Adriatic.

Anomia squamula Linné.

Pl. I, figs. 2 a–d.

Anomia squamula Linné, Syst. Nat. ed. 12, I, 2, 1767, p. 1151. — *Anomia cphippium* Forbes & Hanley, Brit. Moll. II, 1853, p. 325 (partim); Jeffreys, Brit. Conch. II, 1863, p. 30 (partim); Sars, Moll. Reg. Arct. Norv., 1878, p. 14 (partim?). — *Anomia aculata* Müller, Zool. Dan. Prodrum., 1776, p. 249; Sars, Moll. Reg. Arct. Norv., 1878, p. 15, Pl. 19, fig. 1.

Anomia squamula Mörch, Vidensk. Medd. Naturhistorisk Foren. 1867, p. 98; *ibid.* 1868, p. 226. — *Anomia cphippium* Mörch, *ibid.* 1867, p. 99.

The Ingolf-Expedition has taken this species at:

St.	Locality	Depth (fm.)	Bottom-temp.	Specimens
St. 51.	E. of Iceland.	68	7°32 C.	5 spec. (on <i>Bugula</i>).
- 127.	N. - - - - -	44	5°6	8 — (on <i>Hornera</i> and <i>Bugula</i>).
- 129.	N.W. of Iceland.	117	6°5	1 —
- 16.	W. - - - - -	250	6°1	7 — (on <i>Scrupula</i> , <i>Tubularia</i> and <i>Cidaris</i> spines).
- 86.	- - - - - (Brede Bugt)	76		Several hundred valves and 1 spec. on a Hydroid.
- 87.	- - - - -	110		Several hundred valves and 3 spec. on <i>Arcturus Baffini</i> and 7 spec. on <i>Tubularia</i> .
- 98.	- - - - -	138	5°9	Several hundred valves and 1 spec.
- 89.	- - - - -	310	8°4	2 spec. (on Brachiopod and <i>Cidaris</i> spine).
- 11.	- - - - -	1300	1°6	3 valves (apparently old).
- 9.	- - - - -	295	5°8	1 spec. and 1 valve.
- 8.	S.W. - - - - -	136	6°0	1 —
- 85.	- - - - -	170		3 valves.
- 67.	S. - - - - -	975	3°0	1 spec., with 3 others on it.
- 54.	S.E. - - - - -	691	3°9	1 —
- 55.	- - - - -	316	5°9	4 — (on <i>Oculina</i> and on <i>Cidaris</i> spine).
- 6.	- - - - -	90	7°0	6 — and 7 valves.
- 1.	W. of the Færoes.	132	7°2	5 — (on <i>Cidaris</i> spines and on shell of <i>Pecten septemradiatus</i>).

The greatest depth at which any living specimen was taken was 975 fm., but they may have been attached to two large pieces of timber brought up in the trawl; otherwise the greatest depth was 691 fm.; the other depths lie between 44 and 316 fm.

¹⁾ The specimen from 90 fm. is very small, 5^{mm}. long.

The specimens from deep water are more or less thin-shelled and of small dimensions; of those from 170 fm. and more the largest specimen is 11.5^{mm} long. Some of the many shells from St. 86, 87 and 98 belong to the variety *aculcata*.

Besides, the tendency of the species to vary is shown in a remarkable power of changing sculpture and form according to the substratum, possessed not only by the valve which is closely adherent to the substratum but also by the free, upper valve. Thus a specimen on *Reticpora* has a pitted surface on the upper valve, where the pits correspond to the openings in the network of the Bryozoa; a second specimen shows spinous ribs corresponding to the costæ of the *Pecten septemradiatus* to which it is attached; a third on a spine of a *Cidaris* shows folds or wrinkles corresponding to the longitudinal ribs of the spine; a fourth specimen attached crossways on a *Scrpula* tube has sharp ridges opposite the rings of the tube, and so on. The contour of the shell is as a rule circular, but sometimes the length is considerably greater than the breadth or the reverse or the contour becomes very irregular according as the substratum restricts the growth in the one or other direction.

Iceland.

In addition to the specimens from the "Ingolf" stations, *Anomia squamula* has been taken at Iceland in recent years at other places, east, north, west and south, as is shown by the following list.

East Iceland:

Myre Bugt	26 fm.	7 spec. and 10 valves.
— —	36 -	1 —
Lónsvik	40 - , mud and clay.	1 valve.
64°27' N. L., 13°27' W. L.	84 -	Many spec. on <i>Balanus Hameri</i> .
The Horn N. 74 E. 9 miles	38 -	2 spec.
64°58' N. L., 13°25' W. L.	40 -	3 valves.
Faskruds fjördr	50—20 - , blue clay.	1 —
Reydarfjördr	14 -	2 spec.
Vidfjördr	8—12 -	6 valves.
Nordfjördr	40 -	1 —
Seydisfjördr at Skulavig.	6 -	1 spec. and 18 valves.
— — —	30 -	3 —
Bakkafjördr	12—15 - , black sand.	1 valve.
—	20—28 - , sand and clay.	1 spec.
—	32—25 - , sand and clay with shells.	3 valves.

The largest specimen measures 15.5^{mm}.

North Iceland:

66°32' N. L., 15°15' W. L.	75 fm.	1 spec. and 2 valves.
Thistil Fjördr	10 -	2 — on algæ, 3 spec. on <i>Cyprina</i> and 9 spec.
— —	50 - , clay with stones.	1 valve.

Thorshöfn	6 fm.	35 valves.
Vidarvík	11 -	2 —
—	13 ¹ / ₂ - , black sand.	6 spec. and 4 valves.
Haganesvík	3 ¹ / ₂ —4 -	5 valves.
Axarfjördr	22 - , mud.	3 spec. (1 on <i>Pecten islandicus</i>) and 7 valves.
—	30 - , sand and stones.	18 valves.
Grjótnes	12—15 -	2 —
Skjálíandi Bugt	31 - , fine, black sand.	1 spec. and 2 valves.
Ofjord S. of Hrisey	18 - , clay.	1 —
— - - —	17—20 - , stones and mud.	2 valves.
Hedinsfjördr	13 -	1 —
66°17' N. L., 18°13' W. L.	52 -	8 spec.
Kollafjördr	5 -	1 —
Skagastrand		15 —
Prestbakki	3—4 -	2 —
66°17' N. L., 21°14' W. L.	95 -	1 — (on <i>Bugula</i>).
66°36' — , 21°57' —	32—37 -	11 —

The largest specimen measures 20.5^{mm}. A few belong to the variety *aculcata*.

West Iceland:

Höfnvík	9—10 fm.	2 spec. and 3 valves.
Adalvík	6—9 -	3 —
Isafjardardjúp	60—63 -	23 —
Skutulsfjördr	2—4 -	1 —
Arnarnes	5—7 -	1 —
Önnundarfjördr	11 -	1 —
66°8' N. L., 24°21' W. L.	47 -	2 — and 3 valves.
Dyrafjördr, inside Thingnæs 10 ¹ / ₂ —12 ¹ / ₂ - , ooze and small stones.		15 valves.
—	19 ¹ / ₂ -	2 spec.
65°52' N. L., 23°58' W. L.	33 -	1 valve.
Arnarfjördr	10 -	2 spec.
64°45.8' N. L., 23°55.2' W. L.	30 -	10 — (2 on <i>Hyas</i>).
Tálknafjördr	15 -	2 —
Stykkishólmur	6—9 -	14 —
Hvalfjördr	24 -	1 — and 25 valves.
Krossvík	8 - , shell-gravel, blue clay, stones.	12 valves.
Faxafjördr	14 ¹ / ₂ -	2 spec. and 2 valves.
—	17 - , coarse shell-sand.	ca. 100 valves.
—	14—29 -	- 13 —

Faxafjördr, ca. 3 miles N. 59 W. from Gróttá lighthouse . . . 25 fm.	8 valves.
— , off Kollafjördr . . . 8—11 ¹ / ₂ - , mud and stones.	5 spec. and 2 valves.
— , mouth of Kollafjördr 9 ¹ / ₂ —11 - , fine, black sand and mud.	12 valves.
— , off Kollafjördr 10 -	17 —
— , Keflavik 15—16 - , fine, black sand.	8 —
— , ca. 2 miles N. E. of Keflavik 19 ¹ / ₂ —20 ¹ / ₂ -	10 —
— , 1 mile W. of Helgasker Vager 13—16 -	4 —
— , 1 mile W. of Helgasker Vager 14 ¹ / ₂ -	1 — (on <i>Pecten islandicus</i>).
— , E. of Videy 9—10 - , fine sand and mud.	5 —
— , 7 miles N. N. E. of Skagens light 17—20 ¹ / ₂ - , sand and shells.	1 —
Reykjavik, on <i>Laminaria</i> driven on land.	ca. 80 spec.
— , at low-water mark	1 spec.
— 1 ¹ / ₂ fm., stony bottom.	9 —
— 1 ¹ / ₂ - , gravel —	1 —
— 2—3 - , on <i>Laminaria hyperborca</i> .	15 —
— 8 -	2 —
— (Engey). 7—8 ¹ / ₂ - , mud.	1 spec. and 3 valves.
Hafnarfjördr, on the beach	10 —
— 4 fm., sand and mud.	1 valve.
— 25 - , fine, black sand and mud.	10 —
Skagi 21 -	13 —

The largest specimen is 22^{mm} long. A number of specimens belong to the variety *acutula*.

South Iceland:

63°15' N. L., 22°23' W. L. 170—114 fm.	2 spec. and 20 valves.
63°18' — , 21°30' — 94 -	5 valves.
63°30' — , 20°14' — 42 -	1 spec.
63°05' — , 20° 7' — 293 -	3 valves.
Vestmannaeyjar, beach	14 —
— 10 fm.	2 spec. and 4 valves.
— 15—20 -	8 —
— 30 - , shell-gravel.	2 valves.
— 49 - , clay with a little mud.	ca. 100 valves.
— Heimaey, beach	70 —
62°57' N. L., 19°58' W. L. 500 fm.	2 —

63°17' ¹ / ₂ ' N. L., 17°39' W. L.	87 fm., black sand w. shells and stones.	3 spec. and 1 valve.
63°21' — , 17°31' —	69 - , black sand with shells.	2 —
63°21' — , 17°15' —	58 - , sand, stones and shell-gravel.	3 spec. and 25 valves.
63°24' — , 17° 5' —	70 - , black sand w. stones and shells.	4 valves.
63°30' — , 17° —	57 -	4 spec. (from stomach of cod).
63°21' — , 16°22' —	263—295 -	2 —

The largest specimen is 21^{mm}; some are of the variety *aculeata*.

The Færoes.

Anomia squamula has been frequently taken at the Færoes during recent years, from the shore down to a depth of 475 fm. The localities are the following:

Viderejde.		1 valve.
Svinö		9 spec.
Klaksvig.	10—15 fm.	25 valves.
—	11 - , on <i>Laminaria</i> .	32 spec.
Arnefjord.	0—15 - , hard bottom.	12 —
Bordövig.	7—10 - , black sand, small stones, <i>Laminaria</i> .	ca. 100 valves.
—	7—15 - , sand with <i>Laminaria</i> .	2 spec.
—	10 -	9 valves.
Ejde.	5—6 - , coarse, black sand.	72 —
Fundingsfjord.	12— ca. 20 - , coarse sand and clay.	Some spec. and many valves.
Andefjord	16—23 -	3 spec. (on <i>Modiola modiolus</i>).
Solmunde	, on <i>Scrpula</i> tubes.	7 spec.
Kongshavn	12—16 fm.	5 —
Vestmanhavn	3 ¹ / ₂ - fine black sand.	8 valves.
—	4 - , sand.	1 spec.
—	4—5 -	2 —
—	5—6 - , fine, black sand.	10 valves.
—	10—30 -	Some specimens and ca. 100 valves.
Vestmansund	ca. 70 -	8 valves.
Sandevaag	on <i>Laminaria</i> .	10 spec.
Sörvaag	14—16 ¹ / ₂ fm., mud.	6 valves.
Midvaag	7—11 -	3 —
Kalbækfjord		3 spec.
Thorshavn, outer harbour	12—16 fm.	3 — and 5 valves.
Glivursnes at Thorshavn		2 —
Nolsö, beach		8 valves.
— deep hole at north end, ca. 100 fm.		Many spec. (on <i>Modiola modiolus</i>).
Sandsvaag.	, on <i>Laminaria</i> .	5 spec.

Kvalbö		1 valve.
Trangisvaag	6-8 fm., mud and clay.	4 —
—	20 - , on <i>Laminaria</i> .	40 spec.
62°29' N. L., 7°37' W. L.	60 - , sand and shells.	7 —
5 miles N. of east point of Myggenæs	50 -	80 valves.
7 miles N. by E. of east point of Myggenæs	57 -	3 —
13 miles S. of Myggenæsholm	70 -	2 —
61°40' N. L., 7°40' W. L.	135 -	19 spec. and 22 valves.
61°15' — 9°35' —	ca. 475 -	3 — — 67 —
61° 7' — 9°30'	440 -	30 valves.
61°06' — 8°30'	61 -	2 spec.
61° — 8°52'	90 -	4 —
60°55' — 8°56'	ca. 75 -	20 — (on <i>Balanus</i>).
9 miles E. S. E. of Bispen	ca. 70 -	12 valves.
5 — S. S. E. —	50 -	3 —
6 — N. by W. of Kalsö	60 -	12 spec.
1½-2 miles off mouth of Bordö- vig	20-30 -	27 — and 5 valves.
Bordönæs in N. 75 W., 1¾ miles	30 -	60 — (on <i>Modiola modiolus</i>).
16 miles E. by S. of south point of Nolsö	80 -	5 spec. and 6 valves.
Akralejte in N. 57 W. 12 miles	150 -	2 — — 7 —
13 miles W. by S. of Munken	ca. 150 -	ca. 100 valves.
61°35' N. L., 4°39' W. L.	210 -	4 —

The largest specimen measures 23.5 mm. A number belong to the variety *aculeata*. The specimens from the deep localities (210-475 fm.) are thin-shelled and small (none over 11 mm.). The shells may also be very thin however in the littoral belt.

Distribution. *Anomia squamula* with the variety *aculeata* has its northern boundary in the "warm area" of the White Sea (Knipowitsch) and Murman Coast (Herzenstein). It is distributed along the whole of the Norwegian coast, from the shore down to 400 fm. (G. O. Sars), and goes through the Kattegat down to the northern part of the Great Belt and the Sound (C. G. Joh. Petersen). Towards the west it is distributed, as shown above, as far as the Feroes and round the whole of Iceland. In the Zoological Museum of Copenhagen specimens occur on *Cidaris papillata* spikes from the sea between Orkney and the Shetlands (135 fm.) and from 60°39' N. L., 3°09' W. L. (203 fm.) as also from many localities in the North Sea, down to a depth of 65 fm. It occurs on all the British coasts. Where the southern boundary of its distribution lies, I am unable to say, as the authors have confused this species with the more southerly *Anomia cphippium* (comp. p. 3), but it goes at least to the Bay of Biscay, where the Danish research-steamers "Thor" has taken some specimens at great depths

(43°37' N.L., 2°08' W.L.; 250—790 fm.). On the western side of the Atlantic it is distributed from Hatteras to the southernmost part of Labrador¹).

Ostreidæ.

Ostrea edulis Linné.

[Iceland.]

In "Brit. Conchol." vol. II, 1863, p. 40 Jeffreys gives Iceland as the northern boundary for the distribution of the oyster²) and Mohr as his authority. If we look up the work of the latter: "Forsog til en Islandsk Naturhistorie", 1786, we find *Ostrea edulis* mentioned (p. 130), it is true, but with the addition, that it "is said to occur in Hvalfjorden" according to E. Olafsen. But in the work of Eggert Olafsen and Biarne Povelsen: "Reise igjennem Island" (2nd part, 1772, p. 1010) the record cited is followed by the remark "but we have not seen it." As no other naturalist has found the oyster at Iceland since that time, it may be deleted from the fauna.

[The Færoes.]

From here the collection of the Zoological Museum possesses quite a small oyster (length 8^{mm}, height 10^{mm}.) attached to a shell of *Modiola modiolus* and still containing the dried-up soft parts; the specimen was sent in by Syssehuand Müller in 1873.

So far as I know, this is the only evidence we have, that the oyster may occur at the Færoes³). It is hardly credible, however, that *adult* oysters occur at the islands, as they would scarcely have escaped attention. Nor can the small specimen referred to be considered to have been transported here as larva by oceanic currents, as no current runs from the English or other European coasts to the Færoes⁴). But experiments have perhaps at some time been made to "introduce" oysters at the Færoes.

Pectinidæ.

Pecten pusio Linné.

Ostrea pusio Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1146. — *Pecten pusio* Jeffreys, Brit. Conchol. II, 1863, p. 51, Pl. 22, fig. 1.

Pecten (Hinnites) distortus Mörch, Vidensk. Medd. naturhist. Forening 1867, p. 98.

¹) In a geologically very late (postglacial) period *Anomia squamula* was distributed to West Greenland, where it is now extinct; cf. Ad. S. Jensen: On the fossil quaternary Mollusc-Fauna of Greenland (Medd. om Grönland, XXIX, 1909, p. 293); and Ad. S. Jensen and P. Harder: Post-glacial changes of climate in arctic regions as revealed by investigations on marine deposits (Postglaziale Klimaveränderungen, Stockholm 1910, p. 399).

²) The same statement is repeated in Proc. Zool. Society, 1879, p. 555.

³) In his "Faunula Moll. Insul. Færoënsium" (p. 99) Mörch cites the following passage from Landt: "It (i. e. *Anomia squamula*) is attached to small stones on the bottom at the same place as "the small oyster, *Ostrea minuta*", which he has fished up from the bottom of Vestmannaðhavnsfjorden close to the Vaagö side" and adds to this: "what we are to understand by Landt's *Ostrea minuta* is not clear; Landt has perhaps overlooked the hole in the shell of an *Anomia*, or he may even have meant a distorted *Saxicava*".

⁴) The Færoes are washed by the Gulf Stream, but it is improbable that the pelagic life of the oyster is of such long duration, that the larvæ could be carried the long distance across the Atlantic. Further, the specimen in question belongs to the European oyster (*Ostrea edulis*), as the muscular impression is white, not dark as in the American *Ostrea virginica* (cf. Whiteaves, Catal. of the marine Invertebrata of Eastern Canada, 1901, p. 116).

The "Ingolf" has taken this species at:

St. 87. West Iceland (Brede Bugt) 110 fm. 1 valve (height 4 mm.).

Further, *Pecten pusio* has been taken during recent years at several places on South-West and South Iceland, namely:

South-West Iceland:

Brede Bugt, off Hellissandur . . .	20 fm.	1 valve (small).
Faxafjördr.	17 - , coarse shell-sand.	10 — —
— mouth of Kollafjördr	9 ¹ / ₂ -11 - , fine black sand and mud.	1 fragment.
Hafnarfjördr, 1 mile W. ³ / ₄ N. of Hel- gasker Vager.	14 ¹ / ₂ fm.	1 spec.
Skagi	21 -	2 valves.

South Iceland:

Grindavik		1 valve.
Vestmannaeyjar.	10—20 fm.	1 spec. and 1 valve.
—	30 - , gravel with many shells.	4 valves.
—	49 - , clay.	Numerous valves.
— Heimaey.	shore.	17 valves.

The largest specimens are from the Vestmannaeyjar and measure:

length.	30 mm., height	35 mm.
—	33.5 - —	36 -

The largest specimen from the west coast (that from Hafnarfjördr, 14¹/₂ fm.) measures:

length.	15 mm., height	18.5 mm.
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The fragment from Faxafjördr, 9¹/₂—11 fm., however, has been of considerably larger dimensions.

The Færoes.

When Mörch wrote his "Faunula Molluscorum Insularum Færöensium" he knew a specimen and a valve from the Færoes, but the locality is not stated; the specimen, which contains the remains of the soft parts, is 32 mm. high and 27 mm. long; the valve is 38 mm. high. In recent years *Pecten pusio* has been taken with the dredge at the following places:

Ejde	5—6 fm., coarse, black sand.	1 valve (small).
Vestmannaeyjar	10—30 -	2 —
Nolsö, deep hole at north end	ca. 100 -	2 —
7 miles N. by E. of east point of Myggenæs	57 -	1 —
5 miles N. of east point of Myggenæs.	50 -	1 —
13 miles W. by S. of Munken	ca. 150 -	4 —
Færoe Bank	58 -	1 —

The largest of these valves is 36^{mm}. high and 26^{mm}. long.

Among the specimens from Iceland are some down to a size of scarcely 2^{mm}. The prodissoconch is smooth; immediately under it are radiating ribs, which are more or less spinous and tuberculous. Small specimens are difficult to recognize as belonging to this species, as they are relatively elongated, with the two dimensions of the shell almost the same, and the ears extremely well-developed; they might easily be confused, for example, with the young of *Pecten varius*. Medium-sized specimens still free are higher than long and of regular form. Later, the growth becomes irregular owing to the sedentary mode of life.

Distribution. In addition to South-West and South Iceland and the Færøes, *P. pusio* occurs at Southern Norway, but it has not been found living in the Danish waters inside the Skaw (a few dead, probably fossil, valves have been taken in the Eastern Kattegat). It also occurs at the British coasts ("on every rocky coast from Shetland to Cornwall"), along the coast of France and the Liberian Peninsula, through the whole of the Mediterranean right to Asia Minor. It is further distributed as far as Madeira, Canary Isles, Azores and Liberia, according to Dunker even to the Cape of Good Hope.

The vertical distribution extends at Norway from 0 to 90 fm., according to G. O. Sars, and at the British Isles from 0 to 85 fm., according to Jeffreys. Nevertheless, the latter author records the species as taken by the "Lightning" N. of the Hebrides in 530 fm. and by the "Porcupine" off the west coast of Ireland in 808 fm. Other authors also record it from great depths, thus Dautzenberg and Fischer¹⁾ from 1360 m. and 1494 m. at the Azores, and A. Locard²⁾ from 896–2285 m. in the Bay of Biscay and north coast of Spain, as also from 1200 m. W. of the Soudan. Is it not possible that these records are based on mistakes? Or were they only dead shells which occurred at the great depths?

Remarks. *Pecten pusio* is here taken *sensu latiore*. The French malacologist A. Locard definitely maintains that the "*P. pusio*" of the authors covers two distinct species, namely: (1) a free-living species for the whole of its life, of regular form (*Pecten multistriatus* Poli); (2) a species permanently attached in adult condition, always of irregular form (*P. distortus* da Costa); the first species belongs to the Mediterranean, though exceptionally occurring in the Atlantic as far as the Bay of Biscay and coast of Liberia, whereas the latter species is exclusively an oceanic form, with a distribution from the Azores to Norway³⁾. It seems to me, however, that Locard's mode of reasoning is not conclusive in the matter. Bucquoy, Dautzenberg and Dollfus seem likewise most inclined to consider *P. distortus* and *P. multistriatus* as one and the same species, *inter alia*, because both forms may be found as members of the same "colony" and thus in all probability of the same origin.⁴⁾

Pecten opercularis Linné.

Ostrea opercularis Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1147. — *Pecten opercularis* Jeffreys, Brit. Conch. II, 1863, p. 59, Pl. 22, fig. 3.

Pecten opercularis Mörch, Vidensk. Medd. Naturhist. Foren. 1867, p. 98.

1) Mém. Soc. Zool. de France, X, 1897, p. 193.

2) Expéd. scient. Travailleux-Talisman, Moll. Test. II, 1898, p. 379.

3) A. Locard: Contrib. à la faune malacol. Française. XI Monographie. Pecten, 1888, p. 38; idem: Expéd. scient. Travailleux-Talisman, Moll. Test. II, 1898, p. 377–79.

4) Mollusques marins du Roussillon, II, 1887–98, p. 106.

The Færoes:

Mörch's list gives this species from Kollefjord (on Strömö)¹⁾ and from "Fiskebanken" W. of the Færoes. In recent years *Pecten opercularis* has been dredged at the following places:

Klaksvig	10—15 fm.	1 valve.
Andefjord	16—23 -	1 —
Fundingsfjord.....	12—ca. 20 - , coarse sand and clay.	1 spec. & 5 valves.
Ejde	5— 6 - , coarse black sand.	2 valves.
Vestmánhavn.....	5— 6 - , fine black sand.	1 spec.
—	5—13 - mud and black sand.	1 —
—	10—30 -	1 valve.
Nolso, deep hole at north end	ca. 100 -	2 spec. & 1 valve.
Trangisvaag.....	1—12 -	1 spec.
62°29' N.L., 7°37' W.L.	60 - , sand and shells.	1 valve & 1 fragment.
62°16.5' — , 6°6' —	50—60 -	10 valves.
62°16 — , 5°54' —	50—60 -	1 valve.
5 miles N. of east point of Myggenæs	50 -	2 fragments.
7 — N. by E. of east point of Myggenæs.....	57 -	9 valves.
61°56' N.L., 7°04' W.L.	30 -	1 valve.
61°40' — 7°40' —	135 -	1 —
61° — 8°52' —	90 -	2 spec. and 1 valve.
60°55' — 8°56' —	69 -	4 valves and some fragments.
9 miles E. S. E. of Bispen	ca. 70 -	3 valves.
6 — N. by W. of Kalsö ..	60 -	7 spec.
1½—2 miles off mouth of Bor- dovig	20—30 -	1 spec. and 1 valve.
16 miles E. by S. of south point of Nolso.....	ca. 80 -	4 spec.
13 miles W. by S. of Munken	- 150 -	7 valves.

It should be emphasized, that all the specimens taken in the fjords and at the coast itself are small, at most 24.5 mm. In the open sea round about the Færoes, on the contrary, many large individuals have been taken; the largest living specimen measures 65 mm., the largest of the empty shells 80 mm.

The specimens vary somewhat in regard to colour and sculpture, just as at other places.

Distribution. *Pecten opercularis* occurs at the Canary Isles, Madeira and the Azores. It is common in the Mediterranean (including the Aegean) and along the coasts of Europe to Southern

¹⁾ It is probably these specimens (collected by Iap. Steenstrup) to which Jeffreys refers, when he writes (l. c. p. 60): "Steenstrup informs me that he has found it (*P. opercularis*) in Iceland", the Færoese locality being confused with Kollefjordr in Iceland. *Pecten opercularis* has never been found at Iceland.

Norway; its northern boundary, according to Sparre Schneider, is reached in Norway at 67° N.L. It enters the Kattegat, in the southern part of which it is common, as also into the Sound to the island Hveen. In the west, as shown above, it ranges to the Færoes.

Jeffreys estimates the vertical distribution of the species at 0—180 fm., and at Norway according to Sars, it only goes down to 100 fm. and at the Færoes to 100 (150?) fm. Nevertheless, Jeffreys states that the "Lightning" and "Poreupine" Exped. have taken it N. of the Hebrides at 530 fm., W. of Ireland at 808 fm. and off the Channel at 257—690 fm., as well as off Portugal at 364 fm., but it is not stated whether these were living specimens or empty shells; from the Azores also it is given by Fischer and Dautzenberg from a depth of 1360 m.

Pecten islandicus Müller.

Pl. I, figs. 4 a—b and c—d (young).

Pecten islandicus Müller, Zool. Dan. Prodröm., 1776, p. 248; Sars, Moll. Reg. Arct. Norv., 1878, p. 16, Pl. 2, fig. 2; Verrill, Trans. Conn. Acad., X, 1899, p. 72, Pl. XVI, figs. 2—5. — *Pecten Fabricii* Philippi, Abb. u. Beschreib. neuer oder wenig gekannter Conchyl., I, 1845, p. 101, Pecten Tab. 1, fig. 5.

Pecten islandicus Fabricius, Fauna groenl., 1780, p. 415; Møller, Index Moll. Groenl., 1842, p. 16; Möreh, Rink's Grönland, 1857, p. 94; Vidensk. Medd. Naturh. Foren. 1868, p. 225; Arctic Manual, 1875, p. 133; Rink's Dan. Greenland, 1877, p. 442; Becher, Österr. Polarstat. Jan Mayen III, 1886, p. 68; Posselt, Medd. om Grönland, XXIII, 1898, p. 14.

This species has been taken by the Ingolf-Expedition at the following places:

St. 31.	Davis Strait.....	88 fm.	1°6 C.	1 spec. (small).
- 26.	— —	34 -	0°6 -	1 —
- 127.	N. of Iceland.....	44 -	5°6 -	4 valves (1 with remains of soft parts).
- 87.	W. - — (Brede Bugt)..	110 -		2 — , ancient in appearance.
- 86.	— - — — ..	76 -		1 small spec. and several valves, ancient in appearance.
- 6.	E. - --	90 -	7°6 -	1 young spec.

West Greenland.

Very common from the southernmost parts and as far north as zoological investigations have been made, namely to Ivsugigsok (76° N.L.). The largest specimen I have seen is from Egedesminde and measures 105^{mm}. It occurs most frequently at depths of 15—50 fm. and prefers hard bottom. At some of the colonies (Holstensborg, Egedesminde) the Danes frequently send out men to dredge for it on the "banks", where it flourishes in quantity, especially when they have guests to whom they wish to offer this Greenland delicacy; its large adductor muscle has a very good taste and it even seemed to the malacologist H. P. C. Møller "more tender and finer in the flesh than *Ostrea edulis*". The same author states, in a manuscript, that *P. islandicus* "moves very rapidly by firm beats of the valves and can thus spring almost a foot each time; I have never seen it use the foot".

East Greenland.

Whole valves, still less living specimens, have not been found; on the other hand, some fragments have been taken in the dredge off Angmagsalik in 140 fm. (a fragment) and in Forsblads Fjord in 50—90 fm. (fragments of a larger and a smaller valve). Further, a shell fragment has been found at Rolige Bræ in the inner part of Scoresby Sound¹⁾.

Jan Mayen.

The Austrian Expedition of 1882—83 found numerous specimens on the north side of the island, 75—95 fm. The Danish Expedition of 1900 obtained 9 living specimens and various valves on muddy bottom at a depth of 55 fm.; the largest was 86^{mm} in height.

Iceland.

Pecten islandicus has not been found at all on the south coast but it is common on the other coasts of the island. The specimens, which are preserved in the Zoological Museum, come from the following localities:

East Iceland:

64°27' N. L., 13°27' W. L.	84 fm.	1 valve (fossil perhaps).
64°58' — , 13°25' —	40 -	1 —
Faskrudsfjördr	50—20 -	3 spec. (small).
Outer Reydarfjördr	60—80 -	2 —
Reydarfjördr	86 -	1 —
Nordfjördrs Flóin	35—55 -	1 —
Mjófifjördr	40—52 -	1 —
Seydisfjördr	10 -	1 —
— at Skulavíg	6 -	1 —
Bakkafjördr	20—28 -	1 —
—	25—32 -	10 —
—	52—43 -	11 — (small)

The largest specimen is 78^{mm} high.

North Iceland:

Haganesvík	3 ¹ / ₂ —4 fm.	3 valves.
Axarfjördr	22 -	3 spec.
—	30 -	2 valves.
Ofjord	2—3 -	1 spec.
—	11 -	2 —
66°17' N. L., 18°13' W. L.	52 -	1 —
Kollafjördr	5 -	1 —
—	10 -	1 — & 3 valves.
Veidileysafjördr	21—25 -	3 —

¹⁾ Cf. A. d. S. Jensen, Medd. om Grønland, XXIX, 1909, pp. 301—2 and 333.

It is naturally due to chance that all the shells brought home are small in size, none over 60^{mm}; in reality very large specimens occur at North Iceland and in extremely large quantities at places.

West Iceland:

Hesteyrarfjördr	15—17 ¹ / ₂ fm.	2 spec.
Dyrafjördr, inside Thingnæs	10—12 ¹ / ₂ - , mud and small stones.	15 valves.
—	18 -	7 spec.
—	20 -	1 —
Bildudalr	5—7 -	1 —
Fossfjördr	44 -	2 valves.
Tálknafjördr	14 -	10 spec.
—	ca. 24 -	1 —
N.W. of Tálkni		1 — & 2 valves.
Patreksfjördr	drag-net on beach	1 —
65°17.5' N.L., 23°24' W.L.	28 fm.	3 —
Hvalfjördr	24 -	Several spec.
Faxafjördr, Keflavik	15—16 - , fine, black sand.	1 fragment.
— , ca. 2 miles N.E. of Keflavik	19 ¹ / ₂ —20 ¹ / ₂ - , ooze.	1 —
— , ca. 3 miles N. 59 W. of Gróttu Light	25 -	1 valve.
Reykjavik Roads		1 spec.
— — near Engey		1 —
— , Engey	7—8 ¹ / ₂ - , ooze.	8 —
Hafnarfjördr	4—7 -	1 —
— , 1 mile E.N.E. of Helgasker Vager	11 ¹ / ₂ - , bottom-temp. 9.3° C. (August).	6 —
— , 1 mile W. ³ / ₄ N. of Helgasker Vager	14 ¹ / ₂ -	4 —

Even at the southern boundary of its occurrence at Iceland the species attains a considerable size; the specimens from Hvalfjördr reach a size of up to 80^{mm}, from Reykjavik up to 95^{mm} and from Hafnarfjördr up to 78^{mm}. Outside the fjords however, it has not been taken further south than in Brede Bugt, and the living specimens from there are only 20—25^{mm}.

[The Færoes.]

In recent years a number of shells of *P. islandicus*, all large (72—90^{mm}) and with a “fossilized” appearance, have been taken with the dredge at various places out to sea round about the islands, namely:

S. of Myggenæs	from the line-fishing	1 valve
Akralejte in N. 57 W. 12 miles	150 fm.	3 — , fragments.
61°10' N.L., 5°46' W.L.	150—160 -	1 —
61°21' N.L., 5°12' W.L.	210 -	1 —

As no living specimens were forthcoming, it may probably be taken as fairly certain, that *Pecten islandicus* no longer lives at the islands.

Remarks. The radiating ribs of the shell begin to appear in the young immediately below the prodissoconch. In the beginning the shell is provided with very dense, concentric lines (Pl. I, figs. 4 c and d), which in the spaces between the longitudinal ribs give way later to a very characteristic rasp-like structure (distinct under the lens) (Pl. I, fig. 4 a). The longitudinal ribs themselves are often smooth, but not rarely rough from down-turned spines or scales. The rasp-like sculpture is almost always present, if the shell is not too much rubbed; it may be difficult to see or has disappeared only in the cases, when the radiating ribs lie very closely and are covered with scales, but even on such specimens it can as a rule be observed on the older parts of the shell (Pl. I, fig. 4 b). Curiously enough authors do not seem to have attached any weight to this good distinguishing character, and Verrill has even recently established a special variety *insculpta* (l. c., p. 73, fig. 5) for specimens with such structure; in my experience this is practically never wanting, when carefully sought for under a lens.

Some few of the Greenland and Iceland specimens belong to the variety, which Chemnitz has described and figured in Conchyl. Cabinet VII, 1784, p. 318, Tab. 65, fig. 616: the shell is thrown into undulating, radial folds. I have also a similar variety from Jan Mayen.

Distribution. *Pecten islandicus* is an arctic species, but whether it is circumpolar, as is generally stated, seems to me more than doubtful. It has been taken, it is true, at Labrador, West Greenland, Iceland and Spitzbergen, in the Barents Sea and at the entrance to the Kara Sea, but it has not been found in the Kara Sea nor in the Polar Sea of Siberia¹); then it appears again in the Bering Sea, but it has not been met with in the Polar Sea north of arctic America²), any more than at the high-arctic East Greenland. In the Atlantic to the south it reaches to Cape Cod and West Norway³), in the Pacific to Korea and North Japan⁴). — Its vertical distribution extends in general from 5 to 50 fathoms, but sometimes it goes deeper down.

Shells ancient in appearance have been taken at many places, where it is certain the species no longer lives, e. g. at Bohuslän (Malm), in the Kattegat (C. G. Joh. Petersen), in the North Sea (Metzger), at the British coasts (Forbes & Hanley) and off the west coast of Ireland ("Porcupine").

¹) The Dijnphna-Exped., which made many dredgings in the Kara Sea, only got a single small specimen, and it was not taken in the Kara Sea itself, but in the entrance (Jugor Strait). Nor was it found by the Vega-Exped. in the Polar Sea of Siberia.

²) Under the distribution of *P. islandicus*, Posselt (l. c., p. 15) notes "Wellington Channel" and Belcher as his authority. But on looking up Belcher: "The last of the Arctic voyages" (1855), where *P. islandicus* is certainly noted among the Molluscs collected by the Expedition and determined by Lovell Reeve (Vol. II, p. 396), we find the locality given as "Lievly, Greenland", i. e. Godhavn on Disko Isl. in W. Greenland, which was touched at by the Expedition both on the outward and homeward voyage. "Lievly" is the name given by the English whalers to Godhavn.

³) The southern boundary lies right down about 59° N. L., where Dr. O. Nordgaard in 1902 took a specimen off the mouth of Lysefjord (Bergens Museums Aarbog 1903, No. 8, p. 36); Dr. Nordgaard kindly permitted me to see this specimen, which was 45 mm. high and taken at a depth of ca. 24 fm. At Bergen already, where M. Sars found it, though only as small, dwarf-like specimens (50 mm. high), *P. islandicus* is rare, as it is not mentioned in Friele's or Norman's lists of the Molluscan fauna of Bergen Fjord. I have had the opportunity of seeing two specimens from the immediate neighbourhood of Bergen, taken by Dr. Nordgaard, the one in Radosund at a depth of ca. 50 fm. (height of specimen 29.5 mm.), the other, of the same size, in Alværstrømmen at a depth of 16 fm. along with *Pecten opercularis*.

⁴) From Engineer Schönau of the Great Northern Telegraph Co., our Museum has received a specimen from the coast of Korea and one from the waters S. of Wladiwostock (42° 15' N. L., 130° 43' E. L.).

Nor can I believe, that the shells of this species stated to have been taken off the west coast of France, 748—1262 m. ("Princesse Alice") and in the Bay of Biscay, 400 m. ("Caudan") were "fresh" — unfortunately, the authors say nothing as to the condition of the shells — though Locard makes the following statement regarding *P. islandicus*: "C'est, comme on le sait, une espèce particulièrement septentrionale, qui ne vient jusque dans nos régions qu'à la condition de se propager en eaux profondes".¹⁾

Pecten islandicus is not a particularly high-arctic species; it lives in greatest quantity, forming whole banks of shells, at Finmarken, North Iceland and South-West Greenland as well as on the fishing banks of Nova Scotia and Newfoundland, whereas it occurs much more sparsely at Spitzbergen²⁾. Mörch also remarks, that it does not grow so large in the high north³⁾. As mentioned, it attains a considerable size even so far south as S. W. Iceland, where the bottom-temperature in August amounted to 9.3° C.

Pecten aratus Gmelin.

Pl. I, figs. 5a—e.

Pecten aratus Gmelin, Linn. Syst. Nat. ed. 13, 1788, p. 3327. — *Pecten sulcatus* Jeffreys, Brit. Conchol. II, 1863, p. 64; Proc. Zool. Soc., 1879, p. 557. — *Pecten aratus* Sars, Moll. Reg. Arct. Norv. 1878, p. 17, Tab. 2, fig. 3.

The "Ingolf" Expedition has taken this species at:

St. 98.	W. of Iceland	.....	138 fm.	5.9° C.	A number of valves.
- 97.	- - -	.....	450 -	5.5° -	1 right valve.
- 89.	- - -	.....	310 -	8.4° -	1 spec. & 1 left valve.
- 9.	S. W. -	.....	295 -	5.8° -	11 valves.
- 10.	- - -	.....	788 -	3.5° -	1 small spec. (height 6 ^{mm}).
- 85.	- - -	.....	170 -		2 valves.
- 55.	S. E. -	.....	316 -	5.9° -	2 spec.

At **Iceland** and the **Færoes** — where it has not been known hitherto — it has also been taken at the following places by Danish expeditions:

64°42' N.L.,	27°43' W.L.	.....	426 fm.	6° C.	1 spec.
63°15'	— 22°23'	.....	170—114 -		1 —
63°05'	— 20°7'	.....	293 -		2 — & 13 valves.
63°12.5'	— 20°06'	.....	268 -		ca. 20 spec.
61°15'	— 9°35'	.....	ca. 475 -		1 spec.

The specimens to hand are rather variable both in form and sculpture. As a rule the height is somewhat greater than the length, but the two dimensions may be almost equal. In consequence of this the circumference is variable, the lower contour forming sometimes a part of an oblique oval, sometimes an almost perfect arc of a circle. The number of the primary, stronger ribs is extremely variable

¹⁾ Campagne du "Caudan", par R. Koehler, 1896, p. 207.

²⁾ Torell: Spitsbergens Molluskfauna, 1859, p. 124.

³⁾ Catal. des Moll. du Spitzberg, p. 27. Ann. Soc. Mal. de Belgique, IV, 1869.

e. g. 6, 8 (Pl. I, figs. 5a & b), 10 and 12. Sometimes the intermediate ribs are almost as well developed as the primary, so that the difference is not appreciable, and the sculpture then assumes a certain resemblance to that in *Pecten islandicus*; it lacks however the characteristic intercostal, rasp-like structure of the latter (Pl. I, figs. 5c & d). Each primary rib again is composed of a varying number of small ribs, which may be smooth but are usually rough (at least towards the periphery) from the presence of small, erect scales (Pl. I, fig. 5e). All the specimens to hand are grayish-yellow to straw- or orange-yellow (elsewhere the colour is described as purple-red or rose-red). The largest specimens measured:

Length	Height	Breadth
29.5 ^{mm}	30 ^{mm}	7.5 ^{mm}
29.5 -	29.5 -	8 -
28.5 -	29 -	7 -
24.5 -	27 -	7 -

Distribution. *Pecten aratus* ranges from Morea through the Mediterranean to the Atlantic off Soudan ("Talisman"), Pyrenean Peninsula, France and Ireland, as also north of Shetland¹⁾; further, it occurs from Bohuslän along the coast of Norway to Lofoten²⁾. Lastly, the Danish investigations have shown that it goes south of the Færoes and south of Iceland and a good way up into the Denmark Strait. Its vertical distribution is placed by Jeffreys at from 20 to 530 fm.; the "Ingolf" however has taken a living (though small) specimen at a depth of even 788 fm. (St. 10).

Among the synonyms of this species Jeffreys gives *Pecten brucei* Payraudeau, but French and Italian authors do not agree with him here. After examining a specimen of *P. brucei* (from Corsica) sent to our Zoological Museum by Marchese di Monterosato, I consider there is no doubt, that Jeffreys is right; this means at the same time that *P. aratus* is distributed in the Mediterranean.

Pecten septemradiatus Müller.

Pl. I, figs. 6a—c (var. *scaber*).

Ostrea septemradiata Müller, Zool. Dan. Prodr., 1776, p. 248. — *Pecten septemradiatus* Jeffreys, Brit. Conchol. II, 1863, p. 62, Pl. 23, fig. 1.

This species has been taken by the "Ingolf" at the following stations:

St. 98.	W. of Iceland	138 fm.	5.9° C.	Fragments of numerous valves.
- 89.	- - -	310 -	8.4° -	1 spec.
- 9.	S.W. - -	295 -	5.8° -	1 spec. and 8 valves.
- 8.	- - -	136 -	6.0° -	Fragments of 4 -
- 85.	- - -	170 -		- - 7 -
- 55.	S. E. - -	316 -	5.9° -	1 spec.
- 6.	- - -	90 -	7.0° -	2 valves.
- 1.	N.W. of the Færoes	132 -	7.2° -	7 spec.

¹⁾ During my participation in the cruise of the "Michael Sars" in 1902, I obtained a specimen at 60°21.5' N.L., 3°55' W.L., 148 fm.

²⁾ Noman's record of its occurrence right up at 71°12'30" N.L., 20°30'30" E.L., 135 fm. seems hardly credible and is based in all probability on an erroneous determination (Niederländ. Arch. f. Zoologie, Suppl. Bd. 1, 1881—83, No. 10 p. 3).

In recent years, further, it has been taken at other places at Iceland and the Færoes, namely:

Iceland.

63°15' N.L., 22°23' W.L.	170—114 fm.	2 spec. and 23 valves.
63°18' — 21°30' —	94 -	1 fragment.
63°05' — 20°07' —	293 -	11 valves.
63°12.5' — 20°06' —	268 -	1 valve.

Færoes.

62°29' N.L., 5°17' W.L.	191 fm.	2 valves.
61°40' — 7°40' —	135 -	ca. 25 valves.
61°15' — 9°35' —	ca. 475 -	3 valves.
61°09' — 7°54' —	180 -	2 spec. and 5 valves.
61°07' — 9°30' —	440 -	1 valve.
61°06' — 9°21' —	210 -	1 —
Akralejte in N. 57 W. 12 miles	ca. 150 -	9 spec. & numerous valves.
13 miles W. by S. of Munken	- 150 -	1 valve.

Pecten septemradiatus is thus quite common round the Færoes and the south and south-west of Iceland, which has not been known hitherto. It does not enter the fjords, however, occurring only in the open sea. It has been taken at depths of 90—475 fm. (living specimens however only from 132—316 fm.).

The specimens to hand from Iceland and the Færoes show no small variation with regard to the sculpture of the shells. Compared with typical specimens (from the Kattegat) they have on the whole more numerous folds (8—13) (Pl. I, figs. 6a—b) and are very distinctly radially striated on the left shell. Some specimens are smooth, in others again the radiating stripes of the left shell are rough from the presence of small, down-turned scales; lastly, the specimens from stations 9 and 89 of the "Ingolf" have not only the stripes on the left valve densely beset with such sharp scales (Pl. I, fig. 6c), but likewise have the stripes which lie between the radiating folds of the right valve provided with small spines. Had transitions not been present, one might have been tempted to consider the last-named specimens as belonging to an independent species; it will now be most correct to call this, the most strongly spined form, by the name of var. *scaber*.

At the Færoes and Iceland the species attains to a considerable size; the largest specimens measure:

Length	55 ^{mm}	Height	52 ^{mm}	Breadth	13 ^{mm}
—	55 -	—	55 -	—	13.5 -

Distribution. According to Locard¹⁾ *Pecten septemradiatus* does not live in the Mediterranean, but is an oceanic species occurring off West Africa (Sahara), at the Canaries, the French Atlantic coast and in the Channel. At the northern parts of the British Isles, as also in the southern Skagerak

¹⁾ A. Locard: Contrib. à la faune malacol. française, XI, Monogr. Pecten, 1888, p. 90; idem: Rés. scient. de la camp. du "Caudan", 1896, p. 211. English authors are said to have confused with *P. septemradiatus* the more southerly *P. clavatus* Poli (= *P. inflexa* Poli; *P. Dumasii* Payraudeau). Cf. also Bucquoy, Dautzenberg et Dollfus: Les Moll. marins du Roussillon, II, 1887—98, pp. 69—70; cf. also, however, the record of the occurrence of *P. septemradiatus* at Bouches du Rhône, p. 802.

and in the eastern Kattegat (its southern boundary lies in the Sound at Hveen Island). Further it is very common along the Norwegian coast, right up to Varanger Fjord (70° N.L.) and, as shown above, our knowledge of its distribution has been extended to embrace also the Atlantic at the Færoes and at south and south-west Iceland. — The bathymetric distribution extends from 15 to over 300 fm.

M. Sars considered *P. septemradiatus* (*P. danicus* Chemn.) as an arctic species¹⁾, and G. O. Sars inclines to the same view, as his father has found the same species very common in the fossil condition in the older glacial marl. As will have been seen from the above list, the "Ingolf" has only taken this bivalve at localities with fairly high temperature; nor has the species been found elsewhere, where the conditions are "arctic" in the hydrographical sense of the word. As it is inconceivable, that the above authors could have made an erroneous determination of this easily recognized species, I venture to conclude that *P. septemradiatus* belongs to a layer, which has been deposited under milder climatic conditions. I notice also, that W. C. Brogger has put forward quite the same view. He writes namely²⁾: "When we see, what a considerable size this species attains to in the Isocardia-clay (up to more than 62^{mm}), there is no reason for believing it to be originally an arctic species, the less so, as it does not occur at all in the living or fossil, high arctic fauna. It is therefore undoubtedly a typically boreal species".

Pecten tigrinus Müller.

Pecten tig(c)rinus Müller, Zool. Dan. II, 1788, p. 26, Tab. 60, figs. 6—8; Jeffreys, Brit. Conch. II, 1863, p. 65, Pl. 23, fig. 2.

Pecten tigrinus Mörch, Vidensk. Meddel. Naturh. Foren. 1868, p. 226 and p. 229.

The "Ingolf" has taken this species at:

St. 86. W. of Iceland (Brede Bugt) 76 fm. 9 valves (fragments).

Iceland.

Jeffreys gives "Iceland" as the home of this pretty species, as also Mörch, who mentions Torell as his authority. In addition to the above locality from the "Ingolf", *P. tigrinus* has been taken in recent years at the following places at South Iceland:

$63^{\circ}15'$ N.L., $22^{\circ}23'$ W.L.	170—114 fm.	1 valve.
$63^{\circ}30'$ — , $20^{\circ}14'$ —	42 -	1 —
Vestmannaeyjar	30 - , gravel with shells.	3 —
—	49 - , clay with a little mud.	5 —
$63^{\circ}21'$ N.L., $17^{\circ}31'$ W.L.	69 - , black sand.	2 —
$63^{\circ}21'$ — , $17^{\circ}15'$ —	58 - , sand, stones, shell-gravel.	15 —
$63^{\circ}24'$ — , $17^{\circ}5'$ —	70 - , black sand w. stones and shells.	1 spec. and 9 valves.

The largest of these shells measures: length 21.5^{mm}, height 22^{mm}.

¹⁾ M. Sars: Fossile Dyrelevninger fra Quartærperioden, 1865, p. 127.

²⁾ W. C. Brogger: Om de sen-glaciale og post-glaciale nivåforandringer i Kristianiafeltet, 1900—1901, p. 469.

Færoes.

In an appendix to "Faunula Moll. Insul. Færøensium" Mörch (l. c.) has added *P. tigrinus* to the fauna of the islands, without however stating the locality. In recent years it has been taken at many places round the islands at depths of 20—150 fm., as will appear from the following list:

Vestmanhavn	10—30 fm.	1 valve.
Nolso, deep hole at north end.....	ca. 100 -	1 spec. and 1 valve.
62°29' N.L., 7°37' W.L.	60 -	2 valves.
62°16' — , 5°54' —	50—60 -	5 —
5 miles N.E. of east point of Myggenæs..	50 -	2 —
7 — N.byE. - - - - -	ca. 57 -	1 —
13 — S. of Myggenæsholm.....	ca. 70 -	28 —
61°40' N.L., 7°40' W.L.	135 -	6 —
61°06' — , 8°30' —	61 -	2 —
60°55' — , 8°56' —	69 -	1 —
5 miles S.S.E. of Bispen	50 -	1 —
9 — E.S.E. - - - - -	ca. 70 -	22 —
6 — N.byW. - Kalsö	60 -	2 —
1 1/2—2 miles off mouth of Bordövig...	20—30 -	1 spec.
16 miles E.byS. of S. point of Nolsö ..	ca. 80 -	4 valves.
Akralejte in N.57W. 12 miles.....	ca. 150 -	1 spec. and 10 valves.
13 miles W.byS. of Munken	ca. 150 -	1 — - 90 —

The largest of these shells measures: length 32^{mm}, height 31.5^{mm}.

These shells from Iceland and the Færoes vary greatly in regard to form, sculpture and colour. Forbes and Hanley have given the following description which agrees well with our shells: "Sometimes the surface is otherwise smooth, sometimes there is a marginal belt of narrow and very closely disposed depressed radiating costellæ; occasionally these latter extend over the whole shell with or without the presence of about five principal radiating ribs, which are rounded, generally broad, and variable in amount of elevation (var. *costata* Jeffreys)".¹⁾ In the last variety the margin of the shell is sometimes inflexed.

Distribution. *P. tigrinus* is distributed along the west coast of Europe from the north of Spain to West Finmarken, also over the Færoes to South and South-West Iceland; it goes further into the Kattegat. The vertical distribution is given by Jeffreys as 5—180 fm.

Remarks on *P. tigrinus* and *P. striatus*.

Pecten tigrinus and *P. striatus* are as a rule most readily distinguished from one another by the hindmost ears in the former being almost rudimentary, but well-developed in the latter; further, the radiating ribs in *P. striatus* are beset with short vaulted spines or prickles, whereas these are lacking in *P. tigrinus*. Sometimes, however, it is not at all easy to separate them, as the posterior

¹⁾ Forbes and Hanley: A history of British Mollusca, II, 1853, p. 286.

ears in *P. tigrinus* may be fairly large, and the hindmost part of the shell may show a trace of being echinated; on the other hand, the number of the spined ribs in *P. striatus* may be limited to two, even to one along the anterior edge of the shell, whilst the whole of the remaining part of the shell in form and sculpture agrees with *P. tigrinus*.

Pecten striatus Müller.

Pecten striatus Müller, Zool. Dan. II, 1788, p. 26, Tab. 60, figs. 3—5; Jeffreys Brit. Conchol. II, 1863, p. 69, Pl. 23, fig. 4.

Pecten striatus Mörch, Vidensk. Meddel. Naturh. Foren. 1867, p. 98.

At **Iceland** the "Ingolf" Expedition took this fragile species at:

St. 98.	W. of Iceland (Brede Bugt)	138 fm.	5.9° C.	4 valves.
- 86.	- - - - -	76 -		8 -
- 87.	- - - - -	110 -		3 -
- 6.	S.S. E. of -	90 -	7° C.	3 spec. & 1 valve.
- 51.	- - - - -	68 -	7.32° -	1 - - 1 -

It has later been taken at Iceland at the following places:

63°15' N.L., 22°23' W.L.	170—114 fm.	1 spec. and 12 valves.
63°21' - 17°31' -	69 -	3 valves.
63°21' - 17°15' -	58 -	1 valve.

The largest of these shells is 20^{mm}. high.

At the **Færoes**, where it had already been noted by Mörch, *P. striatus* has been taken at the following places:

Thorshavn, outer roads	12—16 fm.	1 valve.
Nolso, deep hole at north end ca. 100 -		1 spec.
61°40' N.L., 7°40' W.L.	135 -	1 valve.
16 miles E. by S. of south point of Nolso	- 80 -	7 spec. and 1 valve.
Akralejte in N. 57 W., 12 miles -	150 -	5 valves.
13 miles W. by S. of Munken -	150 -	3 -

The largest of these shells is 22.5^{mm}. high.

Distribution. *P. striatus* occurs in the Western Mediterranean (from Sicily) and ranges along the west of Europe to West Finmarken in Norway; it goes over the Færoes to South and South-West Iceland¹). It enters the Kattegat as far as Hellebæk and Samso. The vertical distribution is given by Jeffreys to be from 5 to 180 fm.

Regarding its relation to *P. tigrinus*, see notes under the latter.

¹) The record given by Becher, that the Austrian Expedition has taken the species on the north side of Jan Mayen, 140—180 m. (Österr. Polarstat. Jan Mayen, 1886, III, p. 68) is undoubtedly based on an erroneous determination.

Pecten imbrifer Lovén.Pl. II, fig. 1 (var. *major*) & fig. 2 (var. *minor*).

Pecten imbrifer Lovén, Index Moll. Scand., 1846, p. 31; Dall, Bull. Mus. Comp. Zool. Harvard Coll. XII 1886, p. 220, Pl. IV, fig. 4; Friele & Grieg, Norw. North-Atlantic Exped., Mollusca III, 1901, p. 8. — *Pecten mamillatus* M. Sars, Christ. Vid. Selsk. Forh. 1873, p. 12. — *Pecten Hoskynsi* G. O. Sars, Moll. Reg. Arct. Norv., 1878, p. 20, Pl. 2, fig. 1; var. *major* Leche, K. Sv. Vetensk. Akad. Handl. 16, No. 2, 1878, p. 35; Collin, Dijplma-Togtets zool.-bot. Udbytte, 1886, p. 453; var. *pustulosus* Verrill, Trans. Conn. Acad. V, 1882, p. 581, Pl. 42, fig. 22. — *Cyclopecten pustulosus* Verrill, Trans. Conn. Acad. X, 1899, p. 70, fig. 1 & p. 83, Pl. 19, figs. 3, 4; Verrill & Bush, Proc. Unit. Stat. Nat. Mus. XX, 1898, p. 839, Pl. 85, figs. 5, 6, 10, 11. — *Cyclopecten subimbrifer* Verrill & Bush, Trans. Conn. Acad. X, 1899, p. 84; Proc. Unit. Stat. Nat. Mus. XX, 1898, p. 840, Pl. 85, figs. 8, 9. — *Pecten lucidus* Norman, Niederländ. Arch. f. Zool., Suppl. Bd. I, 1881–82, No. 10, p. 2, Pl. 1, figs. 5, 6, 7, 8.

Pecten Hoskynsi Friele, Nyt Mag. f. Naturvidensk. 24 Bd., 1879, p. 222; Becher, Österr. Polarst. Jan Mayen, 1886, III, p. 68. — *Pecten imbrifer* Posselt, Medd. om Gronland, XIX, 1895, p. 66; *ibid.* XXIII, 1898, p. 12; Jensen, *ibid.* XXIX, 1905 (1909), p. 332; Hägg, Arkiv för Zoologi, Bd. 2, 1904, No. 2, p. 30; var. *lamellosa* Posselt, Medd. om Gronland, XXIII, 1898, p. 13, Pl. 1, fig. 1.

Pecten imbrifer has been taken by the "Ingolf" at:

St. 115.	S. of Jan Mayen	86 fm.	0.1° C.	1 valve.
- 116.	- - -	371 -	-0.4° -	3 spec. and a number of valves.
- 98.	W. of Iceland	138 -	5.9° -	ca. 35 spec.
- 97.	- - -	450 -	5.5° -	1 spec. and 3 valves.
- 87.	- - -	110 -		1 valve.
- 90.	- - -	568 -	4.4° -	3 valves (fragments).
- 9.	- - -	295 -	5.8° -	1 valve.
- 85.	S.W. -	170 -		7 valves.
- 81.	- - -	485 -	6.1° -	ca. 65 spec.
- 54.	S. -	691 -	3.9° -	2 valves.
- 59.	E. -	310 -	-0.1° -	3 -
- 143.	N. of the Færocs	388 -	-0.4° -	1 spec.

West Greenland.

During my cruise with the "Tjalfe" I took *P. imbrifer* in Davis Strait at:

66°22' N. L., 57°16' W. L. 360 fm. 6 spec.

The Swedish Expedition of 1871 found it in Umanak Fjord at 397 fm. and in Baffins Bay at 227 fm.

East Greenland.

Danish Expeditions have taken *P. imbrifer* at the following places:

Off Scoresby Sound	167 fm.	1 valve.
Forsblads Fjord	50 -	1 -
- - -	50-90 -	ca. 125 spec.

The Swedish Expedition of 1900 took *P. imbrifer* at:

S. E. of Pendulum Island ($74^{\circ}35' \text{ N.L.}$) 79 fm. 1 spec.

Jan Mayen.

In addition to at the above stations of the "Ingolf", *P. imbrifer* has been taken by the Norwegian North-Atlantic Exped. at a depth of 263 fm. (bottom-temp. — 0.3° C.) and by the Austrian Exped. at a depth of 75–95 fm.

Iceland.

In addition to at the 8 "Ingolf" stations, *P. imbrifer* has been taken by the "Thor" at:

$63^{\circ}05' \text{ N.L.}, 20^{\circ}7' \text{ W.L.}$	293 fm	1 spec. and 10 valves.
$62^{\circ}57' - 19^{\circ}58' -$	500 - .	1 - - 9 -

The Færoes.

As well as N. of the Færoes, as noted above, *P. imbrifer* has been taken (by the "Thor") S.W. of the Færoes, at:

$61^{\circ}15' \text{ N.L.}, 9^{\circ}35' \text{ W.L.}$	ca. 475 fm.	12 spec. and 25 valves.
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Remarks. The specimens to hand of *Pecten imbrifer* from East Greenland and from Jan Mayen differ from the Atlantic specimens (W., S.W. and S. of Iceland, as well as S.W. of the Færoes) in attaining to a greater size, namely 15–22 mm. for full-grown specimens, against 10–12 mm. in the Atlantic, as also in the fact, that the posterior ears of the shell are relatively large (cf. in Pl. II figs. 1a, b, c, d, e and f with figs. 2a and b).

On the whole the Polar Sea form probably reaches a greater size than the Atlantic. The specimens brought home by the Dijnphna Exped. from the Kara Sea measure up to 21 mm., and Leche records the maximum size from the Kara Sea as 22 mm.¹⁾; Friele and Grieg give 20 mm. as being not uncommon for high-arctic specimens, whereas the species does not become more than 11 mm. at the Norwegian coast. Leche for his specimens found it convenient to set up a var. *major*; I quite agree with this and propose therefore to call the southern, smaller form var. *minor*. So far as my experience goes, the variety *major* also differs from the more southerly form by having as a rule the posterior ears of the shell relatively large (comp. in Pl. II figs. 1a–f (var. *major*) with figs. 2a–b (var. *minor*)). I am of opinion, therefore, that the forms *major* and *minor* represent geographical subspecies, connected respectively with the "cold" (or transitional belt to this) and the "warm" area in the deeper regions.²⁾

Within each of these subspecies there are numerous modifications in regard to the sculpture of the left valve. Posselt (l. c.) has some pertinent remarks on this point. Whilst Posselt received his impressions from "a consideration of the figures cited", I have been able to observe the transitions on the material before me and I may take the opportunity of illustrating these not uninteresting conditions by some figures.

¹⁾ In the Vega-Exped. Vetensk. Iakttagelser III, 1883, p. 452 Leche records the species from the Bering Sea with an even greater size, namely 30 mm., but the specimens in question I have had the opportunity of seeing in the Riks-Museum at Stockholm, do not belong to this species.

²⁾ The specimens from St. 59 and St. 143 of the Ingolf, with negative temperatures, are small but seem, to judge from the relatively large, posterior ears of the shell, to be the young of var. *major*.

The lines of growth on the right valve appear as numerous, low and sharp folds, whilst the left valve, in addition to similar folds, bears in general radially arranged, pored, small vesicles (Pl. II, figs. 1g–h), the number of which increases towards the periphery, new ones arising regularly in the interspaces.

Closer consideration shows, that the vesicles have the lower edge free and that they are simply outgrowths of the concentric lamellæ. Thus, we may find some specimens, in which the left valve in regard to sculpture only differs in the main from the right by some few, distant rows of very small, pocket-like outgrowths (Pl. II, fig. 1a), but generally their number is large (fig. 1b). Other specimens have larger and fewer, rather vaulted outgrowths (fig. 1c). In others again the vesicles are so broad and flat, that they almost meet one another (fig. 1e). Lastly, we find in the variety *lamellosa* Posselt (fig. 1f) a form where the vesicles are fused together to concentric, porous wrinkles, formed of projecting, down-turned lamellæ, which at their lower free margin reach to and rest on the next wrinkle; the lamellæ are in general interrupted and broken, so that only remnants of them remain as sharp combs. The vesicular outgrowths are also broken off more or less and their position is then shown as a concavity in the line of growth; sometimes almost all the vesicles are rubbed off, so that the lines of growth appear like the cogs on a cog-wheel (fig. 1d & 1i). Among other variations it may further be mentioned, that the upper part of the shell may be almost completely smooth and the outgrowths appear only towards the margin, as shown in fig. 2a; lastly, fig. 2b represents a specimen in which the left valve is almost quite smooth.

I would not have entered so much into detail on these points had not Prof. A. E. Verrill and Miss Katherine Bush raised these variations to the rank of species; their *Pecten pustulosus* and *P. subimbrifer* are in fact based on specimens such as are represented in my figures 1c and 1d.

Distribution. The form *major* is an arctic, deep-water form (30–400 fm., perhaps even deeper, 650 fm.¹⁾, occurring at East Greenland, Jan Mayen and Spitzbergen, in the Barents Sea and the Kara Sea²⁾. The form *minor* is an Atlantic, deep-water form, which occurs in Davis Strait and off the east coast of the United States of North America, down to ca. 40° N.L., along West and South Iceland, S. of the Færoes and at the western and northern coasts of Norway. The "Thor" has taken it S. E. of the Færoes (61°25' N.L., 4°39' W.L., 210 fm.) and in the North Sea (58°32' N.L., 4°18' E.L., 147 fm.). How far the species goes southwards along the west coast of Europe cannot be stated³⁾, as *P. imbrifer* is said not to be identical — as assumed earlier — with the Mediterranean-Atlantic *P. Hoskynsi* Forb.⁴⁾

Pecten vitreus Chemnitz.

Pallium vitreum Chemnitz, Conch. Cab. VII, 1784, p. 335, Pl. 67, Fig. 637 a. — *Pecten vitreus* G. O. Sars, Moll. Reg. Arct. Norv., 1878, p. 21, Pl. 2, fig. 5; Jeffreys, Proc. Zool. Soc. 1879, p. 561; Smith, Chall. Rep. XIII, 1885, p. 303. — *Palliolum vitreum* Verrill, Trans. Conn. Acad. X,

1) St. 192 of the Norweg. North-Atlantic Exped. lies at 69°46' N.L., 16°15' E.L., with a depth of 649 fm. and bottom-temp. of —0.7° C., but I have not seen specimens from here.

2) Leche's record of its occurrence in the Bering Sea is due to an erroneous determination, as shown on p. 26 note 1.

3) Dautzenberg & Fischer record it right down at the Azores (Dragages effectués par l'Hirondelle et par la Princesse Alice; Mém. Soc. Zool. France 1897, T. 10, p. 192).

4) Cf. Dall, Bull. Mus. Comp. Zoology, XII, 1886, pp. 214 and 220.

1899, p. 66, Pl. 18, figs. 6—13. — *Pecten abyssorum* (Lovén M. S.) G. O. Sars, Moll. Reg. Arct. Norv., 1878, p. 22, Pl. 2, fig. 6. — *Chlamys Chaperi* Dautzenberg & Fischer, Mém. Soc. Zool. France X, 1897, p. 190, Pl. 5, figs. 5—8.

Pecten vitreus Posselt, Medd. om Gronland, XXIII, 1898, p. 11.

This species has been taken by the "Ingolf" Expedition at:

St. 28.	Davis Strait	420 fm.	3.5° C.	3 spec.
- 25.	—	582 -	3.3° -	3 — and 1 valve.
- 98.	W. of Iceland	138 -	5.9° -	1 — - 4 valves.
- 90.	—	568 -	4.4° -	3 valves.
- 10.	—	788 -	3.5° -	7 spec. and 1 valve.
- 9.	—	295 -	5.8° -	2 — - 1 —
- 8.	S. W. of Iceland	136 -	6 ° -	3 valves.
- 80.	—	935 -	4 ° -	1 valve.
- 78.	—	799 -	4.5° -	2 spec. and 32 valves.
- 73.	—	486 -	5.5° -	2 —
- 69.	S. of Iceland	589 -	3.9° -	1 — and 6 valves.
- 68.	—	843 -	3.4° -	3 —
- 39.	—	865 -	2.9° -	7 —
- 67.	—	975 -	3 ° -	6 — and 3 valves.
- 40.	—	845 -	3.3° -	16 —
- 7.	—	600 -	4.5° -	1 —
- 46.	W. of the Færoes	720 -	2.4° -	1 —

The largest of these specimens (from St. 25) measures: length 25 mm., height 25.5 mm., breadth 8 mm.; the second largest (from St. 40): length 19 mm., height 19.5 mm., breadth 7 mm.

Further, *P. vitreus* has been taken by the "Thor" at the following places:

Iceland.

63°05' N.L., 20°7' W.L.	293 fm.	1 spec. and 5 valves.
63°12.5' -- 20°06' —	268 -	7 — - 1 valve.
62°57' — 19°58' —	500 -	1 — - 40 valves.
62°10.5' — 19°36' —	ca. 1000 -	3 —
63°21' — 16°22' —	263—295 -	3 —

Færoes.

61°8' N.L., 9°46' W.L.	450 fm.	1 spec. (on spine of <i>Cidaris</i>).
61°15' — 9°35' —	ca. 475 -	6 — and 17 valves.

Remarks. Examination of the numerous specimens at hand has led me to the same view as that held by Jeffreys, Norman, Verrill, Friele and Grieg, namely that *P. abyssorum* (Lovén)

Sars is only a variety of *P. vitreus* Chemn.¹⁾ On the one hand, there are all transitions from the densely scaled to the perfectly smooth specimens; on the other, we find specimens which have just as thin valves and just as small ears as *P. abyssorum* in combination with a sculpture such as we find in *P. vitreus*.

Distribution. The investigations of the "Ingolf" show that *Pecten vitreus* does not enter into the "cold" area, but keeps to places with positive bottom-temperature (2.4°—6° C.) in the southern part of the Davis and Denmark Straits, also south round Iceland over to the Færoes, in 136 to 975 fm.²⁾ On the European side the species ranges from Lofoten along the Norwegian coast, 50—650 fm. (Sars), into the northern part of the North Sea, ca. 150 fm. ("Thor") and down into the Skager Rak, ca. 240—350 fm. ("Thor"). Further, it occurs between the Færoes and Hebrides, 229—650 fm. ("Lightning"), off the west coast of Ireland, France and the Pyrenean Peninsula, 90—994 fm. ("Porcupine"), in the Bay of Biscay, ca. 340—895 fm. ("Candan"), N. of the Azores, 2240 fm. ("Travailleur-Talisman"), at the Azores, ca. 445—840 fm. ("Princesse Alice")³⁾, at the Canaries and W. of Morocco and Soudan, ca. 85—1100 fm. ("Travailleur-Talisman"), Sargasso Sea, 1650 fm. (id.) as also in the Mediterranean (to Sicily). In the Western Atlantic it occurs off Nova Scotia and Newfoundland, 57—400 fm. and further south as far as Florida, going down to a depth of 1537 fm. off Chesapeake Bay (Verrill). It has also been taken off the west coast of Patagonia, 140—400 fm., at the Philippines, 100—700 fm. and at the south of Japan, 345 fm. ("Challenger").

Pecten similis Laskey.

Pecten similis Laskey, Mem. Wern. Soc. I, 1811, p. 387, pl. 8, fig. 8; Jeffreys, Brit. Conchol. II, 1863, p. 71, Pl. 23, fig. 5.

At Iceland the "Ingolf" has taken this species at:

St. 98. W. of Iceland.	138 fm.	5.9° C.	8 valves
- 86. - - - - (Brede Bugt)	76 -		6 -
- 87. - - - -	110 -		1 -
- 85. S.W.- -	170 -		1 spec. and 15 valves.
- 6. S.E. - -	90 -	7.0° C.	3 -

The largest of these specimens (St. 98) measure: length 7^{mm}, height 6.25^{mm}.

Further, *P. similis* has been taken S. of Iceland at

63° 15' N. L., 22° 23' W. L. 170—114 fm. Numerous spec.

as well as at the following places at the Færoes:

Klaksvig.	10—15 fm.		2 valves.
Fundingsfjord	12—ca. 20 -	coarse sand	23 -
Vestmanna	5—6 -	fine black sand	2 -
61° 40' N. L., 7° 40' W. L.	135 -		5 -

¹⁾ In his great work on the Mollusca from the "Expéd. scient. du Travailleur et du Talisman" (T. II, 1898, p. 398) A. Locard maintains the opposite view.

²⁾ Posselt records a specimen from Sukkertoppen (almost in the same latitude as St. 28 of the "Ingolf") at 15—20 fm., but the specimen has certainly not been living at this shallow depth.

³⁾ It can be seen from the figures, that *Chlamys Chaperi* Dautzenberg and Fischer (l. c.) is identical with the present species.

13 miles S. of Myggenæsholm	ca. 70 fm.	85 valves.
9 - E. S. E. of Bispen	- 70 -	ca. 100 valves.
6 - N. by W. of Kalsö	60 -	1 spec.
16 - E. by S. of south point of Nolso	80 -	1 valve.
13 - W. by S. of Munken	- 150 -	24 —

This pretty little *Pecten* was not known earlier from Iceland or from the Færoes.

Distribution. *Pecten similis* ranges from the Gulf of Aegina through the Mediterranean, from Madeira along Europe to West Finnmarken and into the eastern Kattegat; over the Færoes it reaches to South and South-West Iceland. According to Jeffreys it is also said to occur at Jamaica and Korea. The same author gives its vertical distribution at from 2 to 300 fm.

Pecten groenlandicus Sowerby.

Pecten vitreus (non Chemnitz) Gray, Parry's first voyage, 1820, Suppl. to App. p. 245. — *Pecten groenlandicus* Sowerby, Thes. Conch. II, 1842, p. 57, Pl. 13, fig. 40; Sars, Moll. Reg. Arct. Norv. 1878, p. 23, Pl. 2, fig. 4. — *Camptonectes groenlandica* Verrill, Proc. Unit. Stat. Nat. Mus., XX, 1898, p. 837, Pl. 85, fig. 7.

Pecten grönländicus Mörch, Rink's Gronland, 1857, p. 94; Medd. Naturl. Foren. 1868, p. 226; Arctic Manual, 1875, p. 133; Rink's Dan. Greenland, 1877, p. 442; Friele, Nyt Mag. f. Naturvidensk., 24 Bd., 1879, p. 222; Becher, Österr. Polarst. Jan Mayen, III, 1886, p. 69; Posselt, Medd. om Grönland, XIX, 1895, p. 65; ibid. XXIII, 1898, p. 9; Hägg, Ark. f. Zoologi, 1904, Bd. 2, No. 2, p. 28; Jensen, Medd. om Gronland XXIX, 1905 (1909), p. 331.

The "Ingolf" has taken this species at:

St. 24. Davis Strait	1199 fm.	2.4° C.	2 valves.
- 115. S. of Jan Mayen	86 -	0.1° -	Numerous spec.
- 116. — - -	371 -	-0.4° -	1 valve.
- 126. N. of Iceland	293 -	-0.5° -	3 —
- 128. — - -	194 -	0.6° -	17 —
- 127. — - -	44 -	5.6° -	3 —
- 85. S.W. of -	170 -		20 —
- 18. - - -	1135 -	3° -	1 —
- 81. - - -	485 -	6.1° -	4 spec.
- 69. S. - - -	589 -	3.9° -	6 valves.
- 40. - - -	845 -	3.3° -	1 —
- 4. E. - - -	237 -	2.5° -	2 —
- 58. - - -	211 -	0.8° -	3 spec. and a number of valves.
- 59. - - -	310 -	-0.1° -	1 spec.

West Greenland.

At the northern part *Pecten groenlandicus* has been taken by Swedish Expeditions in Umanak Fjord and in Baffins Bay, 12—227 fm., by the Fox Exped. in Melville Bay and at Cape York. On the American side it is known right up to 81°41' N. L. (Discovery Bay).

East Greenland.

Here *P. groenlandicus* has been taken both by Danish and by Swedish Expeditions at the following places:

Off Angmagsalik	25—40 fm.	clay.	15 spec.
Tasiusak	30—50 -		9 —
Odesund	5—15 -	stones with algæ.	2 —
Cape Dalton	9—11 -	clay with small stones.	1 fragment.
Off Henry Land	ca. 20 -	stones.	1 valve.
Turner Sound	ca. 3 -		1 spec. and 1 valve.
Hekla Havn	3—11 -		ca. 20 spec.
Hurry Inlet	10 -	clay.	- 50 —
Fleming Inlet	118 -	red clay.	1 valve.
Mouth of Forsblads Fjord .	14—3 -		ca. 70 spec.
Forsblads Fjord	90—50 -	clay with sharp stones.	6 spec.
Cape Borlase Warren	10 -	Laminaria.	1 —
Sabine Island.		—	4 —
S. E. of Hvalros Island . . .	42—53 -	mud and stones.	Numerous spec.
S. E. of Pendulum Island . .	79 -	- - -	2 spec.

It has thus been found at many places over the distance from 65°35' N. L. to 74°35' N. L. and reaches the considerable size of 28.5^{mm}. (Forsblads Fjord).

Jan Mayen.

According to Friele *P. groenlandicus* is common at a depth of 30—100 fm.; the Danish Expedition of 1900 took over 300 living specimens at a depth of 55 fm. and on ooze bottom, and the "Ingolf", as mentioned, found numerous specimens at a depth of 86 fm. on muddy bottom; the Austrian Exped. also dredged up numerous specimens. It reaches a length of 22^{mm}.

Iceland.

In addition to the "Ingolf" stations mentioned, *P. groenlandicus* has been taken at the following places by Danish Expeditions:

5 miles E. of Seydisfjördr (east coast)	135 fm.		1 spec.
6—7 miles N. of Borgarfjördr (N. W. coast)	85 -		1 —
N. E. of Lánnganes (N. W. coast)	70 -		1 fragm. (on tube of <i>Ommphis</i>).

Also on the S. coast of Iceland at:

63°05' N.L., 20°7' W.L.....	293 fm.	Numerous spec.
62°57' — 19°58' —	500 -	12 spec. & 23 valves.

Færoes.

P. groenlandicus has been taken off the islands at:

63°15' N.L., 9°35' W.L.....	270 fm.	2 spec.
63°03' — 9°28' —	275 -	1 — & 4 valves.
61°15' — 9°35' —	ca. 475 -	ca. 150 spec.
61°7' — 9°30' —	440 -	10 spec. & 19 valves.

Distribution. *Pecten groenlandicus* occurs further at Spitzbergen (30–260 fm., Norweg. North-Atlantic Exped. and others), Finnmarken (30–150 fm., Sars), in the Barents Sea (7–250 fm., “Will. Barents”) and the Kara Sea (5–125 fm., “Dijmphna”, Leche) as also in the Siberia Sea as far as to 116° E.L. (15–36 fm., “Vega”). It has not been met with in the Bering Sea, and it is therefore doubtfully circumpolar. On the other hand, it occurs in the arctic seas N. of America, in the western part of Davis Strait, as well as off Newfoundland (130–224 fm., Verrill). In high-northern seas it is one of the most frequent Molluscs and occurs in such incredible numbers, that the trawl can take it sometimes by hundredweights (cf. Krause, Mollusken von Ostspitzbergen, Zool. Jahrb. Abth. f. Syst. 6. Bd., p. 341).

Apart from its arctic distribution *P. groenlandicus* has also another, in the Atlantic. As shown above, it has been taken in the Atlantic S. of Iceland and S. of the Færoes; Jeffreys records it from the waters N. of the Hebrides (542 fm.), W. and S. of Ireland (257–517 fm., “Lightning” and “Porcupine”); the “Thor” has taken it off the Channel (625–670 fm.), the “Caudan” in the Bay of Biscay (500 and 740 fm.), the “Travailleur” and “Talisman” also in the Bay of Biscay (365–610 fm.) and N. of Spain (570–625 fm.), the “Josephine” between the Azores and Gibraltar (550 fm.), the “Travailleur” and “Talisman” W. of Morocco and W. of Soudan (410–05 fm.).

Remarks. In high-northern regions *P. groenlandicus* reaches a considerable size; at E. Greenland, we have heard, it becomes up to 28.5 mm. long, at Jan Mayen 22 mm., in the Kara Sea 28 mm.¹⁾, at Spitzbergen even 32.5 mm.²⁾. In comparison with these sizes all my specimens from the true Atlantic are very small; the largest is only 10.75 mm. I believe therefore, that the *P. groenlandicus* living in the Atlantic is a dwarf-form. With this agrees also Loead's remark regarding the specimens taken by the “Travailleur-Talisman”, that they belong to a var. *minor*³⁾ and Jeffreys' statement that the specimens taken by the “Porcupine” Exped. off the British Isles were “young only”⁴⁾; I believe, that the species in the warm Atlantic is already full-grown at a size, which in the Polar Sea would still be considered young.

As it is still constantly stated, that the left valve is considerably larger than the right, I may say J. Collin is perfectly right when he writes (l. c., p. 452): “in most . . . the valves are of the same

¹⁾ Collin has introduced the term var. *major* for specimens from the Kara Sea; Dijmphna-Togtets Zool.-bot. Ud-bytte, 1886, p. 452.

²⁾ N. Knipowitsch: Zool. Ergebn. d. russ. Exped. nach Spitzbergen. Moll. und Brachiop. I, p. 79; Ann. Mus. Zool. St. Pétersbourg, T. VI, 1901.

³⁾ Expéd. scient. du Travailleur et du Talisman; Moll. Test. II, 1898, p. 399.

⁴⁾ Proc. Zool. Soc., 1879, p. 560.

size, only in a few does the margin of the left valve extend a trifle beyond that of the right, without however bending over it" and p. 453 (under *Pecten Hoskynsi* Forbes var. *major* Leche): "in all very thin-shelled *Pecten*-forms the weakest valve gives way at the edge, when the animal retracts strongly on dying, thus producing the characteristic concavity, which runs concentrically with the margin of the shell, the sculpture markings on the right valve giving this a greater firmness".

In his diary written on the Danish East Greenland Expedition of 1900, the young zoologist Soren Jensen, since dead, entered the following observations regarding *P. groenlandicus*: ". . . this small bivalve is able to swim when fully-developed. It opens and shuts the valves, beating the water out during the latter process with considerable force and thus moving backwards through the water. The specimens which lay on the bottom of a glass with water, could in this way "gape" their way right up to the surface".

Pecten frigidus Jensen.

Pl. I, figs. 7 a—f.

1876. *Pecten fragilis* Jeffreys, Ann. Mag. Nat. Hist. (4) XVIII, p. 424 (partim).
 1877. *P. fragilis* Friele, Nyt Mag. f. Naturvidensk., 23 Bd., 1877, II, p. 2.
 1879. *P. fragilis* Jeffreys, Proc. Zool. Soc. Lond., p. 561 (partim), Pl. 45, fig. 1 ad dextram.¹⁾
 1879. *P. fragilis* Friele, Catal. d. auf d. norw. Nordmeerexped. bei Spitzbergen gef. Mollusken; Jahrb. Deutsch. Mal. Gesellsch. VI, p. 264.
 1901. *P. fragilis* Friele & Grieg, The Norwegian North Atlantic Exped., Zool., Mollusca III, 1901, p. 8.
 1902. *P. biscayensis* Friele (non Locard), Moll. d. ersten Nordmeerfahrt d. Fischereid. "Michael Sars" 1900; Bergens Museum Aarbog 1902, No. 3, pp. 3, 15 & 17.
 1904. *P. frigidus* Jensen, Vidensk. Medd. fra den naturhist. Foren. i Kbhvn. 1904, p. 305 (cum fig.).
 1904. *P. fragilis* Hägg, Arkiv för Zoologi, Bd. 2, 1904, No. 2, p. 30.
 1905. *P. frigidus* Bavay, Mém. de la Soc. Zool. de France, T. XVII, 1905, p. 189, Pl. 17, fig. 4.

The shell a little higher than long, irregularly suborbicular, with the anterior and lower margins forming together a semicircle and the posterior margin slightly arched or almost straight, compressed, the right valve flatter than the left, translucent silvery white. The valves very thin, fragile, with concentric folds, to the number of about 12 in the adult, broad in the middle of the shell, narrowing towards the lateral margins, with numerous fine, elevated, radiating striæ. The auricles small, unequal, the posterior the smallest, faintly marked off from the shell, the anterior distinctly marked off from the shell, the left triangular, the right with an acutely angulated sinus for the byssus. Hinge-margin straight, pit for the cartilage very small, triangular; the internal surface shining. Length 27^{mm.}, height 29^{mm.}, breadth 6.5^{mm.}

Distribution: The ice-cold depths of the Norwegian Sea, from Spitzbergen down towards Iceland, the Færoes and Shetland, 579—1539 fm.

¹⁾ The figure to the left represents, so far as the contour is concerned, the same valve seen from the inside, but provided with a form and sculpture as if seen from the outside.

This species has been taken by the "Ingolf" at:

St. 125	.....	729 fm.	—0.8° C.	Fragments of 2 valves.
- 113	.....	1309 -	—1 ° -	8 spec. and some fragments.
- 117	.....	1003 -	—1 ° -	6 spec. and ca. 14 valves.
- 118	.....	1060 -	—1 ° -	10 spec. and ca. 50 valves.
- 112	.....	1267 -	—1.1° -	Fragment of 1 valve.
- 119	.....	1010 -	—1 ° -	25 spec. and ca. 20 valves.
- 111	.....	860 -	—0.9° -	1 spec. and 14 valves.
- 120	.....	885 -	—1 ° -	3 — - ca. 20 valves.
- 110	.....	781 -	—0.8° -	4 —
- 102	.....	750 -	—0.9° -	ca. 25 valves.
- 103	.....	579 -	—0.6° -	1 spec.
- 104	.....	957 -	—1.1° -	10 spec. and ca. 80 valves.
- 105	.....	762 -	—0.8° -	3 — - 2 valves.

These 13 stations all lie between Jan Mayen, Iceland and the Færoes, with depths of 579—1309 fm. and bottom-temperature of -0.6° — -1.1° C. According to Friele and Grieg (l.c.) it was taken at 12 of the stations of the Norweg. North-Atlantic Exped., from Spitzbergen down towards the Færoes and Shetland; the depths varied from 658—1539 fm., the bottom-temperature from -1° — -1.6° C. It was also found again in 1900 by the "Michael Sars" N. of the Færoes, at a depth of ca. 1100 fm. and with a bottom-temperature of -1.12° C. (according to Friele, l.c. 1902), likewise in 1900 by the Nathorst Exped. between Greenland and Jan Mayen ($72^{\circ}42'$ N.L., $14^{\circ}49'$ W.L.) and at depth of ca. 1050 fm. (19 spec.). Lastly, the "Thor" in 1903 took 3 shells off N.E. Iceland at $66^{\circ}19'$ N.L., $10^{\circ}45'$ W.L., 766 fm., bottom-temp. -0.95° C.

Pecten frigidus must be considered the most characteristic Bivalve of the ice-cold depths of the Norwegian Sea, both in regard to size of individuals and numbers.

The variation is fairly small, being confined to some changes in the strength of the radiating striae and contour of the shell. As a rule the shell is a little higher than long (Pl. I, figs. 7a & b), sometimes the two dimensions are approximately equal (Pl. I, figs. 7c & d). The specimens figured measure:

Height	Length
28.5 mm.	26.5 mm.
27 -	26.5 -

Quite small specimens have the ears of the shell comparatively enormously large, as is shown in fig. 7f, which represents a specimen 2 mm. long. Even in the full-grown the ears of the shell may be of slightly different size (cf. figs. 7a & b with figs. 7c & d), but are yet on the whole comparatively very small, by which means the species is distinguished from the nearly related *P. pudicus* Smith and *P. undatus* Verrill and Smith (see p. 36).

P. frigidus, as indicated in the diagnosis, is not exactly symmetrical and it obviously rests on the flattest (right) valve, as this is always "clean", whereas the left valve is covered with Foraminifera, worm-tubes, Scalpellum etc.

Remarks on "*Pecten fragilis* Jeffreys" ¹⁾.

As I find myself able to clear up the obscurity which has hitherto rested over this species of Jeffreys, I take this opportunity of making a few remarks in this regard.

Pecten fragilis was founded by Jeffreys in 1876 (Ann. Mag. Nat. Hist. (4) 18, p. 424) for a species taken by the "Valorous" Expedition in the North Atlantic, between Ireland and South Greenland, at depths of 1450, 1750 and 1785 fm. At the same time Jeffreys reports, that the Norweg. North-Atlantic Exped. had taken the same species during its cruise of 1876, at 1000—1500 fm.; this latter information must have come through H. Friele (of Bergen), to whom the working up of the Mollusca of the Norwegian Expedition was entrusted, sending Jeffreys a specimen of this Pecten of the northern ocean, which the latter has identified as belonging to his North Atlantic species.

In 1879 Jeffreys again mentions *Pecten fragilis*, in the report on the Mollusca collected by the "Lightning" and "Porcupine" Expeditions (Proc. Zool. Soc. Lond. 1879, p. 561), a specimen having been taken by the "Porcupine" in 1869 off the west coast of Ireland in 420 fm. On this occasion two figures of the shell are given (l. c. Pl. 45, fig. 1).

In the same year Friele stated, that *P. fragilis* Jeffreys was common over the whole of the deep "cold area" from the Færoe-Shetland Channel to Spitzbergen.

On comparing the "fragile" Pecten found by the "Ingolf" Expedition in great depths in the "cold area" with the *P. fragilis* Jeffr. figured in the Proc. Zool. Soc. 1879, Pl. 45, fig. 1 *to the right*, it was evident to me, that it must be the same species, and that fig. 1 *to the left* on the same Plate must have arisen from the artist turning the right valve round and publishing it as left valve, as it has the auricular sinus (for the byssus) and is on the whole a copy of the right valve.

I had some doubts, however, as to how far the figure to the right had really been drawn from one of the original specimens of the "Valorous" Expedition, as it is stated regarding these in Jeffreys' paper of 1876: "Fragments only"; nor could I believe, that the specimen of the "Porcupine" Expedition had served as basis for the figure, as it is designated "young", whilst the figure in question represents a fairly large specimen. To still further increase the confusion, it is stated in Jeffreys' diagnosis of 1876: "the lower valve has a few slight concentric ribs, but no longitudinal striæ", which does not agree with my specimens from the depths of the Norwegian Sea (nor with Jeffreys' figure) and "ears . . . equal in size", which does not agree either.

I had my suspicions, therefore, that the figure in the Proceedings of the Zool. Soc. had been drawn from a specimen from the deep arctic basin, sent to Jeffreys by Friele. I therefore asked Dr. A. C. Johansen, who was at that time studying at the British Museum in London, to examine into this matter, and through the friendly assistance of Mr. E. A. Smith, the Director of the Malacological Department, Dr. Johansen was able to send me the following information.

From the "Valorous" Expedition there were only rather poor fragments of "*Pecten fragilis*

¹⁾ These remarks are a translation from my earlier article, written in Danish, on *Pecten frigidus* (l. c.).

Jeffreys", of which a couple of very small pieces show similar characteristic, concentric folds which mark the *Pecten* of the Norwegian Sea, whilst others and larger pieces obviously belong to another type. The specimen from the "Porcupine" Expedition is entire, but only ca. 10^{mm}. long. — Under the name of *P. fragilis*, further, there were found a right and a left valve from the waters of Spitzbergen, sent by H. Friele, but the left valve was in pieces; these valves proved to be completely identical with a specimen from the "Ingolf" Expedition, which I had sent Dr. Johansen for comparison.

The explanation of the matter is now quite clear; Jeffreys has identified the fragments from the "Valorous" Expedition with the deep-water *Pecten* taken by the Norwegian North-Atlantic Expedition a year later; the diagnosis has been based on the specimen from the deep basin of the Norwegian Sea, but as the left valve of this specimen was in pieces, Jeffreys has made use of the larger fragments from the "Valorous" Expedition; these belong, however, to quite a different type, obviously without striation, since they reminded Dr. Johansen of *P. groenlandicus* — from this has come the passage, which has caused so much trouble to authors: "the lower valve has . . . no longitudinal striae". Later, in the paper of 1879, Jeffreys' artist has replaced the fragmentary left valve in another way, namely, by placing the right valve on its convex side, taken its contour and furnishing it with a sculpture, as if it was seen from the outer side. I need not refer to the manner in which other authors have sought to explain the difficulties caused in this way.

It is not at all certain, therefore, that the fragile *Pecten* of the Norwegian Sea with concentric folds is identical with the North Atlantic *P. fragilis* Jeffreys from the "Valorous" Expedition; on the contrary, I feel convinced, that there are two species, nearly related yet distinct, and for the following reasons.

From the Western Atlantic off the United States (37°38'40" N.L., 73°16'30" W.L., 1423 fm.) Verrill and Smith have described a *Pecten undatus*, which agrees in all regards with the *Pecten* of the Norwegian Sea except that *the ears of the shell are considerably larger*, for which reason it must be considered a different species from the arctic deep-water form. It is more reasonable to conclude, therefore, that the fragments of the Atlantic *P. fragilis* Jeffr. from the "Valorous" Expedition and the small specimen from the "Porcupine" belong to the same species as *P. undatus* Verrill & Smith than to the species living in the deep water of the Norwegian Sea under quite different physical conditions. For this reason I have given the form from the Norwegian North-Atlantic and "Ingolf" Expeditions a new name: *frigidus*, meaning, that it lives at temperatures which are constantly under 0° C.

In the same year (1885) in which *P. undatus* was founded, E. A. Smith described a *Pecten pudicus* from the Southern Ocean E. of Marion Island (46°46' S.L., 45°31' E.L., 1375 fm.), which likewise shows a great resemblance to my form from the northern cold area, but has in common with *P. undatus* the relatively large ears and will perhaps on direct comparison prove to be identical with the latter.

Pecten (Hyalopecten) dilectus Verrill & Bush from the east coast of North America, 1813 fm., will also probably prove to belong to *P. undatus* as its younger developmental stage.

If these suppositions prove to be well-founded, the synonymy of the Atlantic form will then be as follows:

Pecten undatus Verrill & Smith¹⁾.

1876. *Pecten fragilis* Jeffreys, Ann. Mag. Nat. Hist. (4) XVIII, p. 424 (partim). — Northern Atlantic (between Ireland and Greenland), 1450—1785 fm.
1879. *P. fragilis* Jeffreys, Proc. Zool. Soc. Lond. p. 561 (partim) (non Pl. 45, fig. 1). — W. of Ireland, 420 fm.
1885. *P. undatus* Verrill & Smith, Trans. Conn. Acad. VI, p. 444, Pl. 44, fig. 21. — Off Virginia, 1423 fm.
1885. *P. pudicus* E. A. Smith, Chall. Rep., XIII, Lamellibranchiata, p. 302, Pl. 21, fig. 8. — Southern Ocean E. of Marion Island, 1375 fm.
1888. *P. biscayensis* Locard, Contrib. à la faune malacologique française, XI Monogr. des esp. app. au Genre Pecten, p. 144. — Bay of Biscay, “zones profondes”.
1897. *Chlamys (Pseudamussium) pudica* Dautzenberg & Fischer, Mém. Soc. Zool. de France, 10, p. 191. — Azores, 1846 fm.
1898. *Pecten Biscayensis* Locard, Expéd. scient. du Travailleur et du Talisman, Moll. Test. II, p. 400. — N. of Spain, 1353 m.; off Santander, 1960 m.; W. of Soudan, 2635 m.
1898. *Hyalopecten dilectus* Verrill & Bush, Proc. Unit. Stat. Nat. Mus., 20, p. 836, Pl. 97, fig. 9. — Off Marthas Vineyard, 1813 fm.
1899. *H. dilectus* Verrill & Bush, Trans. Conn. Acad., X, p. 90.
1899. *H. undatus* Verrill & Bush, *ibid.*, Pl. 18, fig. 5.

To this species I refer a fragment of a left valve, taken by the “Ingolf” at St. 18. Entrance to the Denmark Strait..... 1135 fm. 3.0° C.

Pecten maximus Linné.

Ostrea maxima Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1144. — *Pecten maximus* Jeffreys, Brit. Conchol. II, 1863, p. 73, Pl. 24.

A fragment, ancient in appearance, of a large valve (the ventricose right valve) was obtained by me in the dredge on **Færoe Bank** (60°55' N.L., 8°56' W.L.) at a depth of 69 fm.

Distribution. The Western Mediterranean²⁾ and along Europe from the Canary Isles and Madeira to Scotland, Southern Norway, Skager Rak and Boluslän.

Amussium lucidum Jeffreys.

Pl. II, figs. 3a—c.

Pleuronectia lucida Jeffreys, in Wyville Thomson's Depths of the Sea, 1873, p. 464, fig. 78.³⁾ — *Amussium lucidum* Jeffreys, Ann. Mag. Nat. Hist. (4) XVIII, 1876, p. 425; Jeffreys, Proc.

¹⁾ The name *Pecten fragilis* Jeffreys cannot be taken into consideration, as on the one hand, as shown, it embraces heterogeneous forms, on the other it has been used, as Locard has shown, both by Chemnitz and by Montagu for other species. More doubtful is the question between the names *undatus* and *pudicus*, as they were brought into use in the same year.

²⁾ Cf. Monterosato: Revision de quelques Pecten des mers d'Europe (Journ. de Conchyliologie, 1899, Nr. 3, p. 4).

³⁾ Dall is of opinion, that only the figure to the left represents *A. lucidum*, whereas the figure to the right (b) is of another species, namely *A. Pourtalesianum*; Bull. Mus. Comp. Zool., vol. XII, No. 6, p. 211.

Zool. Soc. 1879, p. 562; Smith, Challenger Report XIII, Lamellibranchiata, 1885, p. 317, Pl. 24, fig. 2; Fischer & Dautzenberg, Mém. Soc. Zool. de France, 10, 1897, p. 193; Locard, Expéd. scient. du Travailleur et du Talisman, Moll. Test. II, 1898, p. 406.

The shell slightly oblong-orbicular, the anterior margin more strongly curved outwards than the posterior, which slopes fairly steeply down towards the ventral margin, compressed, the right valve flatter than the left, somewhat translucent, glistening. The valves thin, the left almost smooth or only with the margin provided with more distinct, concentric lines, the right valve on the other hand with strong, rather dense, slightly elevated, concentric striæ. Beaks small, little prominent, least on the right valve. The ears well-developed, the posterior a little smaller than the anterior, with lamellæ-like lines of growth; the anterior ear on the right valve with a small sinus at the base. The hinge-margin straight, cartilage-pit small, triangular. The internal surface shining, with 10–15 elevated radiating ribs, translucent on the outer side as milk-white stripes. Height 8.5 mm., length 9 mm., breadth 2.3 mm.

It has been taken by the "Ingolf" Expedition at

St. 10. Denmark Strait..... 788 fm. 3.5° C..... 1 spec. and 10 valves.

The above diagnosis, which is based on the specimens of the "Ingolf" Expedition, agrees on the whole with that given by Jeffreys in Ann. Mag. Nat. Hist. (1876). A couple of small differences, I believe, can be satisfactorily explained. For example, Jeffreys gives the number of radiating ribs as 9, but the figure in Thomson's book shows 10; further, Edg. Smith found 11 on two shells preserved in the British Museum and 14 usually on the "Challenger" specimens. Jeffreys says nothing as to a byssal sinus in the anterior ear of the right valve, but that such is present can be seen in the figure given by Edg. Smith.

Distribution. *Amussium lucidum* has a wide distribution within the northern and tropical Atlantic¹⁾: off the entrance to the Denmark Strait, 1450 fm. ("Valorous"); 49°27' N.L., 13°33' W.L., ca. 1100 fm. ("Thor"); N. and W. of Spain, 580–1100 fm. and N. of the Azores, 2240 fm. ("Travailleur", "Talisman"); the Azores 1000 fm. and 725–1010 fm. ("Challenger", "Princesse Alice"); W. of Morocco and W. of Soudan, 500–1385 fm. ("Travailleur", "Talisman"); off Pernambuco in Brazil, 675 fm. ("Challenger").

Limidae.

Lima loscombii Sowerby.

Lima loscombii Sowerby, Genera of shells, 1820–24, Lima, fig. 4; Jeffreys, Brit. Conchol. II, 1863, p. 85, Pl. 25, fig. 4.

At the Færoes, where it has not been known earlier, the species has been taken in recent years at the following places:

16 miles E. by S. of south point of Nolso.....	ca. 80 fm.	1 valve.
13 — W. by S. of Munken.....	150 -	1 —
60°55' N.L., 8°56' W.L.....	69 -	1 —

¹⁾ The form from the Southern Ocean referred by Jeffreys (l. c. 1879) to *A. lucidum* as a variety (*striata*) has been separated by Edg. Smith (l. c., p. 316) as an independent species: *A. meridionale*.

The largest of these shells (from the last-mentioned locality) measures 17 mm.

Its **distribution** extends from Lofoten along Europe and Africa as far as the west coast of Soudan, also into the Mediterranean to the Aegean. From the Skager Rak it goes into the south-eastern Kattegat.

G. O. Sars gives its vertical distribution as from 5—100 fm., Jeffreys from 5—205 fm. Yet it is stated, that the "Porcupine" has taken it at great depths (4, 5 and 6 hundred fm. on the line Falmouth-Gibraltar, in the Mediterranean even at 1456 fm.).

Lima excavata Fabricius.

Ostrca excavata Fabricius, in Schröter's Naturgeschichte, II, 1780, p. 117. — *Excavata Fabricii* Chemnitz, Conch. Cab., VII, 1784, p. 355, Pl. 68, fig. 654. — *Lima excavata* Jeffreys, Proc. Zool. Soc., 1879, p. 564; Sars, Moll. Reg. Arct. Norv. 1878, p. 24, Pl. 3, fig. 1; Locard, Expéd. scient. du Travailleur et du Talisman, Moll. Test. II, 1898, p. 409. — *Radula (Accesta) excavata* Dautzenberg & Fischer, Mém. Soc. Zool. de France, X, 1897, p. 186.

This beautiful species has been taken by the "Thor" at 3 places **S. of Iceland**, namely at:

63°05' N.L., 20°7' W.L.	293 fm.	1 valve and some fragments.
63°12.5' N.L., 20°06' W.L.	268 -	4 spec. and 7 valves (height 27.5—87 mm.), along with a quantity of <i>Oculina</i> .
63°21' N.L., 16°22' W.L.	263—295 -	1 spec. (height 56 mm.), along with living <i>Oculina (Lophelia) prolifera</i> .

Although these specimens attain to a very considerable size (87 mm.) they are yet far from the maximum size of the species; Sars gives the size of Norwegian specimens as "almost equal to a palm of the hand", and our Zoological Museum possesses specimens from the Trondhjems Fjord up to a size of 160 mm.

Distribution. *Lima excavata* is best known from Norway, especially from Hardanger Fjord. G. O. Sars (l.c.) ascribes to it the following distribution: West Finnmarken, Lofoten and West Norway, 150—400 fm.; to this O. Nordgaard adds the following remark: "On our coast the species is limited to the great fiord depths with their particularly constant temperature and salinity (6—7° C., about 35 ‰). As the Vest Fiord is the most northern of the principal fiords where these physical conditions prevail, I am inclined to think that the mention of this species from Finnmark must be a mistake. The northern limit should be looked upon as Lofoten, until there is definite information that it is distributed still further northwards."¹⁾

Lovén²⁾ records it from Bohuslän, without stating however whether living specimens were obtained.

Further information regarding this species is given by Jeffreys (l.c.); the "Lightning" took it N. of the Hebrides, 189 fm. ("A hinge and a part of the valves, quite fresh and united by the cartilage. Perhaps taken by a fish on the Norwegian coast, and carried out to sea" (!), and the "Porcupine"

¹⁾ Nordgaard: Hydrogr. and biolog. investig. Norwegian Fiords, 1905, p. 175.

²⁾ Öfvers. Kgl. Vetensk.-Akad. Förh. 3, 1846, p. 186.

obtained it at three stations off the S.W. coast of Portugal, 292—718 fm. ("Fragments of old and young specimens. Semifossil?").

Next, it is mentioned by Dautzenberg and Fischer (l. c.) from the Azores, 595—900 fm. and by Locard (l. c.) W. of Soudan, 335—1380 fm.¹⁾

It is found as postglacial fossil in Norway, up to a size of 160 mm.²⁾

Lima gwyni Sykes.

Pl. II, figs. 4a—c.

Lima elliptica Jeffreys, Brit. Conch., II, 1863, p. 81; V, 1869, p. 169, Pl. 25, fig. 2; Proc. Zool. Soc. 1879, p. 563; Locard, Expéd. scient. du Travailleur et du Talisman, Moll. Test. II, 1898, p. 418. —

Lima gwyni Sykes, Journ. of Malacol., X, 1903, p. 104.

The "Ingolf" has taken this species at:

St. 6. S. of Iceland	90 fm.	1 valve.
- 81. S.W. of Iceland	485 -	1 —

Further, it has been taken at **Iceland** at the following places:

63°15' N.L., 22°23' W.L.	114—170 fm.	11 valves.
63°18' — 21°30' —	94 -	1 valve.
Vestmannaeyjar	68—70 -	2 valves.
63°17½' N.L., 17°39' W.L.	87 -	black sand with shells and stones. 1 valve.

These localities all lie off the south coast. The largest shell measures 13.5 mm. One of the shells from Vestmannaeyjar comes near to the variety *leviuscula*, the ribs being almost lacking.

At the **Færoes** it has been taken at:

61°9' N.L., 7°54' W.L.	180 fm.	2 valves.
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The largest of these valves is 11 mm. high.

Distribution. This species reaches from Lofoten along the west coast of Europe into the Mediterranean to the Aegean; according to Jeffreys it is also said to have been found at Newfoundland and the northern Japan; the same author gives its vertical distribution as from 6—400 fm.

Lima gwyni has not earlier been recorded from Danish waters; in reality however it has been taken in the Kattegat, namely, a specimen at Trindelen as also a specimen and a valve in the neighbourhood of Fladen, 13½—29 fm., but an erroneous determination placed it under *L. subauriculata* Mtg.³⁾

Synonymy. With regard to the designation of the species the following information may be quoted from Sykes⁴⁾: "In 1863 Jeffreys described (Brit. Conch. vol. II, p. 81) a shell from the British

¹⁾ At the place cited Jeffreys also ascribes it a distribution to Patagonia and Japan, but in Zool. Chall. Exp., Part XXXV, 1885, p. 290, E. A. Smith refers the specimens in question to the nearly related species *Lima goliath* Sow.

²⁾ P. A. Oyen, in Archiv f. Math. og Naturvidensk. Bd. XXX, Nr. 3, 1909, pp. 33—37.

³⁾ C. G. Joh. Petersen: Om de skalbærende Molluskers Udbredningsforhold i de danske Have indenfor Skagen, 1888, p. 122, and: Det vidensk. Udbytte af Kanonbaaden "Hauch's Togter, 1893, p. 66. — Only one of the shells mentioned, namely that from No 39, belongs to *L. subauriculata*.

⁴⁾ E. R. Sykes: On the Name *Lima elliptica*. The Journ. of Malacology, vol. X, 1903, p. 104.

Seas under this name [*L. elliptica*]. Unfortunately the name had been used in August 1861, by Whiteaves (Ann. Nat. Hist. ser. 3, vol. VIII, p. 146) for a fossil from the "Corallian Oolithes of Oxford". Under these circumstances, as I am unable to trace any other name applicable to the recent shell, I propose to name it *Lima gwyni*, nom. nov."

Lima hyperborea Jensen.

Pl. II, figs. 5a—e.

Limatula hyperborea Jensen, Medd. om Gronland, XXIX, 1909, p. 329, figs. 1a-d.

The shell oval or elliptical, extremely tumid, white or yellowish white with a faint lustre. The valve is thin, slightly oblique, with the anterior margin forming a slight, regular curve, the posterior margin somewhat more strongly curved outwards above, with ca. 24—36 fine, but distinctly elevated, sharp radiating ribs, disappearing outwards towards the sides, two of the central ones as a rule stronger and with larger interspace than the others, thus producing a fairly well-marked furrow, lying almost medially or a little to the anterior side of a line through the middle of the valve (sometimes however only one prominent median rib); the concentric striation extremely fine; the beaks prominent; the hinge-margin relatively long, almost straight, passing into the lateral margins at an obtuse angle; the cartilage-pit triangular; the inner side glistening silvery white or of a pearly lustre. Height 15 mm., length 9.5 mm., breadth 9 mm.

The "Ingolf" has taken this species at:

St. 116.	S. of Jan Mayen.....	371 fm.	—0.4° C.	1 spec. and fragments of 2 valves.
- 139.	N. of the Færoes.....	702 -	—0.6° -	2 spec.

Whilst the specimen from St. 116 is 20 mm. high, the largest from St. 139 is only 4.5 mm.

Lima hyperborea was originally described by me from **East Greenland**, where it was taken by the Danish Exped. of 1900 at the following places:

Fleming Inlet.....	118 fm.	clay.	1 spec.
Forsblads Fjord.....	ca. 50 -	clay with stones.	1 —
Forsblads Fjord.....	90—50 -	clay with stones.	12 spec. and 14 valves.

The largest of these specimens measures: height 16.5 mm., length 10 mm.

Distribution. In addition to at E. Greenland *Lima hyperborea* lives at Jan Mayen and in the "cold area" N. of the Færoes, at Spitzbergen and in the Kara Sea (40—70 fm.)¹⁾, from which I have seen specimens preserved in the Stockholm State-Museum. It also lives presumably in the Barents Sea and in the cold Norwegian Sea, where "*L. subovata* Jeffr." is said to have been taken at several places, according to Friele and Grieg²⁾, as confusion with the present species has probably occurred. The same also holds good probably with regard to the "*Lima elliptica* Jeffr." taken by the Dutch

¹⁾ The specimens from the Kara Sea were referred by W. Leche to *Lima sulculus* (Leach) Lovén; Kongl. Sv. Vet. Akademiens Handl. Bd. 16, No. 2, 1878, p. 34.

²⁾ Norw. North-Atlantic Exped. Zool., Mollusca III, 1901, p. 7.

Exped. in the Barents Sea ($76^{\circ}31' N.L.$, $45^{\circ}36' E.L.$) at 130 fm., bottom-temperature $-1^{\circ} C.$, as NOMANN¹⁾ gives the maximum size to be 11 mm. in the length and 18 mm. in height, a size never reached by *L. elliptica* so far as I know, but which might well agree with the present species.

Remarks. From *Lima gwyni* Sykes (= *L. elliptica* Jeffr. (non Whiteaves)), with which the present species has some resemblance, it is distinguished by the following characters: the form of the shell is higher; the ventral margin forms a steeper curve with the lateral margins; the radiating ribs (fig. 5e) are sharp, not serrate. *L. subovata* Jeffr. is also a nearly related species, but it has more numerous (50—60) radiating ribs and is even more tumid.

Lima subauriculata Montagu.

Pl. II, figs. 6a—c.

Pecten subauriculata Montagu, Test. Brit., Suppl., 1808, p. 63, Pl. 29, fig. 2. — *Lima subauriculata* Jeffreys, Brit. Conchol. II, 1863, p. 82, Pl. 25, fig. 2.

Lima sulcata Möller, Index Moll. Groenl., 1842, p. 16. — *Lima conclusa* Beck, Amtl. Ber. 24 Vers. deutscher Naturf. und Aerzte in Kiel, 1847, p. 114. — *Limatula sulculus* Mörch, Rink's Gronland, 1857, p. 94. — *Lima (Limatula) subauriculata* Mörch, Vidensk. Medd. Naturh. Foren. 1867, p. 98; *ibid.* 1868, p. 226. — *Limatula sulculus* Mörch, Arctic Manual, 1875, p. 133; Rink's Dan. Greenland, 1877, p. 442. — *Limatula subauriculata* Posselt, Medd. om Gronland, XXIII, 1898, p. 17.

This species has been taken by the "Ingolf" at:

St. 87. W. of Iceland (Brede Bugt).....	110 fm.	2 valves.
- 86. - - - - -	76 -	ca. 20 valves.

The largest of these shells measure 5.5 mm.

West Greenland.

Here *Lima subauriculata* is common, on hard bottom and at depths of 15—100 fm., from the southernmost part up to Upernivik ($72^{\circ}47' N.L.$). It reaches the considerable size of 11 mm.

Iceland.

At East Iceland *L. subauriculata* has been taken at:

$64^{\circ}58' N.L.$, $13^{\circ}25' W.L.$	40 fm.	23 spec. and 27 valves.
Reydarfjördr	68 -	1 valve.
Nordfjördr	40 -	2 valves.
Seydisfjördr, mouth.....	38—14 -	1 valve.
- - - - -	ca. 40 - , from stomachs of haddock.	7 spec. and 7 valves.

At North Iceland:

Axarfjördr	30 fm., stones and sand.	2 valves.
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¹⁾ Niederländ. Arch. f. Zoologie, Suppl.-Bd. I, 1881—82, No. 10, p. 4.

At West Iceland, at the two stations in Brede Bugt (86 and 87) mentioned above, and at South Iceland:

Vestmannaeyjar	49 fm., clay with a little mud.	4 valves.
63°21' N. L., 17°31' W. L.	69 - , sand.	1 valve.

At East Iceland the species reaches the considerable size of 10^{mm.}; of the shells from the rest of Iceland none are over 5.5^{mm.}

Færoes.

Here *L. subauriculata* has been taken at the following places:

Bordövig.....	7—10 fm., black sand, small stones, Laminaria.	2 valves.
—	10 - , sand, Laminaria.	1 valve.
Ejde.....	5—6 - , coarse black sand.	9 valves.
Fundingsfjord	12—ca. 20 - , coarse sand and clay.	4 —
Vestmannaeyjar	3½—5 - , fine black sand.	1 spec. and 10 valves.
—	5—6 - , — — —	3 — - 35 —
—	10—30 -	3 valves.
Sörvaag	14—16½ -	1 valve.
13 miles S. of Myggenæsholm.....	ca. 70 -	4 valves.
9 — E. S. E. of Bispen.....	- 70 -	40 —
16 — E. by S. of south point of Nolso	80 -	4 —
13 — W. by S. of Munken.....	ca. 150 -	ca. 100 valves.

The maximum size of the shells taken inshore is 5^{mm.}, of those taken further out to sea 6^{mm.}

Distribution. On the European side *L. subauriculata* ranges from West Finmarken¹⁾ to the Canary Isles, also in the Mediterranean to its eastern part; doubtfully living in the Kattegat at present.²⁾ On the American side it reaches from the Strait of Florida to Labrador and the southern West Greenland; it is also said to occur on the west coast of North America, according to Jeffreys.

At Norway, the Færoes, Iceland and Greenland its vertical distribution is from 10—150 fm. On the other hand, Jeffreys gives its vertical distribution to extend from 10—1785 fm.³⁾ and Locard also records it from great depths, down to 2200 m.⁴⁾; but as the species of the genus *Lima* are very difficult to distinguish from one another, it is conceivable that erroneous determinations have given rise to the records of these enormous depths (cf. under *L. similis* n. sp.).

¹⁾ According to G. O. Sars it has not been found at East Finmarken, but it is recorded from the Murman Coast (Herzenstein: Beiträge zur Kenntnis der Fauna der Murmanküste und des Weissen Meeres. I. Mollusca, 1885, p. 642). It is stated by W. Leche to occur at Nova Zembla and in the Kara Sea, but this comes from an erroneous determination, the specimens in question belonging to *Lima hyperborca* m. (cf. the latter).

²⁾ Only a single shell namely has been found at "Fladen" (Eastern Kattegat); as the other specimens taken in the Kattegat (including one living), which were referred by C. G. Joh. Petersen to *L. subauriculata* (Det vidensk. Udb. af "Hauch's" Togter, 1889, p. 66), do not belong to this species, but to *L. gwyni* Sykes (= *L. elliptica* Jeffreys, non Whiteaves).

³⁾ Proc. Zool. Soc. London, 1879, p. 563.

⁴⁾ Expéd. scient. Travailleur-Talisman, Moll. Test., II, 1898, p. 417.

Lima similis n. sp.

Pl. II, figs. 7a—c.

The shell oblong, nearly equilateral, tumid, silvery white. The valves thin, with ca. 34—38 radiating ribs, two of the middle ones stronger than the others, with an interstitial furrow, or only one prominent median rib; the concentric lines conspicuous and close set. The beaks fairly prominent, the hinge-margin almost straight, forming with the lateral margins an obtuse angle. The inside glistening silvery white. Height 7^{mm}, length 3.75^{mm}.

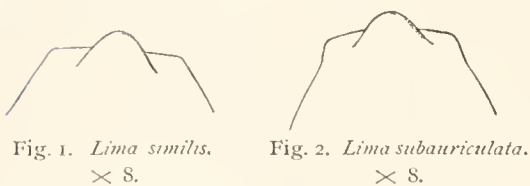
The "Ingolf" has not taken this species, but the "Thor" found it **S. of the Færoes**, namely at

61°7' N.L., 9°30' W.L.	440 fm.	5 valves.
61°15' — 9°35' —	ca. 475 -	10 —

Further, the "Thor" has dredged the same species in the Bay of Biscay at

43°37' N.L., 2°08' W.L.	250—790 fm.	8 spec. and 15 valves.
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This species has a great resemblance to *Lima subauriculata*, but the umbones are less swollen, the radiating (fig. 7c) ribs finer and more numerous and the dorsal margin forms more distinct angles with the lateral margins than in the latter (comp. figs. 1 and 2).

Fig. 1. *Lima similis*.
× 8.Fig. 2. *Lima subauriculata*.
× 8.

I imagine, that the records given by authors of *L. subauriculata* from very great depths are due to mistakes in

determination, *L. similis* being concealed under the name of *L. subauriculata*.

Lima subovata Jeffreys.

Pl. II, fig. 8a—c.

Lima subovata Jeffreys, Ann. Mag. Nat. Hist. (4) XVIII, 1876, p. 427; Proc. Zool. Soc., 1879, p. 563, Pl. 45, fig. 2; Smith, Challenger Report XIII, 1885, p. 292.

This species has been taken by the "Ingolf" at:

St. 24. Davis Strait	1199 fm.	2.4° C.	1 spec.
- 36. — —	1435 -	1.5° -	1 spec. and fragments of 10 valves.
- 38. S. of Greenland.....	1870 -	1.3° -	3 spec. and 2 valves.
- 22. - - —	1845 -	1.4° -	1 spec.
- 90. Denmark Strait.....	568 -	4.4° -	15 valves.
- 10. — —	788 -	3.5° -	10 — (mostly fragments).
- 80. S. W. of Iceland	935 -	4 ° -	2 —
- 81. - - - —	485 -	6.1° -	1 spec. and 1 valve.
- 69. S. of Iceland.....	589 -	3.9° -	ca. 30 valves (mostly fragments).

Further, the "Thor" has taken *L. subovata* to the south of Iceland at the following places:

63°05' N.L., 20°7' W.L.....	293 fm.	1 valve.
62°57' — 19°58' —	500 -	3 spec. and ca. 80 valves (many in fragments).

The largest of these shells measures: height 10.5^{mm}., length 6.5^{mm}., the second largest is 8^{mm}. high.

Specially characteristic of this species seems to me the large number of radiating ribs (fig. 8c); under the lens they are seen to extend right to the ears of the shell; Jeffreys has counted about 50 ribs, and on my specimens I have counted 60—70 ribs.

According to Jeffreys *L. subovata* has been taken in the Northern Atlantic off the entrance to the Denmark Strait, 1450 fm.; between the Hebrides and Faeroes, 542 fm.; off the west coast of Ireland, 420—1443 fm.; off the Azores, 1000 fm.; in the Western Mediterranean, 1456 fm.¹⁾

Lima ingolfiana n. sp.

Pl. II, figs. 9a—d.

The shell oval, somewhat oblique, moderately convex, silvery-white. The valves thin, with ca. 30—40 radiating ribs, the ridges of which are as a rule finely scaled or spined; the middlemost ribs (or rib) are stronger than the others, thus giving rise to a median furrow (or two furrows); the beaks prominent; the hinge-margin fairly short, slightly sloping, forming obtuse angles with the lateral margins; cartilage-pit triangular; the internal surface glistening silvery-white. Height 5.25^{mm}., length 3.5^{mm}.

The "Ingolf" has taken this small, elegant species at **Iceland** at:

St. 98.	W. of Iceland.....	138 fm.	5.9° C.	1 valve.
- 90.	- - -	568 -	4.4° -	30 valves.
- 78.	S.W. of -	799 -	4.5° -	1 spec. and 20 valves.

This species is well characterized by its somewhat oblique, more or less broadly oval contour, the postero-dorsal margin forming a blunt angle not only with the hinge-margin but also with the postero-median margin; as also by the rather well-marked sculpture of its finely scaled or spined radiating ribs (fig. 9d).

Lima jeffreysi Fischer.

Pl. II, figs. 10a—c.

Lima jeffreysi P. Fischer, Ann. Mag. Nat. Hist. (5) VI, 1880, p. 315; Journ. Conch. XXX, 1882, p. 52; Locard, Expéd. Scient. Travailleur-Talisman, Moll. Test. II, 1898, p. 415, Pl. XV, figs. 20—23.

The "Ingolf" has taken this species at:

St. 18.	Off entrance to Denmark Strait.	1135 fm.	3.0° C.	1 valve.
- 90.	S.W. of Iceland	568 -	4.4° -	1 —
- 69.	S. - -	589 -	3.9° -	1 —

The largest of these shells (from St. 90) is 9.5^{mm}. high.

¹⁾ On the other hand, unlike Jeffreys, I am unable to refer to this species the specimens of "*L. subovata*" taken by the Norwegian and the Dutch Exped. in the Norwegian and Barents Seas, as I believe, that they belong to my species *Lima hyperborca* (see the latter).

In addition *L. jeffreysi* has been taken by the "Thor" at the following places **south of Iceland**:

63°05' N.L., 20°7' W.L.	293 fm.	7 valves (mostly fragments).
62°57' — 19°58' —	500 -	ca. 80 valves (many fragments).

The largest of these shells is 12^{mm}. high.

This species is easily recognizable by its oblique shape, its squamular radiating ribs (fig. 10c) and its lack of a central furrow. The number of ribs is 20—25, and even in the middle of the shell their breadth is less than that of the intervening furrows.

L. jeffreysi was only known earlier from the Bay of Biscay, 580 fm. ("Travailleur").

This species is nearly related to *L. confusa* E. A. Smith¹⁾ from the Azores, Sombbrero Island and Pernambuco, 450—1000 fm.; this again is said to be identical with *L. ovata* Jeffreys (non Scarles Wood²⁾) from the North Atlantic, 1450 fm. *L. setifera* Dall³⁾ from Havanna, Barbadoes and North Carolina, 52—450 fm., is also a nearly related species.

Lima sarsii Lovén.

Pl. II, figs. 11 a—d.

?*Lima crassa* Forbes, Rep. Brit. Assoc. Adv. Science, 1843, p. 193. — *Lim(c)a Sarsii* Lovén, Index Moll. Scand., 1846, p. 32; Jeffreys, Brit. Conchol. II, 1863, p. 78, Pl. 25, fig. 1. — *Limatula crassa* Sars, Moll. Reg. Arct. Norv. 1878, p. 26.

At **Iceland** this species has been taken by the "Ingolf" at:

St. 98. W. of Iceland	138 fm.	5.9° C.	1 valve.
- 85. S. W. of Iceland	170 -		1 —

The largest of these shells (St. 98) is 4^{mm}.

Further, *L. sarsii* has been taken at the **Færoes** at:

61° 15' N.L., 9° 35' W.L.	ca. 475 fm.	1 valve (height 4 ^{mm} .)
61° 35' - - 4° 39' - -	210 -	2 valves (max. height 3 ^{mm} .)

This species, which is readily recognizable from its solid, densely and coarsely scaled shell (fig. 11 d) and crenulated cardinal margin (fig. 11 c), was not known earlier from these regions of the Atlantic.

Its **distribution** extends from northernmost Norway (Varanger Fjord) along Europe and into the Mediterranean to the Aegean Sea⁴⁾. It is not known in the Skager Rak or the seas within this.

G. O. Sars estimates the vertical distribution to be from 50—300 fm., Jeffreys from 80—300 fm. Nevertheless the latter records it from great depths (off Ireland and on the line from Falmouth-Gibraltar, 400, 500 and 600 fm., in the Mediterranean even 1456 fm.), and Locard records it from 2018 meters off Cape Finisterre.

¹⁾ Challenger Report, vol. XIII, 1885, Lamellibranchiata, p. 292, Pl. XXIV, fig. 6.

²⁾ Ann. Mag. Nat. Hist. (4) vol. XXVIII, 1876, p. 426.

³⁾ Bull. Mus. Comp. Zool., XII, 1886, p. 225; Proc. U. S. Nat. Museum, XII, 1889, p. 250, Pl. XIV, fig. 10.

⁴⁾ According to Locard it is said to have been found at St. Helena.

Mytilidae.

Mytilus edulis Linné.

Mytilus edulis Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1157; Jeffreys, Brit. Conchol. II, 1863, p. 104, Pl. 27, fig. 1; Gould & Binney, Rep. Inv. Mass. 1870, p. 183, figs. 483—84.

Mytilus edulis Fabricius, Fauna groenl. 1780, p. 417; Möller, Index Moll. Groenl., 1842, p. 19; Möreh, Rink's Grönland, 1857, p. 94; Vidensk. Medd. Naturh. Foren. 1867, p. 97; *ibid.* 1868, p. 225; Arctic Manual, 1875, p. 133; Rink's Dan. Greenland, 1877, p. 442; Posselt, Medd. om Grönland XIX, 1895, p. 66; *ibid.* XXIII, 1898, p. 18; Jensen, *ibid.* XXIX, 1909, p. 322.

At **West Greenland** the edible mussel is common from the southernmost parts up to at least Umanak; further north it is said to have been taken by the "Fox" in Melville Bay. The largest specimen (from Disko Fjord) measures 110 mm., and specimens of 80—90 mm. are not rare.

Regarding the edible mussel at Greenland H. P. C. Möller writes in a posthumous manuscript: "The ordinary length is 64—77 mm., the largest specimen I possess is 105 mm. long and 50 mm. broad; it was found at Julianehaab. It occurs everywhere on the west coast of Danish Greenland in great quantities, both on the shores by the open sea and in the bays, among the stones and in cracks and crevices of the rocks. It always lives at a depth corresponding with lowest ebb-tide. Gould (Rep. Inv. Mass.) states, that it keeps to places which are laid dry by the water during ebb, but in this country it keeps to the boundary of the lowest ebb, or a little below or outside this; if it went higher up, it would be enclosed by the ice from November to May. It is eaten by the Greenlanders, boiled, raw or pickled in train-oil. It is an even more common source of nourishment for the ravens, foxes, dogs and all the animals, which are forced to seek their food on the shore at ebb-tide". It may be remarked here, however, that I have often seen living mussels in Greenland on seaweed laid dry during ebb-tide, and that Dr. V. Nordmann likewise found living *Mytilus* in great numbers in Nordre Strömfjord, fixed among *Fucus* which was daily laid dry at low-water.

At **East Greenland** the edible mussel only lives on the southernmost parts; it is not rare in the Angmagalik district, but the limit for its distribution lies not far north of this place, namely at ca. 66° 30' N. L.¹⁾ It may reach a length of 84 mm. For the details of its occurrence I may refer to my paper: "On the Mollusca of East Greenland" (l. c.).

At **Iceland** it occurs in quantities round the whole island; the largest specimen I have seen is 85 mm. long.

At the **Færoes** it is found at many places and reaches a length of 93 mm.

The material at hand from Iceland and Greenland shows, that *Mytilus edulis* is just as variable in the north as in more southern regions; but without an exact knowledge of the conditions at the different localities, it will hardly repay to discuss the variation.

¹⁾ It is recorded in the literature (Posselt l. c.), that the Danish East Greenland Exped. of 1892 took a small edible mussel in the pelagic net out in the open sea between Spitzbergen and E. Greenland (75° 37' N. L., 6° 4' W. L.). It was 11 mm. long, thus long past the pelagic stage, and cannot have arrived here as floating larva. I imagine, that mussels have been attached by the byssus to the sides of the ship or algae growing there; by the rubbing of the ice against the ship the mussel has been torn off and come by chance into the net towed behind the ship. — Cf. N. Hartz' report, that on the same Exped. he obtained numerous small algae in the net, especially when the ice was dense (Medd. om Grönland, XVII, 1896, p. 387, note).

Distribution. *Mytilus edulis* has a wide range within the temperate, in part also the arctic zone, both in the northern and southern hemispheres. In North America it occurs from North Carolina to Labrador; next, it occurs on the western and south-eastern coasts of Greenland, at Iceland and the Færoes; from the west coast of Nova Zembla its distribution extends along the whole coast of Europe, and also into the Mediterranean (var. *galloprovincialis* Lam.) to its easternmost end; through the Kattegat, decreasing in size, it reaches into the Baltic and up into the Gulf of Bothnia (to 62°6' N.L.). In the Pacific it ranges from Bering Sea to the Sea of Okotsk, Japan and Mexico. In the southern hemisphere the "Challenger" has taken it off Rio de la Plata, at the Falkland Islands, Kerguelen and New Zealand. — It belongs to the littoral belt; I have some young specimens, however, from greater depths, down to 50 fm.¹⁾

In high-arctic regions the dead shells of *Mytilus edulis* have been found at many places, where in spite of the keenest search not a single living specimen could be taken. In Europe it does not live north of Nova Zembla, yet dead shells occur in large numbers on Spitzbergen (both on the shore, at the beach and in raised deposits), on King Charles Land (Svenska Förlandet, 25 m. above the sea) and on Franz Josephs Land (3—6 m. above the sea). At East Greenland, as mentioned, it does not live N. of 66°30' N.L., but it has been found as fossil at ca. 73° N.L., namely at the mouth of Sophias Sound (25 m. above the sea) and in the innermost parts of Franz Josephs Fjord (10 m. above the sea). These discoveries of fossil (postglacial) *Mytilus edulis* indicate, that the high-arctic regions mentioned must have had a somewhat warmer marine climate than now at a not very remote geological period²⁾.

Modiola modiolus Linné.

Pl. III, figs. 1 a—b (young).

Mytilus modiolus Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1158; Jeffreys, Brit. Conchol. II, 1863, p. 11, Pl. 27, fig. 2; (*Modiola*) Gould & Binney, Rep. Inv. Mass. 1870, p. 186, fig. 485. — *Mytilus umbilicatus* Pennant, Brit. Zool., IV, 1767, p. 112.

Modiola umbilicata Mörch, Vidensk. Medd. Naturh. Foren. 1867, p. 96; ibid. 1868, p. 224.

The "Ingolf" has taken this species at:

St. 87. W. of Iceland (Brede Bugt) 110 fm. 1 spec. (empty).

[Greenland].

The species is recorded from here by G. O. Sars³⁾ and by Dr. A. Krause⁴⁾. I have no hesitation in refusing to admit the correctness of these records; a bivalve of such a size and so easy to get could not have escaped the attention of those, whose collections are preserved in the Copen-

¹⁾ N. Knipowitsch (Verhandl. Kais. Russ. Mineral. Gesellsch. Bd. 43, 1906, p. 271) mentions a few cases where he has found living, full-grown *Myt. edulis* in great depths and at a constantly very low temperature but at the same time expresses agreement with a view I had put forward elsewhere (K. D. Vidensk. Selsk. Forhandl. 1904, p. 394), namely, that such is not the normal habitat of the species; the specimens in question must be considered to have been carried out into the deep, cold layers with seaweed, perhaps also with ice-floes (in the Kara Sea, for example, *M. edulis* has been found on drift-ice; cf. Jensen l. c.).

²⁾ For further details see Ad. S. Jensen and Poul Harder: Post-Glacial changes of climate in Arctic regions as revealed by investigations on marine deposits (Postglaziale Klimaveränderungen. Stockholm, 1910, p. 399).

³⁾ Sars: Moll. Reg. Arct. Norv., 1878, p. 387.

⁴⁾ Krause, in Grönland-Expedition der Gesellsch. f. Erdkunde zu Berlin, II, 1, 1897, p. 185.

hagen Zoological Museum; here there is not and never has been any specimen of *M. modiolus* from Greenland¹⁾).

Iceland.

Dr. A. C. Johansen mentions *M. modiolus* among the Molluscs which occurred in the greatest abundance 2—3 meters below the high-water mark at the coasts of Iceland²⁾. Further, G. Bardarson has made the following observation on the northern coast: "*M. modiolus* lives here at Húnaflói at a depth of 10—15 meters and is thrown up on the beach in a heavy sea, but in small quantity", and regarding the conditions on the west coast he writes as follows: "At Isafjörður and Breidifjörður . . . it is found washed up at a few places in considerable quantity. At Faxaflói it is common . . . still more frequent at Grindavík S. of Reykjanes, where thousands can be collected after a heavy sea. *M. modiolus* thus lives in shallower depths and is more frequently washed up, the further south we come along the west coast of Iceland".³⁾ Lastly, the Icelandic naturalist Bj. Sæmundsson writes to me, that *M. modiolus* is often thrown up on the beach in autumn on the north coast.

I have made these preliminary remarks in order that the following lists may not give the impression, that *M. modiolus* is a rarity, for example, at East and North Iceland; its littoral occurrence and its considerable size have probably been the reasons why a comparatively small material of this species has been brought home.

East Iceland:

64°58' N. L., 13°25' W. L.	40 fm.	5 spec. and 1 valve.
Bakkafjördr	32—25 -	2 valves.

The shells last-mentioned reach a length of 105^{mm}.

North Iceland:

Húsavík.	washed up with <i>Laminaria</i> rhizoids.	3 spec.
Skagastrand Bugt	33 fm.	1 —

The last specimen is small, the first up to 100^{mm}.

West Iceland:

66°6' N. L., 23°59' W. L.	23 fm.	1 spec.
Dyrafjördr	ca. 19 -	3 —
65°52' N. L., 23°58' W. L.	33 -	1 valve.
Arnarfjördr, beach		1 spec.
65°32' N. L., 24°38' W. L.	22 -	4 —
Grundarfjördr	9 ¹ / ₂ -	4 valves.
64°45.8' N. L., 23°55.2' W. L.	30 -	3 spec.
Hvalfjördr	24 -	1 — and 1 valve.
Krossvík	8 - , shell-gravel, blue clay, stones.	1 —

1) G. O. Sars has also made the mistake in his "Tabulae distributionis" (op. cit.) of including Spitzbergen under its region of distribution.

2) Vidensk. Medd. Naturh. Foren. Kbhvn., 1902, p. 387.

3) Vidensk. Medd. Naturh. Foren. Kbhvn., 1910, p. 62.

Faxafjördr	.....	25 fm.	Many valves.
—	.....	14 ¹ / ₂ -	1 spec.
—	Keflavik.....	15—16 - , fine black sand.	3 fragments.
Reykjavik	beach, on Laminaria rhizoids		11 spec.
—	.....	1 ¹ / ₂ fm., stony bottom.	2 spec.
—	.....	8 -	4 —
Hafnarfjördr	beach		3 —
—	.....	4 -	1 —
—	.....	25 - , fine black sand and ooze.	1 valve.
—	1 mile E.N.E. of Helgasker Vager.....	11 ¹ / ₂ -	2 valves.

It has thus been taken living even at a depth of 30 fm.; the specimen from the "Ingolf" St. 87, which also lies on the west coast of Iceland at a depth of 110 fm., was on the other hand empty and may possibly have been carried out with Laminaria, to the rhizoids of which *M. modiolus* is accustomed to attach itself by means of its byssus. The largest specimen is 146^{mm.} long.

South Iceland:

63°30' N.L., 20°14' W.L.....	42 fm.	3 valves.
Heymaey, Vestmannaeyjar	beach.	4 spec. & many valves.
Vestmannaeyjar	30 fm., shell-gravel.	3 valves.
—	49 - , clay with a little mud.	Fragments of 3 valves.

The specimens washed up on the beach at Heymaey are up to 95^{mm.} long.

The Færoes.

According to earlier authors (Svabo, Landt) *M. modiolus* occurs at many places at the Færoes; after a heavy sea it is often found washed into the bays, not rarely hanging to large tufts of seaweed under whose rhizoids it likes to live.

The largest specimens I have seen are 155^{mm.} long; large specimens are taken at a depth of even ca. 100 fm.

In recent years it has been taken at the following places at the Færoes:

Klaksvig.....	11 fm., on Laminaria rhizoids.	5 spec.
Fundings Fjord	12—ca. 20 - , coarse sand and clay.	1 — and 16 valves.
Andefjord	16—23 -	1 —
Kongshavn	12—16 -	2 —
Vestmanhavu	3 ¹ / ₂ —5 - , fine black sand.	1 —
—	4 - , sand.	1 —
—	4—5 -	1 —
—	ca. 10 -	2 —
—	10—30 -	10 —

Vestmansund.....	70 fm.	6 spec.
Sörvaag beach.		2 — and 3 valves.
—	14—16 $\frac{1}{2}$ - , ooze.	1 —
Thorshavn beach.		4 —
—	3—4 -	1 —
Nolso beach.		4 valves.
— deep hole at north end.....	ca. 100 -	30 spec. and many valves.
Trangisvaag Fjord, mouth.....	4—5 - , among rhizoids of <i>Laminaria</i> .	1 — and 3 valves.
62°29' N.L., 7°37' W.L.....	60 -	3 —
62°16.5' N.L., 6°6' —	50—60 -	5 —
5 miles N. by E. of east point of Myggenæs	50 -	2 —
7 — N. by E. of Myggenæs Point	57 -	6 —
6 — N. by W. of Kalso	60 -	14 —
1 $\frac{1}{2}$ —2 miles off mouth of Bordøvig	20—30 -	1 —
Bordonæs in N. 57 W., 1 $\frac{3}{4}$ miles..	30 -	15 — & many valves.
9 miles E. of Nolso Light.....	ca. 30 -	2 —
16 — E. by S. of south point of Nolso	80 -	1 —

Distribution. On the European side *Modiola modiolus* ranges from the “warm area” of the White Sea¹⁾ to the British Isles and west of France (Loire)²⁾ as also through the Kattegat into the Sound and Belts; next, over the Færoes to the coasts of Iceland. On the American side it is distributed from Labrador to North Carolina, and from Bering Sea to Japan and California. Jeffreys gives the vertical distribution to be from 0—100 fm., which agrees with the observations from the Færoes and Iceland (cf. above); its true habitat is the *Laminaria* region.

Modiola phaseolina Philippi.

Pl. III, figs. 2a—b.

Modiola phascolina Philippi, Enum. Moll. Siciliae, II, 1844, p. 51, Pl. 15, fig. 14. — *Mytilus phascolinus* Jeffreys, Brit. Conchol. II, 1863, p. 118, Pl. 27, fig. 5.

Modiola phascolina Mörch, Vidensk. Medd. Naturh. Foren., 1868, p. 224.

¹⁾ According to Collin (Dijmphna-Togtets zool.-bot. Udbytte, 1886, p. 450) a very young specimen (19^{mm}. long) is said to have been taken in the Kara Sea at 53 fm., but this case is isolated, and I doubt whether the species really belongs to this Sea. N. Knipowitsch also reports, that he has once obtained *M. modiolus* from the deep part of the White Sea, where a very low temperature constantly prevails (the “cold area”), but he is of opinion, that it is not the normal home of the species, but that the specimens have probably been carried out there from the coastal region with seaweed or ice-floes (Verhandl. d. Kais. Rnss. Min. Gesellsch. Bd. 43, 1906, p. 275). — The circumpolarity of *M. modiolus*, as maintained by some authors, is in any case a mistake; it has not been taken at Greenland (cf. antea p. 48), nor at Spitzbergen (cf. Knipowitsch, Ann. Musée zool. de l'Acad. Imp. St.-Petersbourg, VI, 1902, p. 119, note), nor on the north coast of Asia or in the waters N. of arctic America.

²⁾ It has been forgotten by Locard in his list: Les coquilles marines des côtes de France (1892); in the same author's Prodrome de Malacologie Française, Mollusques marins (1886) numerous localities are given for it (p. 491).

This species has been taken by the "Ingolf" at:

St. 98.	W. of Iceland	138 fm.	5.9° C.	15 valves.
- 86.	- - - (Brede Bugt)	76 -		Numerous valves.
- 87.	- - - - -	110 -		1 spec. & numerous valves.
- 54.	S. E. of Iceland	691 -	3.9° -	1 -
- 55.	- - -	316 -	5.9° -	3 -
- 6.	- - -	90 -	7° -	6 -
- 51.	- - -	68 -	7.32° -	1 - & 1 valve.
- 1.	N. W. of the Færoes	132 -	7.2° -	1 -

Previously *M. phascolina* was only known in these regions from Faxafjördr in West Iceland, where Iap. Steenstrup had taken 2 specimens (recorded in Jeffreys l. c.).

In addition to at the above stations of the "Ingolf", *M. phascolina* has in recent years been taken at many other places on the west, south and south-east coast of Iceland as well as at the Færoes, as will be seen from the following summary.

West Iceland:

66°8' N.L., 24°21' W.L.	47 fm.	1 spec.
Faxafjördr	13 -	1 -
-	17 - , coarse shell-sand.	15 valves.
-	17—20½ - , sand and shells.	3 -
Skagi	21 -	1 valve.

South Iceland:

63°15' N.L., 22°23' W.L.	170—114 fm.	7 valves.
63°18' - 21°30' -	94 -	1 valve.
Vestmannaeyjar	49 - , clay with a little mud.	25 valves.
- Heymaey, on beach		18 -
63°17½' N.L., 17°39' W.L.	87 - , black sand with shells and stones.	1 spec.
63°21' - 17°31' -	69 -	1 valve.
63°21' - 17°15' -	58 - , sand, stones, shell-gravel.	9 spec. and 12 valves.
Ingolfshöfði in N. by E. ½ E., 9½ miles	53 -	1 -

South-East Iceland:

64°3' N.L., 15°40' W.L.	35 fm.	5 spec.
Myre Bugt	36 -	1 spec. and 1 valve.
64°27' N.L., 13°27' W.L.	84 -	3 spec.

The Færoes:

Ejde	5—6 fm., coarse black sand.	6 valves.
13 miles S. of Myggenæsholm	ca. 70 -	2 -
61°56' N.L., 7°04' W.L.	30 -	1 spec.

61°40' — 7°40' —	135 fm.		1 spec. and 1 valve.
61°9' — 7°54' —	181 -	Temp. 8.42° C.	1 —
9 miles E. S. E. of Bispen	ca. 70 -		3 valves.
16 — E. by S. of south point of Nolso	80 -		4 spec. and 1 valve.
Akralejte in N. 57 W., 12 miles.....	- 150 -		1 —
13 miles W. by S. of Munken	- 150 -		ca. 100 valves.

At Iceland it reaches a length of 19^{mm}. in the shallower waters, whilst the specimen from 691 fm. (St. 54) is only 3.5^{mm}. long and the largest specimen from 316 fm. (St. 55) 7.5^{mm}. The largest of the specimens at hand from the Færoes is 16^{mm}. long.

Remarks. The numerous specimens to hand confirm in every respect the variation remarked upon by other authors; the form of the shell is sometimes elongated, sometimes very short, but with all transitions.

Modiola phascolina is often confused with the young of *M. modiolus*, from which however it can be distinguished with certainty by means of the following combination of characteristics (cf. Pl. III, figs. 2a—b (*M. phascolina*) with figs. 1a—b (*M. modiolus*, young):

The shell is more ventricose.

The anterior end under the umbo is less prominent.

The inner edge of the antero-dorsal margin is finely crenulated across, and the hinge-margin in from the beak is somewhat flattened and expanded and marked by minute transverse teeth.

The impression of the anterior closing muscle is bounded above by a ridge-like projection from the shell-margin.

The antero-dorsal margin rises more steeply and the dorsal margin is for some distance almost parallel with the ventral margin.

Distribution. *Modiola phascolina* is distributed from northernmost Norway (Varanger Fjord) along Europe and into the Mediterranean as far as the Aegean Sea; it goes down into the Kattegat. To the west it reaches over the Færoes to the south-eastern, southern and western coasts of Iceland. — Jeffreys gives the vertical distribution to be from 0—3000 fm., though it is not apparent where he has obtained the record of this enormous depth from; the greatest depth noted by himself lies in the Mediterranean at 1415 fm¹). At Norway, according to G. O. Sars, it reaches down to 300 fm., at the Færoes and Iceland to 691 fm., so that I am inclined to doubt the correctness of Jeffreys' record. Nor is the purely littoral occurrence quite certain, as it has not been taken living at less depths than 13 fm. at Iceland, the Færoes, Norway or Denmark. That it may be washed up on land is another matter; I have before me a number of apparently fresh shells, which had been washed up on the beach at Heymaey, Vestmannaeyjar on South Iceland (collected by Dr. A. C. Johansen).

Dacrydium vitreum Möller.

Modiola ? vitrea "Holböll", Möller, Index Moll. Groenl., 1842, p. 19. — *Dacrydium vitreum* Torell, Spitsbergens Molluskfauna, 1859, p. 139, Pl. 1, fig. 2; Sars, Moll. Reg. Arct. Norv., 1878, p. 28, Pl. 3, fig. 2; Verrill, Transact. Connecticut Acad., V, 1882, p. 579, Pl. 44, fig. 8.

¹) Jeffreys, as usual, does not mention whether the shells were "dead" or contained the animal.

Modiolaria vitrea Mörch, Tillæg til Rink's Grönland, 1857, p. 94; Arctic Manual, 1875, p. 133; Rink's Dan. Greenland, 1877, p. 442. — *Dacrydium vitreum* Friele, Nyt. Mag. Naturvidensk., 1879, p. 22; Posselt, Medd. om Grönland, XIX, 1895, p. 66; idem, ibid. XXIII, 1898, p. 21; Jensen, Medd. om Grönland, XXIX, 1909, p. 325.

The "Ingolf" has taken this species at:

St. 32.	Davis Strait	318 fm.	3.9° C.	33 spec.	
- 28.	—	420 -	3.5° -	30 —	
- 35.	—	362 -	3.6° -	3 —	
- 24.	—	1199 -	2.4° -	5 —	
- 115.	S. of Jan Mayen.....	86 -	0.1° -	18 —	and 25 valves.
- 116.	—	371 -	-0.4° -	2 valves	(corresponding).
- 117.	—	1003 -	-1.0° -	1 spec.	
- 101.	N. E. of Iceland.....	537 -	-0.7° -	1 —	
- 124.	N. of Iceland	495 -	-0.6° -	1 —	
- 126.	—	293 -	-0.5° -	12 —	and 12 valves.
- 128.	—	194 -	0.6° -	27 —	- 9 —
- 87.	W. of Iceland (Brede Bugt).....	110 -		4 —	- 50 —
- 86.	—	76 -		1 valve.	
- 98.	W. of Iceland.....	138 -	5.9° -	8 spec.	and 25 valves.
- 97.	- - —	450 -	5.5° -	1 —	
- 90.	- - —	568 -	4.4° -	2 —	- 7 —
- 85.	S.W. of —	170 -		5 —	
- 80.	— - —	935 -	4.0° -	1 —	- 1 valve.
- 78.	— - —	799 -	4.5° -	35 —	-ca. 50 valves.
- 58.	E. - —	211 -	0.8° -	1 valve.	
- 138.	N. of the Færoes	471 -	-0.6° -	10 spec.	

Quite small,
maximum
size 1 mm.

The largest shell, namely of 7 mm., is one from St. 58, E. of Iceland; in the Davis Strait a size of 5 mm. is attained (St. 28) and S. of Jan Mayen a size of 5 mm. (St. 115 and 116). From the stations west and south-west of Iceland the maximum size is 4 mm. From the two very deep stations, 24 and 117, the size is respectively only 3 mm. and 2.5 mm.

There is considerable variation in regard to the form and thickness of the shell¹⁾. The specimens from west and south-west of Iceland (St. 87, 86, 98, 97, 90, 85, 80 and 78) differ especially from the typical *D. vitreum* in having a relatively elongated form and a less convex dorsal line; they greatly resemble the *Dacrydium occidentale* of E. A. Smith²⁾ (West Indies, 390 fm.), but I have not thought it right to separate these specimens as an independent species.

¹⁾ Cf. also A. Locard, who distinguishes between the following varieties: *minor*, *elongata*, *curta*, *incurvata*, *ventricosa* and *albida*; Expéd. scient. Travailleur-Talisman, Moll. Test., II, 1898, p. 364.

²⁾ Zool. Chall. Exp., Part XXXV, 1885, p. 282, Pl. 17, fig. 1.

Elsewhere the following information may be given regarding the distribution of the species.

West Greenland.

In addition to the "Ingolf" stations in the Davis Strait, 318—1199 fm., *D. vitreum* has been taken at 7 localities from the southernmost (Julianehaab) to the northernmost part (72°4' N. L.) of Danish West Greenland, on clay bottom and at depths of 48—250 fm. The size is up to 5 mm.

East Greenland.

Here *D. vitreum* has been taken by Danish Expeditions at 9 localities from Cape Dalton to Sabine Island, or from 69½°—74½° N. L. and at depths of 10—127 fm. It reaches here a size of 6 mm.

Jan Mayen.

The Norweg. North-Atlantic Exped. took *D. vitreum* at 2 stations, with depths of 70—95 fm. The Danish Exped. of 1892 took 8 specimens S. of the island (70°32' N. L., 8°10' W. L.), at a depth of 470 fm.; the Danish Exped. of 1900 took 4 specimens and 2 valves at a depth of 55 fm., as also 3 specimens and 1 valve at a depth of 50—60 fm. Lastly, as shown above, the "Ingolf" Exped. found it at 2 stations at a depth of 86 and 371 fm., as also a specimen far to the south of the island (St. 117) at a depth of 1003 fm., but it is only 2.5 mm. long.

Iceland.

Apart from the stations of the "Ingolf" north-east, north, west, south-west and east of the island, *D. vitreum* has also been taken at the following places:

66°32' N. L., 15°15' W. L.	75 fm.		1 valve.
64°58' — 11°12' —	300 -	—0.38° C.	1 spec.

The Færoes.

Besides at the "Ingolf" station N. of the Færoes (St. 138, depth 471 fm.; maximum size of the specimens 4 mm.) *D. vitreum* has been taken at the following places:

63°14' N. L., 9°46' W. L.	260 fm.		18 spec.
63°03' — 9°28' —	275 -		1 valve.
5 miles N. by E. of east point of Myggenæs	50 -		2 valves.
61°40' N. L., 7°40' W. L.	135 -		1 valve.
61°15' — 9°35' —	ca. 475 -		2 spec. and 9 valves.
61°7' — 9°30' —	440 -		1 valve.
6 miles N. by W. of Kalso	60		2 valves.
13 -- W. by S. of Munken	- 155 -		9 —

From the deepest of these places (475 fm.) the specimens have a size of 3.5 mm., from the other places still smaller (1—3 mm.).

Elsewhere *D. vitreum* ranges from the Kara Sea and Spitzbergen to the Mediterranean and the Azores; on the American side from the Gulf of St. Lawrence to Campeche. It is said to occur down to a depth of 2750 fm., and in arctic regions it reaches as high up as 10 fm. (cf. under East Greenland).

Idas argenteus Jeffreys.

Pl. III, figs. 3a—e.

Idas argenteus Jeffreys, Ann. Mag. Nat. Hist. (IV), vol. XVIII, 1876, p. 428; Proc. Zool. Soc. 1879, p. 570, Pl. 45, fig. 3; Proc. Zool. Soc., 1882, p. 683.

Shell having the shape of an irregular parallelogram (varying from rhomboidal to oblong), of a delicate texture, rather opaque, iridescent; it is covered with a pale brownish-yellow periostracum, which rises into fibrous excrescences on the posterior side; under the periostracum the shell is silvery white, except the beaks which are reddish brown; sculpture, very fine and close-set transverse striae and microscopic longitudinal striae, radiating from the beaks; margins straight at the back and in front, rounded on the anterior and smaller side, and sloping from the back with a curved outline on the posterior side; beaks circular and incurved, placed near the anterior side; an internal and long cartilage covers the hinge; hinge-line nearly straight, but obtuse-angled at the hinge; hinge-plate narrow, minutely and closely denticulated on both sides of the hinge; inside polished and nacreous; edge plain; scars inconspicuous. Size of the largest specimens about 8^{mm}.

In 1876 Jeffreys described the species almost as above, the additions and changes made by himself in 1882, however, being added.

This small Mytilid was taken by the "Ingolf" at:

St. 67. S. of Iceland 975 fm. 3° C. ca. 260 spec.

The specimens of the "Ingolf"-Expedition agree extremely well with the descriptions of Jeffreys. A radiating striation however can hardly be seen and the hairy periostracum is often distributed over a greater part of the shell, mostly however on the posterior and dorsal surfaces.

Distribution. During the "Valorous" Cruise of 1875 one valve was taken in the North Atlantic (56°11' N.L., 37°41' W.L.) at 1450 fm. The "Porcupine" Expedition of 1869 also found a shell in the Bay of Biscay at a depth of 994 fm. Lastly, it was taken on the cruise of the "Triton" between the Hebrides and the Færoes at 516 fm., "inhabiting deserted tubes of *Teredo mcgotara* in a large water-logged piece of pine-wood, to which the *Idas* had fixed itself by a strong byssus". The specimens of the "Ingolf"-Exped. were taken south of Iceland (61°30' N.L., 22°30' W.L.) at 975 fm., under similar conditions to the last; the trawl brought up two large pieces of pine-wood, which had been pierced through and through by *Teredo*; in some of the *Teredo* tunnels were in addition mud and worm-tubes, further worms and small bivalves, namely *Idas argenteus*.

In 1882 Verrill mentions an "*Idas argenteus* Jeffreys var.? *lamellosus* Verrill (perhaps sp. nov.)", taken by the "Fish Hawk" in 1881 at New England off Martha's Vineyard (S. S. W. 1/4 W., 103 1/2 miles) at a depth of 335 fm.¹⁾ On this Jeffreys (l.c. 1882) makes the following comment:

¹⁾ E. A. Verrill: Catal. of Marine Mollusca added to the Fauna of New England; Trans. Conn. Acad. vol. V, 1882 (p. 579).

"*Idas argenteus* is probably the species of that name noticed by Verrill as var. *lamellosa*", and the added knowledge of *Idas argenteus* obtained in that year really disposed of the peculiarities of Verrill's *Idas*.

Modiolaria.

The 4 northern species of this genus may, according to my experience, most readily be distinguished from one another in the following manner:

The shell radially striated	{	over the whole			<i>M. faba.</i>			
		only on anterior or also on the posterior area.	{	Central	{	Central		
				and poster- ior areas of shell			not distinctly separated.....	<i>M. nigra.</i>
				separated by a dia- gonal fur- row.			{	smooth .....	M. discors
shagreen-like wrinkled .	<i>M. corrugata.</i>							

(cum var. *laevigata* et *substriata*).

Modiolaria discors Linné.

The true *Modiolaria discors* Linné does not occur at Greenland, Jan Mayen or Iceland. The species is represented here by "*Modiolaria laevigata* Gray" and "*Modiolaria substriata* Gray", which I do not consider separate species, but varieties of a species which also embraces "*Modiolaria discors* Linné". The last name has the prior right by age and must consequently have the advantage in the designation of the species.

var. *laevigata* Gray.

Pl. III, figs. 4a—b.

Modiola laevigata Gray, Parry's first voyage, Suppl. to App., 1824, p. 244. — *Crenella laevigata* Torell, Spitsbergens Molluskfauna, 1859, p. 133. — *Modiolaria discors* Gould & Binney, Rep. Invert. Mass., 1870, p. 192, fig. 489. — *Modiolaria laevigata* Sars, Moll. Reg. Arct. Norv., 1878, p. 29, Pl. 3, fig. 3; Leche, Vega-Exped. Vetensk. Arb. III, 1883, p. 450, Pl. 34, figs. 27—28.

Mytilus discors Fabricius, Fauna groenl., 1780, p. 418. — *Mytilus discors, arcticus* Fabricius (partim), K. D. Vidensk. Selsk. Skr. 1788, p. 453, figs. 1 & 4—6. — *Modiola discors* Møller, Index Moll. Groenl., 1842, p. 19. — *Modiolaria discors* Beck, in Gaimard, Voyage de la Recherche, Pl. 17, fig. 2a—h. — *Modiolaria laevis* Beck, ibid. Pl. 17, fig. 3f. — *Modiola discors* Beck, Amtl. Bericht 24. Versamml. deutsch. Naturf. in Kiel, 1847, p. 115. — *Modiolaria laevigata* Mörch, Rink's Grönland, 1857, p. 94; Vidensk. Medd. Naturh. Foren. 1868, p. 224; Arctic Manual, 1875, p. 133; Rink's Dan. Greenland, 1877, p. 442; Becher, Österr. Polarst. Jan Mayen III, 1886, p. 69; Posselt, Medd. om Grönland, XIX, 1895, p. 67; ibid. XXIII, 1898, p. 25; Jensen, ibid. XXIX, 1909, p. 326. — *Modiolaria corrugata* (non Stimpson) et *laevigata* Hägg, Ark. för Zoologi, Bd. 2, No. 2, 1904, p. 22 & 23.

var. *substriata* Gray.

Pl. III, figs. 5a—b.

Mytilus discors, arcticus Fabricius, K. D. Vidensk. Selsk. Skr. 1788, p. 453 (partim), figs. 2 & 3. — *Modiolaria lævis* Beck, in Gaimard, Voyage de la Recherche, Pl. 17, figs. 3a—e. — *Modiolaria discors* Mörch, Vidensk. Medd. Naturh. Foren. 1868, p. 224. — *Modiolaria lævigata* var. *substriata* Posselt, Medd. om Grönland, XIX, 1895, p. 67; *ibid.* XXIII, 1898, p. 26; Jensen, *ibid.* XXIX, 1909, p. 326. — *Modiolaria substriata* Hägg, Arch. för Zoologi, Bd. 2, No. 2, 1904, p. 25.

The "Ingolf" has taken this species at:

St. 33.	Davis Strait.....	35 fm.	0.8° C.	1 spec.	} var.
- 34.	— —	55 -		1 — very young		} lævigata.
- 119.	Norwegian Sea.....	1010 -		1 — young (empty),	var. <i>substriata</i> .

At **West Greenland** the species is very common from the southernmost part of the land as far northwards as the investigations extend, namely to N. W. of Cape York; on the American side it is still met with in Franklin Pierce-Bay at 79°25' N. L. It prefers shallow water, 0—30 fm., but it is said to live also in greater depths, down to 100 and 200 fm. The variety *substriata* is less common than *lævigata*. The largest specimens at my disposal of var. *lævigata* measure 46 mm., of var. *substriata* 30 mm.; O. Fabricius mentions specimens of up to 50 mm.

At **East Greenland** the species has been taken at many places, sometimes in large numbers, from Angmagssalik as far north as collections have been made (Shannon Island at 75—75½° N. L.). The depths noted are 0—30 fm. The variety *lævigata* is also by far the most abundant here; the largest specimen of this variety measures 36.5 mm., of *substriata* 32 mm.

Jan Mayen. The Austrian Expedition took 13 specimens up to 28 mm. long on the north side of the island, at a depth of 8—13 fm. The Danish Exped. of 1900 took some smaller specimens at 15 and 50—60 fm.

At **Iceland** the species is probably common all round the island, from lowest water¹⁾ and (in small specimens) out to 50—60 fm.; the localities mentioned below hardly give a correct picture of its distribution, as only few dredgings were made in very shallow water, where the species mainly lives. The variety *lævigata*, which is the most frequent, reaches a length of 48 mm., and among the var. *substriata* there is one of 52 mm.

East Iceland:

Lónsvik	8—10 fm., fine black sand.	1 spec.
Berufjörðr, Djupivogr	3 - , on <i>Laminaria</i> rhizoids.	2 —
— —	6 - , mud with black sand.	1 —
— —	8 -	2 —
— —	10 -	3 —
Breiddalsvík	14 -	1 —

¹⁾ A. C. Johansen records *Modiolaria lævigata* among the Molluscs which occurred in the greatest abundance 2—3 meters below the high water mark at the coasts of Iceland. Vidensk. Medd. Naturh. Foren. 1902, p. 387.

Fáskrudsfjörðr, Hafnarnes.....	50—10 fm., blue clay.	2 spec.
Reydarfjörðr.....	60—80 -	1 —
—	70 -	1 —
Seydisfjörðr at Skálanes	on Laminaria rhizoids.	7 —
— - —	6 - , on Laminaria leaves.	1 —
— - —	7—8 -	2 —
— - Brimmes	8—4 -	1 —
Bakkafjörðr.....	12—15 -	7 —
—	52—20 -	15 —
Finnafjörðr, Gunolfsvík.....	12 -	1 —

All these are for the most part quite small specimens, due to chance naturally; the largest specimen is only 25^{mm}. long, but in the Stockholm Museum I have seen a specimen from Berufjörðr, which was 48^{mm}. long. The variety *substriata* is rather frequent, comparatively speaking, in the material at hand.

North Iceland:

Thistilfjörðr	10 fm., sand, coral.	1 spec.
Kollafjörðr		7 —
—	10 -	1 —
— Húnaflói	5 -	1 —
Skagastrand		4 —
— Bugt.....	33 -	1 —
66°36' N.L., 21°57' W.L.....	32—37 -	1 —

Though there happens to be only such a small material from this part of the coast, it nevertheless contains large specimens, of the variety *lævigata* up to 48^{mm}., and of the variety *substriata* of 52^{mm}..

West Iceland:

Höfnvík.....	10 fm.	1 spec.
Adalvík	6—9 -	3 —
Isafjörðr		1 —
Önundarfjörðr	1/2—0 -	1 —
Dyrafjörðr		1 —
65°52' N.L., 23°58' W.L.....	33 -	1 —
65°17.5' — 23°32' —	7—12 -	1 —
Hvalfjörðr.....	24 -	3 —
Faxe-Bugt		15 —
Reykjavík		20 —

All these specimens belong to the variety *lævigata*; the largest (from Önundarfjörðr) is 45^{mm}., the second-largest (from Reykjavík) is 44.5^{mm}. long.

South Iceland:

Vestmannaeyjar	beach	1 valve.
—	..... 10—15 fm.	1 spec.

These specimens belong to the variety *substriata* and reach a length of 18^{mm}.

[At the Færoes the species has *not been found*].

Remarks. At Iceland and Greenland the species occurs, as mentioned above, under two main forms:

a. *Modiolaria discors* L. var. *lævigata* Gray (Pl. III, figs. 4a—b): the shell somewhat compressed, posteriorly high, rounded-truncate; the posterior area without radiating striæ.

b. *Modiolaria discors* L. var. *substriata* Gray (Pl. III, figs. 5a—b): the shell ventricose, posteriorly low, rounded-pointed; the posterior area with radiating striæ.

But each of these forms again is subject to variation.

The typical *lævigata* is a high form, but even among the full-grown we meet with specimens which are much more elongated than is usually the case. The typical *lævigata* does not have the radiating striæ on the posterior area, but sometimes a faint striation may be seen here¹⁾.

In the typical *substriata* the postero-dorsal margin slopes rapidly downwards, but we also find specimens in which the slope of the posterior margin is less abrupt. The typical *substriata* has the posterior area distinctly striated radially, but sometimes the striation is not to be seen, even under a lens (*“Modiolaria lævis”* Beck l. c.).

The two forms frequently occur together and one is often at a loss to determine to which of the forms a given specimen has to be referred; in the case of small specimens it is often quite impossible.

Modiolaria lævigata-substriata are arctic and circumpolar forms, whose southern boundaries lie at Massachusetts, Lofoten and northern Japan. Viewed in a wider sense, including also *Modiolaria discors*, the species is distributed further along the rest of West Europe to Madeira, including the Kattegat-Baltic (to Kiel and Neustadter Bugt) and the Mediterranean²⁾.

In opposition to G. O. Sars I must maintain, that *Modiolaria substriata* and *Mod. lævigata* are not distinct, but forms of one and the same species.

And I am most inclined to believe with Jeffreys, that *Modiolaria lævigata* Gray and *Modiolaria discors* Linné are specifically identical. Against this G. O. Sars has objected very definitely and I can in so far agree with this author, that there is not an excessively great resemblance between *Mod. discors* and an adult, typical *Mod. lævigata*; on the other hand, I certainly consider it as more than probable, that *Mod. discors* is nothing else but a southern³⁾, pygmy⁴⁾ and slightly altered form

¹⁾ I exclude here the fact, that all *lævigata* in the very young stages have the posterior area radially striated and in the adult condition retain this striation on the umbonal region; the striation is obviously a characteristic of the young stages.

²⁾ Bucquoy, Dautzenberg and Dollfus however write in their oft-cited work, on the marine Mollusca of Roussillon, that the occurrence of *Mod. discors* in the Mediterranean requires to be confirmed; they mention various cases, in which *Mod. marmorata* Forb. has been confused with *Mod. discors*.

³⁾ *Mod. discors* is certainly very commonly regarded as an arctic form, but the basis for this is undoubtedly a confusion with the form *substriata*; among many hundreds of specimens, which I have examined from arctic regions (Greenland, Iceland, Spitzbergen, Kara Sea), I have not found a single one of the true *discors*; this hardly goes further than northernmost Norway or Murman Coast, further east and north it is replaced by the *substriata* form. As mentioned by Sparre Schneider (Tromsøundets molluskfauna; Tromsø Museums Aarshefter VIII, 1886, p. 65) the form *substriata* (*“Mod. lævis* Beck”) does not occur at Norway — for the simple reason, in my opinion, that *Mod. discors* is its modification in boreal regions.

⁴⁾ The maximum length of *Mod. discors* (at Denmark and Norway) is 20^{mm}, whereas *Mod. substriata* becomes over 50^{mm} long.

of "*Mod. substriata*", so small is the difference between them¹). *Mod. discors* (Pl. III, figs. 6a—b) is on the whole a more oblong form; this is the essential difference. But whilst maintaining, that *Mod. lævigata*, *Mod. substriata* and *Mod. discors* are identical specifically, I may yet emphasize that in their typical shape they are representatives for just as many special forms and must not be summarily thrown together.

Furthermore, the form *discors*, as I know it from Danish waters, is also not a little variable; frequently the posterior area is distinctly striated, but sometimes it appears almost smooth (cf. var. *semilævis* Jeffreys, Brit. Conchol. II, p. 127); I have even before me at this moment a specimen from the Great Belt (Svendborg), which combines a striation such as we find in *substriata* with the form of a typical *lævigata*, or on the whole shows a great resemblance to a very young *Mod. lævigata*.

In conclusion I may quote some little known observations regarding the biology of this species.

In his paper "Om Ueens-Muslingen" (i. e. *M. discors* var. *lævigata* and *substriata*) O. Fabricius²) writes as follows: "This Bivalve I have found to be of common occurrence in Greenland, where it is called *Bibibiarsuk*; I do not know the certain origin of this word . . . one might be inclined to think, that the Greenlanders have found this name suitable for the whistling or hissing noise, this Bivalve . . . produces when it has stood for a long time closed at ebb-tide for want of water and then with the coming of the flood begins to open again. It is attached by its fine silk (byssus) to large stones or rocks in the sea, the largest end sticking upwards, the open side turned towards the stone or foreign body, to which it is attached. It lives preferably so far from the land, that it does not become dry except at spring-tides when the greatest ebb occurs. On the blind rocks out to sea, therefore, it is most numerous . . . When its silky hairs have been broken by the waves or other cause, I have seen it stretch out its foot, attaching it to the solid rock, elongating and contracting it, and thus push itself forwards . . . the fattest and largest are found on clay bottom . . ."

In a manuscript left by H. P. C. Møller we find: "It occurs everywhere in quantities on the coast of Danish West Greenland and especially where there is shallow water, partly on *Laminaria*, more rarely on *Fucus*, partly among the string-like algal forms and among stones, down to a depth of 20 fm. or still deeper, e. g. at Nennortalik, Godhavn; I have taken it in 30 fm. opposite Nepisene at a distance of 8 Danish miles from the coast."

And in a notice: "Ueber *Mytilus discors*" Iap. Steenstrup makes the following remarks on *Modiolaria discors* var. *lævigata* at Iceland: ". . . Noch mehr zeichnet sich diese Muschel durch ihren sehr ausstreckbaren Fuss aus, welcher ihr erlaubt, die Byssusfäden nicht nur um die Seiten der Schalen, sondern auch über den Rücken derselben heranzuführen; dadurch kann sie sich ganz mit einer Byssushülle umgeben oder sich wie in einem Byssussack verstecken. Die Enden der äusseren Byssusfäden werden auf kleinen Steinchen, Muschelschalentrümmern und dergleichen festgeheftet, so dass der Byssussack ganz einem Steinhäufchen gleicht; die innere Wand der Byssushülle ist dagegen sehr glatt, aus dichtliegenden, sich kreuzenden Byssusfäden gebildet, und schliesst sich den Muschelschalen ziemlich dicht an. Nur das hintere Ende der Hülle hat eine Oeffnung, sonst ist sie ganz geschlossen. In seichten Meeresbusen, in welchen der Boden mit grobem Sande und Graude bedeckt war, hat S.

¹) Leche has obviously been of the same opinion, as he writes (l. c. p. 451), that the *Mod. discors* from Kiel Bay, sent him by Möbius, cannot be specifically distinguished from *Mod. lævis* Beck; Leche refers to this in connection with the fact, that G. O. Sars had erroneously identified Möbius' *Mod. discors* with *Mod. corrugata* Stimpson.

²) Nye Samling af det Kgl. Danske Videnskabernes Selskabs Skrifter, 3. Deel, 1788, p. 453.

sehr oft bedeutende Flächen von den oben erwähnten Steinhäufchen eingenommen gesehen; in jedem derselben steckte eine lebende *Mytilus discors*-Muschel, ganz wie eine Puppe in ihrer Puppenhülle" 1).

Modiolaria corrugata Stimpson.

Pl. III, figs. 7 a—d.

Modiola discors Gould (*nou* Linné), Rep. Invert. Mass. 1841, p. 130, fig. 84. — *Mytilus corrugata* Stimpson, Shells of New England, 1851, p. 12. — *Modiolaria corrugata* Gould and Binney, Rep. Invert. Mass. 1870, p. 193, fig. 491; Sars, Moll. Reg. Arct. Norv. 1878, p. 30, Pl. 19, fig. 2.

Modiolaria corrugata Mörch, Rink's Grönland, 1857, p. 94; Arctic Manual, 1875, p. 133; Rink's Danish Greenland, 1877, p. 442; Posselt, Medd. om Grönland, XXIII, 1898, p. 23 (partim). — *Modiolaria nigra* Walker (*nou* Gray), Journ. Roy. Dublin Soc., vol. 3, 1860, p. 70.

At **West Greenland** this species is not common according to Posselt. In this I can confirm Posselt and I even believe, that it is more rare than he thought, as he has in several cases confused *Modiolaria nigra* with the present species. Specimens which are certainly *M. corrugata* I have seen in the Copenhagen and Stockholm Zoological Museums from the following West Greenland localities: Fiskevær, 70 fm., shell bottom; Godthaab, 50—60 fm.; Disco, Harungen, 160 fm., clay bottom; Godhavn, 70 fm., clay bottom; Umanak, 12 fm. and 25—35 fm., stony bottom; N.W. of Cape York, 5—12 fm., sand mixed with clay. From each locality there is only one or a couple of specimens. According to Jeffreys 2), the so-called "*Modiolaria nigra*" taken by the "Fox" at Cape York and Port Kennedy belong to this species. — The largest Greenland specimen which I have seen is 15.75 mm. long.

[At **East Greenland** *M. corrugata* is stated to have been taken by the Swedish Exped. of 1900, according to R. Hägg 3); I have had the opportunity of seeing the specimens in question and found, that they were in reality the two varieties *laccigata* Gray and *substriata* Gray of *Modiolaria discors* L. *M. corrugata* has thus not yet been found on the east coast of Greenland].

[On the north side of **Jan Mayen** the Austrian Polar Station is said to have taken 2 specimens, according to Becher 4), but we do not know, whether the determination was correct].

[That *Mod. corrugata* occurs at **Iceland**, as stated by Verkrüzen 5), I consider as more than doubtful; the species is not represented in the systematic collections made from the Danish side. I imagine, that the specimens Verkrüzen obtained at Reykjavik by dredging in July 1872, were *M. discors* var. *substriata*].

Distribution. In addition, we have more or less certain records that *Modiolaria corrugata* lives at Spitzbergen, ca. 3½—63 fm. (Torell, Knipowitsch) and at Finmarken, 20—50 fm. (Sars), in the Kara Sea, 20—78 fm. (Collin), in the Polar Sea of Siberia, 9—12 fm. (Leche), in the Bering Sea, 15—20 fm. (Krause) and on the north-east coast of America down to Cape Hatteras (Dall).

1) Amtl. Bericht über die 24. Versamml. Deutscher Naturf. und Aerzte in Kiel, 1847, p. 222.

2) Scient. Proceed. Roy. Dublin Soc., N. S., II, 1880, p. 128.

3) R. Hägg, Arkiv för Zoologi, Bd. 2, No. 2, 1904, p. 22.

4) Becher, Österr. Polarst. Jan Mayen, III, 1886, p. 69.

5) T. A. Verkrüzen: Dredging-Excursion to Iceland. Ann. Mag. Nat. Hist. 4 ser. Vol. X, 1872, p. 372.

Remarks. Great uncertainty prevails among authors regarding *Modiolaria corrugata*; often it is called a "transitional form" to other arctic species of *Modiolaria*, and especially to *M. discors* L. var. *substriata* Gray ("M. *lævis* Beck"). From a close investigation I have come to the result, that *M. corrugata* is an exceedingly well defined species. *M. corrugata* certainly shows some resemblance in habit to *M. discors* var. *substriata*, but is readily distinguished from this by the middle area being not smooth or simply striated (cf. Pl. III, fig. 5c) but showing under the lens a shagreen-like wrinkling of the surface, as shown in fig. 7d on Pl. III (cf. also Krause: Ein Beitrag zur Kenntniss der Mollusken-Fauna des Beringsmeeres, p. 19)¹⁾. A similar kind of surface is also found, however, in *M. nigra*; but in the latter the posterior, striated area grades evenly over into the middle area, whereas in *M. corrugata* the middle area appears depressed along the boundary line towards the posterior area, as in *M. discors*; further, in *M. corrugata* the radial striation is coarser, the shell more ventricose (cf. measurements of *M. corrugata* with those of *M. nigra*) and with more prominent umbones. In regard to shape, moreover, *M. corrugata* is rather variable, as will be seen from the following measurements of a number of specimens:

Locality	Length of shell	Height of shell	Height Length	Breadth of shell	Breadth Length
Greenland	15.75 mm.	10 mm.	63.5 %	7.5 mm.	47.6 %
—	14.5 -	9.5 -	65.5 -	7.5 -	51.7 -
—	14.25 -	9 -	63.2 -	7.5 -	52.6 -
—	12.3 -	7.75 -	63 -	7 -	56.9 -
—	8 -	5.75 -	71.9 -	4.75 -	59.4 -
Spitzbergen	26.5 -	17 -	64.2 -	11 -	41.5 -
—	24 -	15.75 -	65.6 -	10.25 -	42.7 -
—	22.5 -	14.75 -	65.6 -	10 -	44.4 -
—	18.75 -	12 -	64 -	8 -	42.7 -
—	13.75 -	8.75 -	63.6 -	5.75 -	41.8 -
—	13.25 -	8.8 -	66.4 -	5.75 -	43.4 -
—	13 -	8.75 -	67.3 -	5.5 -	42.3 -
—	8.5 -	6 -	70.6 -	4.75 -	55.9 -
—	8.25 -	5.75 -	69.7 -	4 -	48.5 -
Kara Sea	21.5 -	13 -	60.5 -	9 -	41.9 -

Modiolaria nigra Gray.

Modiola nigra Gray, Parry's first voyage, Suppl. to App., 1824, p. 244. — *Crenella nigra* Torell, Spitzbergens Molluskfauna, 1859, p. 130. — *Modiolaria nigra* Jeffreys, Brit. Conchol. II, 1863, p. 128, Pl. 28, fig. 4; Gould & Binney, Rep. Invert. Mass. 1870, p. 190, fig. 487 (juv.) & 488. *Modiola discrepans* Møller, Ind. Moll. Groenlandiæ, 1842, p. 19. — *Modiolaria striatula* Beck, in Gaimard, Voyage de la Recherche, Pl. 17, figs. 1a—f; Annl. Bericht 24. Versamml. deutsch. Naturf.

¹⁾ Archiv für Naturgeschichte, 1885.

in Kiel, 1847, p. 115. — *Modiolaria nigra* Mörch, Rink's Grönland, 1857, p. 93; Vidensk. Medd. Naturh. Foren. 1867, p. 96; *ibid.* 1868, p. 224; Arctic Manual, 1875, p. 132; Rink's Dan. Greenland, 1877, p. 442; Posselt, Medd. om Grönland, XXIII, 1898, p. 27; Hägg, Ark. för Zool., Bd. 2, No. 2, 1904, p. 26; Jensen, Medd. om Grönland, XXIX, 1909, p. 328.

West Greenland.

The species has been taken at many places from the southernmost part up to Proven ($72^{\circ} 23' \text{ N.L.}$), and it will certainly prove to occur even further north, as it has been taken on the American side right up to $78^{\circ} 45' \text{ N.L.}$ ¹⁾. The depths recorded lie between 10—200 fm. It attains to a very considerable size, up to 62 mm.

Regarding this species H. P. C. Møller writes in a manuscript preserved in the Museum here: "This bivalve is living along the whole coast of Danish West Greenland, but only solitary and where the sea is deep (30—60 fm.) and the bottom is clay. Young individuals are frequently to be met with; the adults on the other hand are rather seldom to be found, because they conceal themselves digging down deep in the clay."

East Greenland.

M. nigra has been taken at 6 localities between Angmagssalik ($65^{\circ} 35' \text{ N.L.}$) and Cape Borlase Warren ($74^{\circ} 20' \text{ N.L.}$), at depths of ca. 3—19 fm. The largest specimen is 45.5 mm. long.

Iceland.

M. nigra has been taken all round the island, at depths of ca. 6—50 fm. The largest specimen is not less than 67 mm. long, but as a general rule only small specimens are taken.

The various localities are shown in the following lists.

East Iceland:

Berufjördr, Djupivogr	6 fm., mud with black sand.	45 spec.
Faskruds fjördr	50—20 - , blue clay.	2 —
Reydarfjördr	44 -	1 —
Seydisfjördr at Skálanes	8—7 -	10 —
Bakkafjördr	ca. 10 -	2 —
—	12—15 - , black sand.	1 —
—	52—43 -	Fragments of a large specimen.
Finna fjördr	18 -	3 spec.

The specimen from Reydarfjördr is 67 mm. long, the specimen from the greatest depth in Bakkafjördr has also been of considerable size, but the others are quite small specimens.

North Iceland:

Thórshöfn	6 fm.	1 valve.
Axarfjördr	22 -	1 —
Öfjord at Svalbardseyri	10—20 -	4 spec.

These are small specimens.

¹⁾ Grieg: Rep. Sec. Norw. Arctic Exped. in the "Fram", No. 20, 1909, p. 9.

West Iceland:

Ritur Huk-Straumnæs	30 fm., in haddock.	2 spec.
Dyrafjördr, inside Thingnæs.	10—12 $\frac{1}{2}$ - , mud and small stones.	1 —
Hvalfjördr.....	24 -	1 —
Faxafjördr, off Kollafjördr.....	10 -	2 spec. & 2 valves.
— , - —	8—11 $\frac{1}{2}$ - , ooze and stones.	1 —
— , ca. 2 miles N. E. of Keflavik	19 $\frac{1}{2}$ 20 $\frac{1}{2}$ - , ooze.	3 —
— , 4.3 miles W. $\frac{3}{4}$ S. of Helgasker Vager.....	25 -	1 valve.

All these are quite small specimens; the largest (from the first locality) are only 12^{mm}. long.

South Iceland:

Medalland Bugt.....	47—37 fm.	5 spec.
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These specimens reach a length of up to 33^{mm}.

The Færoes.

From earlier years we have several specimens of up to 53.5^{mm}. long, but the locality is merely given as "the Færoes". In recent years *M. nigra* has been taken at the following places:

Bordövig	7—10 fm., black sand, small stones, Laminaria.	18 spec.
—	10 - , sand with Laminaria.	5 —
Kongshavn.....	50 -	9 —
Vestmanhavn.....	3 $\frac{1}{2}$ —5 - , fine black sand.	1 —
—	5—6 - , fine black sand.	11 —
Trangisvaagfjord, head of.....	0—1 -	1 fragment.
9 miles E. S. E. of Bispen.....	ca. 70 -	4 spec.

Among the specimens from Kongshavn there are 2 which measure 39.5 and 43.5^{mm}.; the remainder are only small specimens.

The **distribution** is undoubtedly circumpolar; *Modiolaria nigra* has been taken at arctic America (Northumberland Sound and Wellington Channel, Jones Sound and Riee Strait), West and East Greenland and Spitzbergen, in the Kara Sea, Polar Sea of Siberia and Bering Sea; towards the south it reaches to Cape Hatteras, Dogger Bank and western part of the Baltic, Sea of Okotsk and North-West America. — The vertical distribution extends from ca. 3—200 fm.

Variation. *Modiolaria nigra* is subject to no small modification in regard to the form of the shell; as will be seen from the measurements below, the height of the shell in these 17 specimens alone varies from 48.3—58.1% of the length of the shell and the breadth from 29.6—40.8% of the length of the shell.

Locality	Length of shell	Height of shell	Height Length	Breadth of shell	Breadth Length
West Greenland (Nanortalik) . .	{ 46.5 mm.	25 mm.	53.8 %	14.5 mm.	31.2 %
	{ 32.5 -	18 -	55.4 -	11 -	33.8 -
East Greenland (Cape Dalton) . .	{ 40 -	22 -	55 -	14 -	35 -
	{ 35.5 -	19.5 -	54.9 -	14.5 -	40.8 -
	{ 35.5 -	20 -	56.3 -	12.5 -	35.2 -
	{ 34.5 -	18.5 -	53.6 -	12.25 -	35.5 -
— (Turner Sound).	{ 44.5 -	21.5 -	48.3 -	16 -	36 -
	{ 31 -	17 -	54.8 -	10.5 -	33.9 -
Iceland (Reydarfjörðr)	67 -	33.5 -	50 -	20.5 -	30.6 -
The Færoes (Kongshavn)	{ 43.5 -	22.5 -	51.7 -	14 -	32.2 -
	{ 41.5 -	23 -	55.4 -		
	{ 39.5 -	21.5 -	54.4 -	12.5 -	31.6 -
Denmark (Hellebæk)	{ 51.5 -	29 -	56.3 -	16 -	31.1 -
	{ 49 -	26 -	53.1 -	14.5 -	29.6 -
— (Hveen)	42 -	23 -	54.8 -	14.5 -	34.5 -
— (Kattegat)	{ 41 -	21.5 -	52.4 -	14 -	34.1 -
	{ 37 -	21.5 -	58.1 -	11.25 -	30.4 -

Modiolaria faba (Müller) Fabricius¹⁾.

Pl. III, figs. 8a—c.

Mytilus faba Müller, Prodr. Zool. Dan., 1776, p. 250; Fabricius, Fauna groenlandica, 1780, p. 419. — *Modiola arctica* Leach, in Ross, A voyage of discovery, 1819, App. II, p. 62. — *Modiola faba* Møller, Index Moll. Groenlandiæ, 1842, p. 19. — *Modiola fubus* Beck, Amtl. Ber. 24. Versamml. deutsch. Naturf. u. Aerzte in Kiel, 1847, p. 115. — *Crenella decussata* Walker (*non* Montagu), Journ. Roy. Dublin Soc. III, 1860, p. 72. — *Modiolaria faba* Beck, in Gaimard, Voyage de la Recherche, Pl. 17, figs. 4a—i; Packard, Mem. Boston Soc. Nat. Hist. I, 1867, p. 280; Mörch, in Rink, Dan. Greenland, 1877, p. 442²⁾; Dall, Bull. U. S. Nat. Mus., XV, 1879, p. 146. — *Crenella faba* Jeffreys, Sc. Proc. Dublin Soc., N. S., II, 1880, p. 128; Bush, Proc. U. St. Nat. Mus. 1883, p. 244, Pl. 9, fig. 3; Dall, *ibid.*, 1886, p. 207; Pfeffer, Jahrb. Hamb. wiss. Anst., 3. Jahrg., 1886, p. 44. — *Modiolaria faba* Posselt, Medd. om Gronland, XXIII, 1898, p. 22. — *Crenella faba* Grieg, Rep. Sec. Norw. Arct. Exped. in the "Fram", No. 20, 1909, p. 10, Pl. I, fig. 1.

The shell more or less ventricose, somewhat trapezoidal with a faint tendency to be oval, truncate in front, anterior margin rather curved, obliquely rounded posteriorly, ventral margin faintly

¹⁾ Of this little known species I give here a synonymy-list, which is complete, so far as I know; by far the most of references, however, are to *nomina nuda* only. — I think it doubtful whether *M. faba* is a *Modiolaria*, but it seems to me to stand further from the genus *Crenella*, and I retain the species under *Modiolaria*, therefore, to avoid founding a new genus on a single, northern species.

²⁾ Mörch has forgotten to include the species in his earlier lists on the Mollusca of Greenland.

curved, dorsal side rissen in the middle and compressed, with the rather tumid and prominent umbones lying at the front end. The valves fairly thin but strong, with a brownish or yellowish, somewhat iridescent periostracum and provided over the whole with distinct, flatly rounded ribs, which to a number of ca. 50 radiate out from the umbones towards the circumference of the shell and are of the same breadth as or little broader than the intercostal furrows, but broadest towards the anterior end; the circular lines of growth very fine. Interior iridescent, usually pale-reddish or violet, crenulated at the margin; a crenulation of ca. 7 small teeth on the hinge-plate under and in front of the beak. Length up to 17.5 mm.

At **West Greenland** *Modiolaria faba* has been taken as far south as at Ivigtut (61°13' N.L.); it first appears in quantity at Godthaab (64°11' N.L.) and it is common further north, at least up to Melville Bay. It is met with most frequently in shallow water (0—15 fm., more seldom 20—30 fm.) and chiefly on stony, algae-covered clay bottom. — In Umanak Fjord I have found it attached by its byssus to sea-weed, which floated at the surface over very great depths.

Distribution. Elsewhere the species is only known on the American side, namely: Cape Sabine in Smith Sound (78°45' N.L.), 2—5 fm. and Havnefjord in Jones Sound (Grieg), Cumberland Sound on Baffin Land (Dall, Pfeffer), as also from Labrador southwards to 51°33' N.L., 0—15 fm. (Packard, Bush and Dall).

Remarks. The numerous specimens at my disposal from Greenland show, that the form is variable to some extent, sometimes swollen and low, sometimes comparatively flat and high; to make this evident I have taken the measurements of the following specimens:

Length of shell	Height of shell	$\frac{\text{Height}}{\text{Length}}$	Breadth of shell	Breadth Length
10 mm.	7.5 mm.	75 %	6.5 mm.	65 %
9 -	7 -	77.8 -	5.5 -	61.1 -
10 -	8 -	80 -	5 -	50 -
12 -	10 -	66.7 -	5 -	41.7 -

In a manuscript left by the author of the Index Moll. Groenlandiae, H. P. C. Møller, the following information is given regarding the animal: "The mantle is open in front for two-thirds of its extent; the posterior third is closed and forms a short conical tube, broad at the base. The hindmost part of the open mantle may extend a little out over the margin of the shell. The foot, when quite extended, is twice as long as the greatest length of the shell, otherwise quite similar in form to the foot in *M. laevigata*; extended whitish, contracted brownish, in young specimens yellowish."

Møller writes further on *M. faba*: "The colour of the shell is dark chestnut-brown; the quite small specimens are clear lilac; those I have taken here in deep water and in the open sea, were greenish and very light-coloured It occurs on Laminaria in great quantity at Godthaab and further north along the coast; but I have also obtained it at a depth of 30 fm., 8 Danish miles from the coast."

†) Mörch's record of its occurrence at the coasts of Denmark must be based on a mistake, as C. G. Joh. Petersen has already remarked (Om de skalb. Molluskers Udbredningsforhold, 1888, p. 128), as also Beck's statement that it lives at Iceland.

Lastly, I may quote a remark by Iap. Steenstrup¹⁾ with regard to *Modiolaria faba*: "Eben dieselbe Lebensart (i. e. wie *Mod. levigata*, cf. p. 61) muss auch eine andere Muschel aus derselben Abtheilung der Gattung *Modiolus*, nämlich der *Mytilus faba* Fabr. im grönl., führen, denn Prof. Steenstrup hatte mehrere in Spiritus aufbewahrte Exemplare aus Grönland in ähnlichen Byssushüllen gesehen; die Hüllen waren durch äussere Fäden theils an Sertularien- und Corallinen-Zweige geheftet und ganz mit denselben bedeckt, theils waren sie zwischen verschiedenen Ascidien eingewebt, zum Theil selbst von den letztgenannten überwachsen".

Crenella decussata Montagu.

Mytilus decussatus Montagu, Test. Brit. Suppl., 1808, p. 69. — *Crenella decussata* Jeffreys, Brit. Conch. II, 1863, p. 133, Pl. 28, fig. 6; Sars, Moll. Reg. Arct. Norv., 1878, p. 31, Pl. 3, fig. 4. *Modiola? cicerculata* Møller, Ind. Moll. Groenlandiæ, 1842, p. 19. — *Crenella decussata* var. Mörch, Rink's Gronland, 1857, p. 94; Arctic Manual, 1875, p. 133; Rink's Dan. Greenland, 1877, p. 442. — *Crenella decussata* Posselt, Medd. om Gronland, XXIII, 1898, p. 19; Hägg, Ark. f. Zoologi, Bd. 2, Nr. 13, 1905, p. 113; Jensen, Medd. om Gronland, XXIX, 1909, p. 329.

The "Ingolf" has taken this species at:

St. 129.	N. W. of Iceland.....	117 fm.	6.5° C.	1 valve.
- 86.	W. of Iceland (Brede Bugt)...	76 -		4 spec. & numerous valves.
- 87.	- - - - -	110 -		12 - & numerous valves.

The largest of these shells (St. 87) is 3.75^{mm}.

West Greenland.

Here *C. decussata* is common from the southernmost parts up to a least Upernivik (72°47' N. L.). It occurs on clay and sand and among fragments of shells, most frequently at 20—50 fm. but also goes higher up (10 fm.) as well as deeper down (200 fm.). The largest specimens measure 5.5^{mm}. — "It spins, but the threads are so fine, that they can scarcely be seen with the naked eye and even under the lens only in certain directions of the light" (H. P. C. Møller M. S.).

East Greenland.

A single specimen, 4.75^{mm}. high, has been taken on the southern part of the coast at Tiningnekelak (65°56' N. L.); according to Hägg (l. c.) a Swedish Expedition is said to have taken a very small specimen in Franz Josephs Fjord, the outer part of Myskokse Fjord, at 116½ fm.

Iceland.

When Mörch wrote his review of the Mollusca of Iceland he did not himself know *Crenella decussata* from the island, but was only able to report, that Jeffreys had seen a single specimen

¹⁾ Extract in: Annl. Bericht über die 24. Versamml. Deutscher Naturf. u. Aerzte in Kiel, 1847, p. 222.

from there. From recent year's collections, however, *C. decussata* proves to be common all round Iceland at depths of 6—50 fm. The following are the various localities where it has been found.

East Iceland:

Lónsvik.....	40 fm., ooze and clay.	1 spec. & 3 valves.
Oster Horn.....	40 -	4 valves.
Berufjördr, Djupivogr.....	6 -	100 spec. & 16 valves.
— —	6—9 - , mud with black sand.	1 —
Breiddalsvik.....	14 -	6 —
64°58' N.L., 13°25' W.L.....	40 -	4 — & 25 valves.
Vidfjördr.....	8—12 -	70 — & 70 —
—	15 -	5 —
Nordfjördr.....	40 -	2 valves
Seydisfjördr at Skulavig.....	6 -	7 spec.
Bakkafjördr.....	12—15 - , black sand.	10 — & 3 valves.
—	32—25 - , clay and sand with shells.	5 — & 5 —
—	52—43 -	1 — & 2 —
Finnafjördr.....	18 -	1 valve.

The maximum size is 4.75^{mm}.

North Iceland:

Thórshöfn.....	6 fm., mud.	1 valve.
Vidarvik.....	11 -	2 spec. & 3 valves.
—	13 ¹ / ₂ - , black sand.	1 valve.
Axafjördr.....	30 - , sand and stones.	9 valves.
Siglufjördr.....	15 -	3 spec. & 3 valves.
Skagastrand		1 spec.

The largest of these specimens is 3.75^{mm}.

West Iceland:

Isafjardardjup.....	60—63 fm.	1 spec.
Dyrafjördr, inside Thingnæs.....	10—12 ¹ / ₂ - , mud, small stones.	4 valves.
Hvalfjördr.....	24 -	60 spec. & 140 valves.
Krossvik.....	8 - , shell-gravel, blue clay, stones.	11 — & 4 —
Faxafjördr.....	17 - , coarse shell-sand.	1 — & 12 —
— off Kollafjördr.....	8—11 ¹ / ₂ - , ooze and stones.	1 — & 28 —
— - —	10 -	Several hundred spec. & valves.
— mouth of Kollafjördr.....	9 ¹ / ₂ -	24 spec. & ca. 200 valv.

Faxafjördr, mouth of Kollafjördr	9 ¹ / ₂ —11 fm., fine black sand and ooze.	3 spec. & 4 valves.
— Keflavik	15—16 - , fine black sand.	4 — & ca. 150 valv.
— ca. 2 miles N.E. of Keflavik	19 ¹ / ₂ —20 ¹ / ₂ - , ooze.	2 — & - 100 —
— 19 miles W. of Helgasker Vager	13—16 - , shell-gravel, stones & Lamin.	5 — & 8 valves.
— 4.3 miles W. ³ / ₄ S. of Hel- gasker Vager	25 -	ca. 200 valves.
— E. of Videy	9—10 - , fine sand and ooze.	2 spec. & 20 valves.
— 7 miles N. N. E. of Ska- gens Light	17— 20 ¹ / ₂ - , sand and shells.	1 — & 1 valve.
Hafnarfjördr	25 - , fine black sand and ooze.	2 valves.

The maximum size of all these specimens is 4^{mm}.

South Iceland:

Vestmannaeyjar	49 fm., clay with a little mud.	5 spec. & 60 valves.
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The maximum size is 3^{mm}.

The Færoes.

At the time when Möreli prepared his Faunula Moll. Ins. Færoënsium, *Crenella decussata* was still unknown. During the investigations of recent years it has frequently been found at the Færoes, at a depth of ca. 5—50 fm.; the following are the different localities:

Klaksvig	11 fm.	2 spec. & 1 valve.
—	10—15 -	10 — & 160 valves.
Bordövig	7—10 - black sand, small stones, Laminaria.	ca. 300 spec. & numerous valves.
—	10 - , sand with Laminaria.	60 spec.
Ejde	5—6 - , coarse, black sand.	35 — & ca. 100 valv.
Fundingsfjord	12—ca. 20 - , coarse sand & clay.	80 — & - 200 —
Kongshavn	12—16 -	10 — & 60 valves.
—	25—35 -	1 —
—	ca. 50 -	9 — & 160 —
Vestmnanhavn	3 ¹ / ₂ —5 - , fine black sand.	Over 1000 spec.
—	5—6 - , fine black sand.	ca. 200 spec. & a number of valves.
—	10—30 -	1 spec.
Sorvaag	14—16 ¹ / ₂ - , ooze.	1 valve.
Kalbakfjord	40—10 -	3 valves.
Trangisvaag		5 spec.
61°40' N. L., 7°40' W. L.	135 -	1 valve.
9 miles E. S. E. of Bispen	ca. 70 -	1 —

16 miles E. by S. of south point of Nolso	80 fm.	1 spec. & 2 valves.
13 — W. by S. of Munken.	ca. 150 -	12 valves.

The maximum size of all these shells is only 3.5^{mm}.

Distribution. *Crenella decussata* is an arctic and boreal species, ranging in the north to Melville Bay ("Fox"), West and East Greenland, Spitzbergen (Torell and others), Nova Zembla (Leche), Kara Sea (Pfeffer) and Bering Sea (Krause); in the south it reaches to Cape Hatteras (fide Dall, 1889), the British Isles¹⁾, Korea and California. In Danish waters it reaches to the southern Kattegat. The vertical distribution extends from 2—300 fm.; Jeffreys' statement, that it goes down to 1750 fm. probably rests on some mistake.

According to my measurements the species becomes 5.5^{mm}. at Greenland, 4.75^{mm}. at East Iceland, 4^{mm}. at West Iceland and only 3.5^{mm}. at the Færoes. The size thus decrease in the same proportion as the marine climate becomes milder.

Cardiidæ.

Cardium echinatum Linné.

Pl. III, fig. 11 (young).

Cardium echinatum Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1122; Jeffreys, Brit. Conchol. II, 1863, p. 270, Pl. 34, fig. 2.

Cardium (Acanthocardia) echinatum Mörch, Vidensk. Medd. Naturh. Foren. Kbhvn. 1867, p. 93.

[Greenland].

Fabricius mentions²⁾, that he had seen a weathered valve washed up on the beach. Since then no one has found the species at Greenland and there is in fact not the least probability that it lives there.³⁾

Iceland.

The species, which was not known earlier from this island, has in recent years been found at several places on the south-western, southern and south-eastern coasts.

South-West Iceland:

Faxafjördr, off Kollafjördr.	8—11 ¹ / ₂ fm., ooze and stones.	1 spec. & 6 valves.
— — —	10 -	3 — & 50 —
— mouth of Kollafjördr.	9 ¹ / ₂ —11 - , fine black sand and ooze.	3 — & 25 —
— Keflavik	15—16 - , fine black sand.	4 — & 40 —

¹⁾ According to Jeffreys the "Porcupine" has taken *Crenella decussata* on Adventure Bank in the Mediterranean; this statement seems all the more remarkable as the species is not mentioned either by French or Italian malacologists.

²⁾ Fauna groenlandica, 1780, p. 409.

³⁾ Cf. also W. H. Dall in Proc. U. S. Nat. Mus. XXIII, 1900, p. 388: "*Cardium echinatum*, O. Fabricius 1780, from Greenland was doubtless derived from European ballast."

Faxafjördr, ca. 2 miles N. E. of Keflavik.....	19 ¹ / ₂ —20 ¹ / ₂ fm., ooze.	4 spec. & 24 valves.
— , 4.3 miles W. ³ / ₄ S. of Helgasker Vager.....	25 -	13 valves.
— , E. of Videy.....	9—10 - , fine sand and ooze.	4 —
— , 7 miles N. N. E. of Skagens Light.....	17—20 ¹ / ₂ - , sand and shells.	1 valve.
Hafnarfjördr.....	25 - , fine black sand and ooze.	1 spec. & 10 valves.

These are on the whole small shells; the largest is only 40^{mm}. long, and of the specimens containing the soft parts the largest is only 22^{mm}. long.

South Iceland:

Vestmannaeyjar.....		1 spec.
—	49 fm., clay with a little mud.	1 fragment & 2 valves.
S. W. of Eyjafjällajökul.....	17 -	2 spec.
— - —	23 -	15 — & 4 valves.
63°17 ¹ / ₂ ' N.L., 17°39' W.L.....	87 - , sand mixed with ooze.	1 valve.
Medalland Bugt.....	47—37 -	6 valves.

The maximum length of these specimens is likewise small, namely 38^{mm}.

South-East Iceland:

Myre Bugt.....	58 fm., sand mixed with ooze.	3 valves.
64°17.3' N.L., 14°44' W.L.....	45 - , black clay.	1 spec. & 4 valves.
Lónsvik.....	40 - , ooze and clay.	7 — - 2 —

The maximum length of these is also only 40^{mm}.

The Færoes.

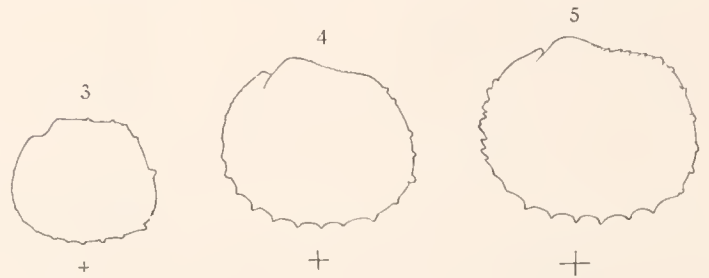
Here the species is common, at depths from ca. 5—80 fm., and reaches a considerable length, namely 57^{mm}. The various places where it has been found are the following:

Viderejde.....	ca. 25 fm.	4 valves.
Klaksvig.....	6—10 -	3 —
Bordövig.....	7—10 - , black sand and small stones.	2 spec. and 6 valves.
—	10 - , sand.	2 —
Ejde.....	5—6 - , coarse black sand.	2 valves.
Fundingsfjord.....	12—ca. 20 - , coarse sand and clay.	2 spec. & 20 valves.
Skaalefjord.....	4—10 -	4 valves.
Kongshavn.....	ca. 50 -	3 —
Vestmahlavn.....	3—14 -	4 —
—	5—6 - , black sand.	7 spec.

Off Sandevaag.		1 spec.
Sörvaag, beach.		7 —
—	14—16½ fm., ooze.	1 —
Kalbakfjord	40—10 -	12 valves.
Thorshavn.		2 spec.
Trangisvaag.		4 —
—	15 -	7 valves.
13 miles S. of Myggenæsholm	ca. 70 -	1 valve.
16 — E. by S. of south point of Nolsö	- 80 -	2 spec.

Distribution. *Cardium echinatum* is distributed along Europe from West Finmarken to Madeira and the Canary Isles, it reaches down to the south-western Kattegat and the Sound (Hveen). Towards the west it extends over the Færoes to the south-eastern, southern and south-western coasts of Iceland. In the Mediterranean, including the Adriatic and Sea of Marmora, a variety (var. *mucronata*) occurs. Its vertical distribution is ca. 5—80 fm.¹⁾

Remarks. The very small specimens of this species are not easy to recognize at first glance; as fig. 3 shows, the antero-dorsal corner forms a sharp angle. During the growth of the shell, however, the distance between the "angle" and the beak becomes reduced (see figs. 4 & 5), so that the earlier, prominent corner now only appears as a tooth close in front of the umbo.



Figs. 3—5. *Cardium echinatum*, very young specimens.
The appended cross indicates the natural size.

Cardium edule Linné.

[Iceland.]

Dr. A. C. Johansen has brought home a left valve of *C. edule* taken on the beach at Heimaey, which is the largest of the Vestmanna Islands at South-Iceland; the valve is thick-shelled and 33.5 mm. long. As the species has not been found elsewhere at Iceland, we must be careful in drawing conclusions from this isolated find; this valve may have been brought to the islands with ballast or in other ways.²⁾

[The Færoes.]

According to Mörch (Vidensk. Medd. Naturhist. Foren. Kbhvn. 1867, p. 93) *C. edule* lives at the Færoes, but from an examination of the specimens from the Færoes labelled "*Cardium edule*"

¹⁾ According to Jeffreys the Porcupine Expedition of 1869 has taken it W. of Ireland down to 183 fm., but it is not stated whether the specimens were living or not.

²⁾ Mohr's *C. edule* (Forsög til en Islands Historie, 1786, p. 128) is identical with *Cardium ciliatum* Fabricius.

by Mörch and preserved in the Museum I have found, that this statement rests on a confusion with *C. fasciatum* Mtg.¹⁾ (cf. p. 79 and figs. 9f, g and h in Pl. III).

The species is thus not known from the Færoes and must be omitted from the fauna list.

Cardium minimum Philippi.

Cardium minimum Philippi, Enum. Moll. Sicil. I, 1836, p. 51; II, 1844, p. 38, Pl. 14, fig. 18. — *Cardium succicum* Lovén, Index Moll. Scand., 1846, p. 36. — *Cardium minimum* Jeffreys, Brit. Conchol. II, 1863, p. 292, Pl. 35, fig. 6.

The "Ingolf" has taken this small species at the following places:

St. 98.	W. of Iceland	138 fm.	5.9° C.	3 spec. & ca. 200 valves.
- 86.	- - - (Brede Bugt)	76 -		1 - & 4 valves.
- 87.	- - - - -	110 -		1 valve.
- 10.	- - -	788 -	3.5° -	2 corresponding valves.
- 8.	S. W. of Iceland	136 -	6° -	3 spec. & 4 valves.
- 85.	- - - - -	170 -		50 - & ca. 100 valves.
- 6.	S. of Iceland	90 -	7° -	10 - & - 75 -

[West Greenland.]

According to Posselt²⁾, there are 5 specimens of *C. minimum* in the Riksmuseum of Stockholm, labelled as taken by the Swedish Expedition of 1871 at Kekertarsuak, which lies at Disko Fjord at 69½° N. L. I have had the opportunity of seeing one of these specimens and can confirm the correctness of the determination; but on taking the general geographical distribution of the species into account, I feel convinced that some change in the label has taken place, and that the specimens in question do not come from Greenland.

Iceland.

The species was not known earlier from Iceland, but in recent years it has been taken (besides at the "Ingolf" stations noted above) at the following places:

63° 15' N. L., 22° 23' W. L.	170—114 fm.	ca. 1000 spec.
63° 18' - 21° 30' -	94 -	10 - & 18 valves.
63° 05' - 20° 7' -	293 -	- 150 - & a number of valves.
Vestmannaeyjar	68 -	5 -
63° 17½' N. L., 17° 39' W. L.	87 -	1 spec. & 4 valves.
		black sand with shells and stones.
63° 42' N. L., 17° 34' W. L.	18—40 -	5 valves.

¹⁾ Has Mörch himself been in doubt as to the correctness of the determination, since he has not included *C. edule* in his summary at the end of his paper, or has he simply forgotten?

²⁾ Medd. om Grønland, XXIII, 1898, p. 60.

Myre Bugt.....	58 fm., sand mixed with ooze.	1 valve.
Lónsvík.....	40 - , ooze and clay.	4 spec. & 9 valves.

C. minimum is thus fairly common and even occurs in considerable numbers off the western and southern coasts of Iceland, at depths of 40—293 fm.¹⁾ The maximum length is 10^{mm}.

The Færoes.

Nor was the species known from here formerly, but in recent years it has been taken at the following places:

Fundingsfjord.....	12—ca. 20 fm., coarse sand and clay.	1 spec.
Vestmanhavn.....	5—6 - , fine, black sand.	1 —
61°40' N. L., 7°40' W. L.....	135 -	1 — & 75 valves.
61°15' — 9°35' —.....	ca. 475 -	ca. 600 spec.
61°7' — 9°30' —.....	440 -	- 400 —
16 miles E. by S. of south point of Nolsö	80 -	1 spec.
Akralejte in N. 57 W., 12 miles.....	150 -	40 — & a number of valves.

The specimen from shallow water (Vestmanhavn, 5—6 fm.) is very small (2^{mm}.); at the other localities the species reaches a length of 7—9^{mm}. Large numbers still occur at a depth of 475 fm.

Distribution. *Cardium minimum* is distributed along Europe from the North Cape to Gibraltar, also in the Mediterranean; through the Kattegat it reaches down to the north coast of Funen and the Sound; over the Færoes it extends to the south and west coast of Iceland. It has been taken at depths of 10—ca. 800 fm.

Cardium fasciatum Montagu.

Pl. III, figs. 9a—k.

Cardium fasciatum Montagu, Test. Brit. Suppl., 1808, p. 30, Pl. 27, fig. 6; Jeffreys, Brit. Conchol. II, 1863, p. 281, Pl. 35, fig. 3.

Cardium fasciatum Mörch, Vidensk. Medd. Naturh. Foren. Kbhvn. 1867, p. 93; *ibid.* 1868, p. 220. —

Cardium edule Mörch (non Linné), *ibid.* 1867, p. 93.

The "Ingolf" has taken this species at:

St. 98. W. of Iceland.....	138 fm.	59° C.	2 valves.
- 86. - - — (Brede Bugt)...	76 -		4 spec. & 80 valves.
- 87. - - — — — ...	110 -		ca. 70 valves.

These valves are up to 11^{mm}.

[West Greenland.]

According to Posselt²⁾ there are 2 specimens of this species in the Riksmuseum of Stockholm, which are stated to have been taken at Julianehaab in southern West Greenland. I feel con-

¹⁾ A single specimen indeed has been taken at a depth of 788 fm. ("Ingolf" St. 10), but it was dead.

²⁾ Medd. om Grønland, XXIII, 1898, p. 60.

vinced, however, for the same reason as that given under the preceding species, that some mistake or other has occurred, and that *C. fasciatum* does not live at all at Greenland.

Iceland.

From the west coast it is present from many localities, and in some cases in fairly large numbers, so that we may say that it is common there; it seems also to be fairly common on the south coast; it occurs in smaller numbers and at comparatively few localities on the north and east coasts, which is also quite natural, as these coasts have a relatively cold marine climate¹⁾. The depths at which the species has been taken lie between ca. 10—120 fm. The maximum length is 15 mm.

The various localities are as follows.

East Iceland:

Myre Bugt.....	26 fm.	2 valves.
Seydisfjördr off Brimnes.....	40 -	1 valve.
Bakkafjördr.....	32—25 -	1 spec.

The largest specimen is 9.5 mm. long.

North Iceland:

Thistil Fjördr.....	50 fm., clay with many stones.	1 valve.
Axarfjördr.....	22 - , mud.	1 —
Skjálfandi Bugt.....	31 - , very fine black sand.	2 spec.
Husavik in E. 4 miles.....	42 -	1 —
Ofjord at Svalbardseyri.....	10—20 -	1 —
Skagastrand Bugt.....	119 - , mud.	1 —
Kollafjördr.....	10 -	1 —
Veidileysa.....	21—25 -	1 —

The largest of these specimens is 12 mm. long.

West Iceland:

Önuundarfjördr.....	10 fm.	7 spec. & 7 valves.
—.....	ca. 12 -	ca. 100 spec.
Dyrafjördr.		7 spec. & 5 valves.
— inside Thingnæs.....	10 ¹ / ₂ —12 ¹ / ₂ - , mud and small stones.	50 — & ca. 300 valv.
Fossfjördr.		1 spec.
Tálknafjördr.		6 —
N. W. of Tálkni.		1 spec. & 3 valves.
Brede Bugt, off Hellissandur.....	20 -	1 valve.
Krossvik.....	8 - , shell-gravel, blue clay, stones.	1 —

¹⁾ It has to be remembered, however, that not so many collections have been made at the other coasts as on the west coast.

Faxafjördr.		12 spec. & 20 valves.
— , —	17 fm., coarse shell-sand.	4 valves.
— , —	14—29 -	2 —
— , off Kollafjördr	8—11 ¹ / ₂ - , ooze and stones.	5 —
— , —	10 -	1 spec. & 34 valves.
— , mouth of Kollafjördr	9 ¹ / ₂ —11 - , fine black sand and ooze.	5 — & 9 —
— , Keflavik	15—16 - , fine black sand.	4 — & 80 —
— , 2 miles N. E. of Keflavik	19 ¹ / ₂ —20 ¹ / ₂ - , ooze.	1 — & 44 —
— , 1 mile W. of Helgasker Vager	13—16 - , shell-gravel, stones.	1 valve.
— , 4.3 miles W. ³ / ₄ S. of Helgasker Vager	25 -	5 spec. & 80 valves.
— , E. of Videy	9—10 - , fine sand and ooze.	2 — & 7 —
— , 7 miles N. N. E. of Skagens Light	17—20 ¹ / ₂ - , sand and shells.	4 valves.
Reykjavik.		3 spec. & 9 valves.
Reykjavik Roads.		1 spec.
Hafnarfjördr	11 ¹ / ₂ -	1 —
—	25 - , fine black sand and ooze.	1 — & 9 valves.
Skagi	21 -	1 —

One of these specimens is 15^{mm}. long, a second 14.5^{mm}. and several are 10—13^{mm}. long.

South Iceland:

Heimaey, beach.		2 valves.
Vestmannaeyjar	30 fm., shell-gravel.	1 spec. & 7 valves.
—	49 - , clay with a little mud.	16 — & 160 —
S. W. of Eyjafjällajökul	15—18 -	1 valve.
63°17 ¹ / ₂ ' N. L., 17°39' W. L.	87 -	1 spec.
63°24' N. L., 17°5' W. L.	70 -	1 —

The largest specimen is 11.5^{mm}.

Færoes.

From these islands we have numerous specimens and valves from many localities, so that it must be considered common both near the coast and out to sea; living specimens have been taken in depths of ca. 5—135 fm. It may attain a considerable size, namely up to 19^{mm}. and is not rarely 14—16^{mm}.; in deep water, however, just as at Iceland, it seems to have a smaller size.

The localities are as follows:

Viderejde	10 fm.	1 valve.
Bordövig	7—10 - , black sand, small stones.	2 valves.
Ejde	5—6 - , coarse black sand.	36 —
Fundingsfjord	12—ca. 20 - , coarse sand and clay.	8 spec. & 42 valves.

Skaalefjord	4—5 fm.	2 valves.
Kongshavn	12—16 - , sand and ooze	14 spec. & 17 valves.
—	25—35 -	1 valve.
—	ca. 50 -	10 spec. & 45 valves.
Vestmanhavn	3 ¹ / ₂ —5 - , fine black sand.	2 — & 3 —
—	5—6 - , — — —	1 — & 2 —
Sörvaag	14—16 ¹ / ₂ - , ooze.	2 — & 9 —
Kollefjord.		1 —
Thorshavn.		2 —
— , outer roads	12—16 -	2 valves.
Nolsö, deep hole at north end	ca. 100 -	2 spec. & 8 valves.
Trangisvaag.		Numerous spec. & —
5 miles N. by E. of Myggenæs east point	50 -	1 valve.
13 — S. of Myggenæsholm	- 70 -	50 valves.
61°40' N. L., 7°40' W. L.	135 -	2 spec. & 11 valves.
6 miles N. by W. of Kalsö	60 -	1 valve.
1 ¹ / ₂ —2 miles off the mouth of Bordövig	20—30 -	1 spec.
16 miles S. of south point of Nolsö	ca. 80 -	5 —
16 — E. by S. of south point of Nolsö	- 80 -	1 — & 4 valves.
Akralejte in N. 57 W., 12 miles	- 150 -	2 valves.
13 miles W. by S. of Munken	- 150 -	40 —

Distribution. *C. fasciatum* is distributed along the whole of Europe, from the western part of the Murman Coast to the Canary Isles and the Eastern Mediterranean; through the Belts it reaches down into the Western Baltic. Towards the west it extends to the Færoes and Iceland. G. O. Sars estimates the vertical distribution to be from 10—180 fm.¹⁾, but at the Færoes it reaches up to 5 fm. (cf. above), according to Sparre Schneider it comes into 3 fm. (at Tromsö) and according to C. G. Joh. Petersen into 2 fm. in the southern Kattegat.

Remarks. *Cardium fasciatum* appears to be a very variable species at Iceland and the Færoes. It occurs in two forms:

a. The shell short, strongly ventricose, with the posterior area sloping quickly downwards and as if abruptly separated from the middle area by a keel (Pl. III, figs. 9a—b).

b. The shell somewhat elongated (especially posteriorly), not much tumid, with the middle area grading without sharp boundary into the posterior area (Pl. III, figs. 9c—d).

Between these extreme forms, however, there are transitions. So far as my experience goes, the tumid variety is usually an oceanic form, whilst the elongated and flat variety is found in fjords; but both may be found together in the latter²⁾.

¹⁾ Jeffreys states, that the "Porcupine" has taken it W. of Ireland at a depth of 808 fm., but as usual without stating whether living specimens or dead shells were found. But the statement itself is perhaps erroneous.

²⁾ Whilst the tumid form is predominant at Iceland and the Færoes, I find the flat form by far the commonest in

The contour changes from the obliquely cordiform or quite triangular (see Pl. III, fig. 9i; just as in *C. exiguum*) to become broadly oval or almost circular.

There is also great variation in regard to the sculpture. Sometimes for example, the ribs may be rough with scales and pointed tubercles not only on the anterior and posterior area, but the middle area may also be partially or wholly beset with scales or tubercles; in this way we obtain a form such as that figured in Pl. III, fig. 9e, the sculpture of which resembles that in *C. nodosum*, but transitions show, that it can be traced back to the common form *C. fasciatum* with smooth, central ribs. In the young, with contour like that of *C. exiguum*, the posterior ribs are beset with very pointed and comparatively long spines.

The ribs are usually quite flat and only separated by a fine line, but very often the interspace between them is somewhat broader, yet never so broad as the ribs themselves. Sometimes, however, the ribs are more or less convex, especially when they are separated by a distinct interspace. Not rarely an intercostal sculpture is seen under the lens in the form of a fine pricking (Pl. III, fig. 9k).

I have further represented (Pl. III, fig. 9f, g and h) that form of *C. fasciatum*, which was confused by Mörch with *C. edule*; the resemblance is striking, indeed, but the pointed tubercles on the posterior ribs (Pl. III, fig. 9h) reveal its true nature — in *C. edule* the rugosities are lamelliform here.

Cardium nodosum Turton.

[Færoes].

To this species Mörch (Vidensk. Medd. Naturh. Foren. Kbhvn. 1867, p. 94) refers 7 specimens from Thorshavn in the Færoes. I have not been able to find these specimens here in the Museum, and as the species is not present in the considerable collections, which have been made at the Færoes in recent years, I think it very doubtful, if the species occurs there. Possibly, an unusually well sculptured form of *C. fasciatum* (cf. above and Pl. III, fig. 9e) has given rise to the confusion.

Cardium ciliatum Fabricius.

Pl. III, fig. 10 (young).

Cardium ciliatum Fabricius, Fauna groenl., 1780, p. 410. — *Cardium islandicum* Chemnitz, Conch. Cab. VI, 1782, p. 200, Pl. 19, fig. 195—96.¹⁾ — *Cardium pubescens* Couthouy, Boston Journ. Nat. Hist. II, 1838, p. 60, Pl. 3, fig. 6 — *Cardium arcticum* Sowerby, Proc. Zool. Soc. 1840, p. 106; Conch. Illustr., 1841, fig. 26. — *Cardium Hayesii* Stimpson, Proc. Acad. Nat. Sc. Philadelphia, 1863, p. 58; Packard, Mem. Boston Soc. Nat. Hist. I, 1867, p. 278, Pl. 7, fig. 14. — *Cardium islandicum* Gould & Binney, Rep. Invert. Mass., 1870, p. 139, fig. 450. — *Cardium ciliatum* Sars, Moll. Reg. Arct. Norv., 1878, p. 46, Pl. 5, fig. 4.

Cardium edule Mohr (non Linné), Forsog til en Islandsk Naturhistorie, 1786, p. 128. — *Cardium islandicum* Møller, Index Moll. Groenl., 1842, p. 20. — *Cardium ciliatum* Mörch, Rink's the material collected from Denmark; it is only among the specimens from the Kattegat that there are some which resemble the ventricose, keeled form from Iceland and the Færoes.

¹⁾ Chemnitz is the author of the name *Cardium islandicum*, not Linné, as the species first occurs in the 13th Ed. of Syst. Nat., pars 6, 1792 (p. 3252) and with a reference to Chemnitz' work of 1782. By erroneously referring the name *C. islandicum* to the 12th Ed. (1767) of Linné's Syst. Nat. (though no *Cardium* of that name occurs there), several older authors have got the present species renamed "*Cardium islandicum* Linné"; this error appears again in Kobelt's Prodr. Faun. Moll. Test. Mar. Eur. (1880).

Greenland, 1857, p. 92; Vidensk. Medd. Naturh. Foren., 1868, p. 220; Arctic Manual, 1875, p. 132; Rink's Dan. Greenland, 1877, p. 441; Posselt, Medd. om Grønland, XIX, 1895, p. 70; *ibid.* XXIII, 1898, p. 57; Hägg, Ark. f. Zoologi, Bd. 2, 1904, No. 2, p. 51; Jensen, Medd. om Grønland, XXIX, 1909, p. 352.

The "Ingolf" has taken this species at:

St. 113.	Norwegian Sea	1309 fm.		1 valve, of a very small spec.
- 104.	— -	957 -		1 small spec., dead but with connected valves.
- 98.	W. of Iceland	138 -	5.9° C.	1 spec. (young).

West Greenland.

Here the species is very common from the southernmost part of the coast at least up to Upernivik; further north, it has been taken in Melville Bay ("Fox"), and on the American side it has been found as far north as at Grinnell Land in Dobbin Bay (79°40' N.L.). It occurs most frequently on clay bottom and in moderate depths (10—80 fm.), but is also found both on hard and quite soft bottom, as also in greater depths (100—280 fm.). The largest specimen is 65^{mm}. long.

East Greenland.

It has been taken here at 5 localities, from Angmagssalik to Mackenzie Bay (65°35'—ca. 73¹/₂° N.L.) and in depths of ca. 10—40 fm. The largest specimen is 62^{mm}. long.

Iceland.

On the north coast *Cardium ciliatum* is very common, as also on the east coast (at least down to Berufjördr¹) and on the north-west coast; on the south-west coast it lives in Hvalfjördr²); on the south coast it has not been found. It keeps especially to clay and sand mixed with clay, but is also found where there is ooze. The depths vary from 6—85 fm., but are most frequently 25—50 fm., the young however being comparatively frequent in more shallow water; on the other hand, the "Ingolf" took a very young specimen (living) at 138 fm. (*cf.* above). The maximum length is 74^{mm}.

The various places where the species was found are as follows.

East Iceland:

Myre Bugt.....	58 fm., sand mixed with ooze.	1 spec.
Lónsvik	40 - , ooze and clay.	4 — & 10 valves.
Berufjördr.....	6 - , mud with black sand.	2 —
— mouth.....	54—41 - , ooze.	27 —
Breiddalsvik	14 - , sand.	3 —
Faskruds fjördr	50—20 - , blue clay.	24 —

¹) On the boundary to the south coast it has been taken in Lónsvik and Myre Bugt, but only as small and dead specimens.

²) It has also been taken at various places out in Faxafjördr (*cf.* the following list), but only as dead specimens and valves.

Reydarfjörðr	48 fm.	1 spec. & 1 valve.
—	50 -	5 —
—	68 -	8 — & 12 valves.
—	74 -	1 — & 1 —
—	86 -	1 —
Outer Reydarfjörðr	68—80 -	2 —
Vidfjörðr	15 -	1 —
Nordfjörðr	40 -	3 valves.
Mjólfjörðr, head of fjord.		1 spec.
Seydisfjörðr	9—5 -	1 —
—	26—50 -	14 —
—	40 - , ooze and clay.	3 —
Mouth of Seydisfjörðr	38—14 - , mud.	23 —
— - - - -	ca. 40 - , stomach of haddock.	9 —
Seydisfjörðr	60—30 -	1 —
— Hánefsstadeyrar	10—2 -	1 —
Lodmundarfjörðr	30—23 - , ooze.	1 —
Bank off Lodmundarfjörðr	38—47 -	1 —
65°42' N. L., 13°57' W. L.	60 -	1 —
Vopnafjörðr	6—12 -	2 —
Bakkafjörðr	7 -	1 —
—	12—15 - , black sand.	12 —
—	20—28 - , clay mixed with sand.	4 —
—	32—25 - , — — — —	7 —
—	20—52 - , — — — —	30 — & 35 valves.
—	52—43 - , — — — —	12 —
Off Midfjörðr	35—50 -	1 —
Finnaafjörðr	18 -	1 valve.

As already mentioned, the specimens from the two southernmost localities are small; from Myre Bugt there is only a very small specimen (1.5^{mm.}), which besides was dead; and from Lónsvik the specimens are likewise dead, though of a fresh appearance and of at most 22.5^{mm.} in length. But from Berufjörðr already the species becomes common, the specimens being up to 50^{mm.} in length. The largest specimen taken on the east coast is 73^{mm.}

North Iceland:

Thistil Fjörðr	10—24 fm., sand and "coral".	1 valve.
— —	27—28 - , sand with mud.	4 spec. & 3 valves.
— —	50 - , clay with many stones.	1 valve.
Thorshöfn	6 -	1 —

Vidarvík	13 ¹ / ₂ fm., black sand.	1 spec. & 3 valves.
Axarfjörðr	22 - , stones and shells.	1 —
—	22 - , mud.	11 —
—	25 - , ooze.	3 spec. & 2 valves.
—	30 - , sand and stones.	5 valves.
Skjálfandi Bugt	21 - , black sand.	4 —
— —	31 - , very fine, black sand.	1 spec.
Húsavík in E. 4 miles	42 -	2 —
— in E. by S.	47—58 -	3 —
Öfjörð.		3 —
— , west side of Oddeyrí	5—9 - From stomach of <i>Hippoglossoides platessoides</i> .	8 —
— , Höfði	6—12 -	1 —
— , at Svalbardseyri	10—20 -	1 —
— , Akureyri	17 -	1 —
— , just S. of Hrísey	18 - , clay.	2 —
— , S. of Hrísey	17—20 - , stones and mud.	1 valve.
Kollafjörðr	5 -	1 spec.
Skagastrand.		2 —

The largest specimen is 74^{mm}. long.

West Iceland:

Skutulsfjörðr	5—13 fm.	1 spec.
Önuundarfjörðr	10 -	2 —
—	ca. 11 -	6 —
—	- 12 -	6 —
Dyrafjörðr.		11 —
— , inside Thingnæs	10 ¹ / ₂ —12 ¹ / ₂ - , mud and small stones.	12 valves.
65°52' N. L., 23°58' W. L.	33 -	1 valve.
Fossfjörðr	44 -	6 spec.
Tálknafjörðr.		4 —
—	ca. 25 -	1 —
N. W. of Tálkni.		1 —
Grundarfjörðr.		1 —
Hvalfjörðr	24 -	20 spec. & 75 valves.
Krossvík	8 - , shell-gravel, blue clay, stones.	1 fragment.
Faxarfjörðr, off Kollafjörðr	8—11 ¹ / ₂ - , ooze and stones.	14 valves.
— , —	10 -	5 spec. & 34 valves.
— , mouth of Kollafjörðr	9 ¹ / ₂ —11 - , fine black sand and ooze.	2 — & 40 —
— , Keflavík	15—16 - , fine black sand.	30 valves.

Faxafjördr, ca. 2 miles N.E. of Keflavik	19½—20½ fm., ooze.	18 valves.
—, 1 mile E. N. E. of Helgasker Vager.....	11½ -	1 spec.
—, 4.3 miles W. ¾ S. of Helgasker Vager.....	25 -	5 valves.
—, E. of Videy.....	9—10 - , fine sand and ooze.	1 spec. & 1 valve.
—, ca. 1½ miles N. W. ¼ N. of Engey Baake.....	19 - , shells and stones.	1 —
Reykjavik.		3 valves.
—, Engey.....	7—8½ - , ooze.	1 spec. & 2 valves.
Hafnarfjördr	25 - , fine black sand and ooze.	1 — & 20 —

From the south-west coast (region of Faxafjördr) only separated valves or dead (empty) specimens are represented, though they often appear quite "fresh", with well-preserved ligament and periostracum; the maximum length is only 53^{mm}. Hvalfjördr is however an exception from what has just been said, as living specimens have been taken there, the largest of which is 14^{mm}. long; a much larger, but dead specimen appears quite "fresh" and the largest of the separated valves is 61^{mm}. long. On the north-west coast the species thrives well and reaches a length of 73^{mm}.

[Færoes.]

A valve has been taken south-west of Syderö (61°9' N.L., 7°54' W.L.) at a depth of 180 fm., but it is quite small (3.75^{mm}.) and looks ancient (fossil). The species does not live at the islands.

Distribution. *Cardium ciliatum* is a high-arctic and circumpolar species, as it occurs, apart from West and East Greenland and northern Iceland, at Spitzbergen, in the Barents Sea, at Nova Zembla and in the Kara Sea, in the Polar Sea of Siberia, Bering Sea, at Sitka and in the Wellington Channel; the southern boundary for its distribution lies at Cape Cod (Dall), East Finmarken (Sars and Friele), northern Japan and Puget Sound (Dall).

Remarks. The shape of this species varies a good deal, as will be seen from the accompanying measurements of 4 specimens from Iceland:

Length	Height	Height Length	Breadth	Breadth Length
73 ^{mm} .	67 ^{mm} .	91.8 %	48 ^{mm} .	65.8 %
72 -	71 -	98.6 -	40 -	55.6 -
71 -	64 -	90.1 -	42.5 -	59.9 -
65 -	58 -	89.2 -	33 -	50.8 -

The very small specimens (see Pl. III, fig. 10) can only be recognized as belonging to this species on comparing them with somewhat larger specimens because the dorsal margin forms an angle with the anterior margin. The young thus obtain some resemblance to those of *C. cchinatum* (cf. p. 73 and Pl. III, fig. 11), but are easily distinguished by the fact, that the radiating ribs are more numerous,

ca. 27 (against ca. 19 in *C. echinatum*) and have a much finer spination; further, the posterior margin rises almost vertically (in *C. echinatum* on the other hand the posterior margin bends forwards).

Cardium elegantulum (Beck) Møller.

Cardium elegantulum (Beck) Møller, Index Moll. Groenl., 1842, p. 20; Gould & Binney, Rep. Invert. Mass., 1870, p. 141, fig. 451; Sars, Moll. Reg. Arct. Norv., 1878, p. 47, Pl. 5, fig. 5.

Cardium elegantulum Möreli, Rink's Gronland, 1857, p. 92; Vidensk. Medd. Naturh. Foren. 1868, p. 220; Arctic Mammal, 1875, p. 132; Rink's Dan. Greenland, 1877, p. 441; Posselt, Medd. om Gronland, XXIII, 1898, p. 56; Jensen, ibid. XXIX, 1909, p. 352; Odhner, Ark. f. Zoologi, Bd. 7, No. 4, 1910, p. 19.

West Greenland.

The species has been taken here at several localities, from Julianehaab (60°43' N.L.) to Upernivik (72°47' N.L.); it keeps mainly to clay bottom and depths of 20–100 fm. It reaches a length of 15 mm.

East Greenland.

The Danish Expedition of 1898–99 took a specimen of 12 mm. in length at 65°39' N.L., namely at Tasiusak, 20–30 fm., stony ground with sparse algal vegetation.

Iceland.

It has only been taken here at some few places and only on the north-eastern part of the island (between Berufjördr on the east coast and Thistil Fjördr on the north coast). The various places are as follows:

East Iceland:

Mouth of Berufjördr	54–41 fm., ooze.	3 spec. & 6 valves.
Off Borgarfjördr	80 -	2 valves.

The largest specimen is 12 mm. long. Odhner (l.c.) also records some few specimens from Berufjördr.

North Iceland:

N. of Lánganes	70 fm.	1 spec.
Thistil Fjördr	50 -	1 valve.

The largest specimen is 9.5 mm. long. Odhner (l.c.) records further a young specimen from Thistil Fjördr, 10–16 fm.

Distribution. *C. elegantulum* is an arctic species, which is found, apart from West and East Greenland and North-East Iceland, only at north-western Norway (to Tromsö) at depths of (10) 15–127 fm. (Sars, Sp.-Schneider, Friele & Grieg)¹⁾. — It has been found as fossil by M. Sars at

¹⁾ Both G. O. Sars and H. J. Posselt give the east coast of N. America as habitat for this species, but this is undoubtedly a mistake; both of these authors have probably assumed that *Cardium elegantulum* is American, because it was included by Gould in his work on the Invertebrates of Massachusetts (l.c.), but Gould does not give any American locality, only Greenland. Nor have I been able to find the species as American in other lists of Packard, Dall, Bush, Whiteaves etc.; thus, it is only mentioned as from Greenland by W. H. Dall in his "Synopsis of the Fam. Cardiidæ and of the North American Species" (Proc. U. St. Nat. Mus. XXIII, 1900, p. 386).

Christiansund in western Norway, by W. C. Brögger at Christiania (in the "younger Arca-clay") and by Knipowitsch at Dwina.

Remarks. Measurements of some specimens show, that the shape is more or less variable:

Length of shell	Height of shell	Breadth of shell
12.5 mm.	11.25 mm.	8 mm.
12.5 -	10 -	8 -
12 -	11.5 -	9.5 -
12 -	9.5 -	7.5 -

[*Cardium norvegicum* Spengler.]

Mörch has shown already (Vidensk. Meddel. Naturh. Foren. Kbhvn. 1867, p. 94), that Jeffreys' reference to this species as *Færoese* (Brit. Conchol. II, 1863, p. 296) is due to a misunderstanding.

Cardium (Serripes) groenlandicum Chemnitz.

Pl. III, figs. 12 a—b (young).

Cardium groenlandicum Chemnitz, Conch. Cab. VI, 1782, p. 202, Pl. 19, fig. 198. — *Cardium boreale* Reeve, Conch. Icon. II, 1844—45, Sp. 131, Pl. 22, fig. 131. — *Cardium fabricii* Deshayes, Proc. Zool. Soc., 1854, p. 333. — *Aphrodite groenlandica* Gould & Binney, Rep. Invert. Mass., 1870, p. 144, fig. 454; Sars, Moll. Reg. Arct. Norv., 1878, p. 49, Pl. 5, fig. 3.

Venus islandica Fabricius (non Linné), Fauna groenl., 1780, p. 411. — *Cardium groenlandicum* Møller, Index Moll. Groenl., 1842, p. 20; Beck, in Gaimard, Voyage de la Recherche, Pl. 15, fig. 1—15; Mörch, Rink's Gronland, 1857, p. 92; Vidensk. Medd. Naturh. Foren., 1868, p. 221 (var. *solida*); Arctic Manual, 1875, p. 132; Rink's Dan. Greenland, 1877, p. 441; Friele, Nyt Mag. f. Naturvidensk., 24 Bd., 1879, p. 222; Becher, Österr. Polarst. Jan Mayen, 1886, III, p. 70; Posselt, Medd. om Gronland, XIX, 1895, p. 70; ibid. XXIII, 1898, p. 55; Jensen, ibid. XXIX, 1909, p. 353; Hägg, Ark. f. Zool., Bd. 2, 1904, No. 2, p. 50.

The "Ingolf" has taken this species at:

St. 113.	Norwegian Sea.....	1309 fm.	A fragment of a left valve.
- 119.	— -	1010 -	A fragment of a right valve.

West Greenland.

The species is one of the commonest Molluscs here, from the southernmost part of the coast at least up to Upernivik; further north it has been taken by the "Fox" in Melville Bay and by the "Fram" on the American side in Rice Strait (78°45' N.L.). It keeps mainly to soft (clay) bottom and to depths of 10—50 fm. It may attain a length of 110 mm.

East Greenland.

It has been taken here at 9 localities, distributed from Angmagssalik to Sabine Island, with depths of ca. 7—25 (40) fm. The largest specimen was 70 mm. long.

Jan Mayen.

The Norwegian North-Atlantic Expedition of 1877 took numerous, small specimens at 10–20 fm., the Austrian Polar Exped. of 1883 17 specimens up to 62^{mm}. long at a depth of 10 fm. The Danish Expedition of 1900 also took several specimens up to 62^{mm}. long, but all empty, at depths of 55 and 50–60 fm.

Iceland.

The species is very common on the north-west, north and east coasts (down to Berufjördr); on the south-west coast it lives at any rate in Hvalfjördr; it has not been found on the south coast. It keeps to soft bottom and depths of ca. (4) 6–60 fm. The largest specimen is 92^{mm}. long.

The various localities are as follows.

East Iceland:

Hornafjördr, beach.		1 spec.
Berufjördr	35–22 fm.	1 —
Djupivogr	6 - , mud with black sand.	9 —
—	10 - , stones.	2 —
Breiddalsvík	14 - , sand.	2 spec. & 3 valves.
Faskruds fjördr	50–20 - , blue clay.	1 spec.
Eskifjördr	20 -	1 —
Vidfjördr	15 -	1 —
Seydisfjördr.		18 —
— , between the bridges on north side of fjord.		1 —
— , Brimnes	4 -	1 —
— , at Skulavík	6 - , black sand.	1 —
—	31–15 -	4 —
—	38–14 - , mud.	1 —
—	20–50 -	1 —
— , mouth	ca. 40 - , stomach of haddock.	1 —
Bank off Lodmundarfjördr	38–47 -	1 —
Vopnafjördr	6 -	2 —
—	6–12 -	1 —
Bakkafjördr	12–15 - , black sand.	7 —
—	32–25 - , clay mixed with sand.	1 valve.
Finnafjördr	18 -	5 spec.

The specimen from the southernmost locality, Hornafjördr, is empty and only 8.5^{mm}. long; but from Berufjördr northwards the species becomes common and reaches a considerable size (maximum length 92^{mm}). The specimen from the shallowest depth, 4 fm. namely, is young (only 15.5^{mm}. long), but already at a depth of 6 fm. the species reaches a length of 89^{mm}.

North Iceland:

Thistil Fjördr	25 fm., sand.	3 spec.
Thorshöfn, 1½ miles from mouth of river	6 - , sand.	1 —
Haganesvik	3½—4 -	2 —
Husavik in E. 4 miles	42 -	4 valves.
— in E. by S.	47—58 -	3 spec.
Ofjord at Svalbardseyri	10—20 -	1 —
— Höfði	16—12 -	3 —
Siglu fjördr	15 -	1 —
Skagafjördr, Miklavatn in Fljótum	5—6 -	1 —

It is due naturally to incomplete collections, that so little of this species is present from the north coast. The specimen from the shallowest depth (4—3½ fm.) is only 28^{mm}. long, but that from a depth of 6 fm. is 86.5^{mm}.

West Iceland:

Lónafjördr	27½—30 fm.	1 spec.
Isafjardardjup	60—63 -	1 —
Arnarnes	5—7 -	2 —
Öxundarfjördr.		2 —
—	ca. 9 -	1 —
—	10 -	6 —
—	- 10 -	35 —
—	- 12 -	3 —
—	12—14 -	7 —
Dyrafjördr.		4 —
— , inside Thingnæs	10—12½ - , mud and small stones.	33 valves.
Fossfjördr	44 -	1 valve.
Talknafjördr.		3 spec.
Patriksfjördr.		1 —
Grundarfjördr.		8 valves.
Olafsvik.		3 —
Hvalfjördr	10—12 -	1 spec. & 3 valves.
—	24 -	10 —
— , Hvammsvik	10—12 - , black ooze.	2 —
— —	11½—12 -	3 —
Faxafjördr, Kollafjördr	8 - , fine sand and mud.	1 —
— , mouth of Kollafjördr	9½ -	7 — & 40 valves.
— , — — —	9½—11 - , fine black sand and ooze.	1 — & 22 —
— , off Kollafjördr	8—11½ - , ooze and stones.	1 — & 30 —

Faxafjördr, off Kollafjördr	10 fm.	ca. 25 spec. & 100 valves.
— , Keflavik	15—16 -	1 — & 2 —
— , ca. 2 mil. N.E. of Keflavik	19 ¹ / ₂ —20 ¹ / ₂ - , ooze.	1 —
— , E. of Videy	9—10 - , fine sand and ooze.	3 —
Reykjavik, Eugey	7—8 ¹ / ₂ - , ooze.	1 fragment of a valve
Hafnarfjördr.		1 valve.
—	25 - , fine black sand and ooze.	1 —

On the northern part of the west coast *C. groenlandicum* is common and reaches the considerable length of 80 mm. As the above list shows, a considerable material has also been collected on the southern part of the west coast (region of Faxafjördr); we might think, therefore, that the species is also common on this part of the coast. It must be emphasized, however, that the living specimens hitherto taken from the bottom of the sea are usually small (2—12 mm. long), and that the separated valves accompanying them most often have an "ancient" appearance and do not reach any great length either (at most 43 mm. long). From this, however, Hvalfjördr, with the Hvammsvik lying on its south side, again forms an exception, as very large specimens have been taken here (up to 79 mm. in length) and containing the animals. The specimen from Keflavik is also of a fairly good size and, though empty, appears rather "fresh".

Distribution. *Cardium groenlandicum* is a high-arctic and circumpolar species; its southern boundary lies in the Atlantic at Cape Cod (Dall) and Varanger Fjord (G. O. Sars)¹⁾ and Porsanger Fjord (Friele), in the Pacific at Hakodate and Puget Sound (Dall).

Remarks. However well-characterized this species may be against all the other northern *Cardiidae*, it nevertheless shows a series of variations.

This is especially evident in quite young specimens. In regard to sculpture some are radially furrowed only on the posterior area, the majority likewise on the anterior area, some even over the whole shell. Some are quite flat, others greatly ventricose and transitions occur. Some are uniformly coloured, whitish, straw-yellow, gray or brownish, others again have dashes of yellowish-red.

Adult specimens vary especially in regard to form. Some are high, short and greatly ventricose, others comparatively elongated and flat, as will appear from the accompanying measurements:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Berufjördr (Iceland)	90 mm.	77 mm.	85.6 %	50 mm.	55.6 %
Jakobshavn (Greenland) . .	85 -	71 -	83.5 -	50 -	58.8 -
Djupivogr (Iceland)	75 -	59.5 -	79.3 -	35 -	46.7 -
Tunugdliarfik (Greenland)	73.5 -	57 -	77.6 -	34 -	46.3 -
Onundarfjördr (Iceland) . .	71 -	59.5 -	83.6 -	37 -	52.1 -
Godhavn (Greenland)	70 -	62 -	88.6 -	42 -	60 -

¹⁾ At this place, however, only small specimens have been taken, according to Sars l. c.

Both Mörch and Posselt have noticed that the species is variable. The former remarks: "The Icelandic specimens are much more thick shelled and elongated than those from Greenland". Posselt modifies the last part of the sentence in the following statement: "The variety *oblonga*, which is the commonest form at Iceland, is met with here and there at South Greenland". So far as I can judge, there is no such connection between the geographical distribution and the outer form of the animal; the variation seems rather individual. In any case, Mörch's statement is erroneous in regard to the first point and greatly exaggerated as to the second.

In Pl. III, fig. 12a I have represented a small specimen of the strongly sculptured, youthful form, which might possibly give rise to difficulty in the determination, if it occurred isolated. Further, for the sake of comparison I give a comparatively smooth specimen (Pl. III, fig. 12b), on which, however, as usual the prodissoconch is strongly sculptured.

Isocardiidæ.

[*Isocardia cor* Linné.]

Posselt has introduced this characteristic Bivalve into the fauna of Greenland. In the Stockholm Museum he found, namely, a fragmentary valve, 70^m. long, taken according to the label by the Swedish Exped. of 1871 at 63°35' N.L., 52°57' W.L. and a depth of 43 fm. "To judge from the discovery of the dead valve, it may be taken as probable, that *Isocardia cor* lives in the Davis Strait", writes Posselt¹⁾.

W. C. Brögger²⁾, on the other hand, has pointed out, that *Isocardia cor*, which is a southern (Lusitanian) form, at the present time to be considered a great rarity on the Norwegian coasts, is certainly extinct at Greenland, and that the fragment mentioned by Posselt must in all probability have belonged to a fossil specimen.

As *I. cor* does not occur at the Færoes, nor at Iceland, which have a much milder marine climate than West Greenland, and as it does not occur at North America either, I also think it quite improbable that it lives on the banks in the Davis Strait.

During a visit to the Stockholm Museum I came to the conviction, that an exchange of label had probably taken place, and that the valve referred to had not been taken at Greenland at all. In any case *Isocardia cor* should be struck out of the Greenland fauna.

Cyprinidæ.

Cyprina islandica Linné.

Venus islandica Linné, Syst. Nat. ed. 12, 1, 2, 1767, p. 1131. — *Cyprina islandica* Jeffreys, Brit.

Conchol. II, 1863, p. 304, Pl. 36, fig. 2; Gould & Binney, Rep. Inv. Mass., 1870, p. 129, fig. 443.

Cyprina islandica Mörch, Rink's Gronland, 1857, p. 92; Vidensk. Medd. Naturh. Foren., 1867, p. 94; ibid. 1868, p. 221; Arctic Manual, 1875, p. 132; Rink's Dan. Greenland, 1877, p. 441; Posselt, Medd. om Gronland, XXIII, 1898, p. 61.

¹⁾ Medd. om Gronland, XXIII, 1898, p. 54.

²⁾ Brögger: Om de sen-glaciale og post-glaciale nivåforandringer i Kristianafeltet, 1900-01, p. 591.

The "Ingolf" has taken this species at:

- | | | |
|---|--------|---|
| St. 86. West Iceland (Brede Bugt) | 76 fm. | A spec. 13 ^{mm} . long and 3 valves of small specimens and fragments of a larger specimen. |
| - 6. S. E. of Iceland | 90 - | A fragment (with sharp edges) of a large specimen. |

[West Greenland].

The Copenhagen Zoological Museum contains:

a. 2 corresponding valves, 43^{mm}. in length, taken according to the label at Jakobshavn by Dr. Rudolph; on this basis *C. islandica* was for the first time recorded as belonging to Greenland in Mörch's list of 1857. The periostracum is preserved; there is no trace of soft parts and the valves bear distinct marks of having lain in a mass of sand mixed with clay.

b. 1 right valve¹⁾, 37^{mm}. long²⁾, taken according to the label by the malacologist H. P. C. Møller (thus about the middle of last century) in "Davis Strait, 7—8 miles from land".

Thus, living specimens are not known from Greenland, and it seems to me inconceivable, that a Bivalve such as *C. islandica* could possibly have escaped attention, if it now lives anywhere at Greenland. In the first place, its size is considerable, so that it is not likely to have been overlooked, as the Danish part of the West Greenland may be said to have been well-investigated, so far as the coastal belt is concerned. Further, we must remember, that *C. islandica* is frequently washed up on the beach, near which it lives; but *C. islandica* is not found either among the large number of washed-up shells, which have been brought home from Greenland.

These facts seem to me to indicate quite definitely, that *C. islandica* does not now live at Greenland; the "dead" shells mentioned above may be taken to have been "subfossil", unless some change of label has taken place in the course of time.

In any case *Cyprina islandica* should be omitted from the Greenland fauna.

Iceland.

The species is to hand in large numbers from the east, north, west and south coasts, so that it is probably common all round the island³⁾. Adult specimens have been taken at depths of 4—30 fm.⁴⁾, the young down to 76 fm. It lives chiefly on sandy bottom or sand mixed with clay, but may also be met with on clay bottom. The maximum length is 105^{mm}.

Færoes.

Here the species is quite common, on sandy bottom or sand mixed with clay, and reaches a length of 110^{mm}. Adult specimens have been taken at depths of 5—50 fm., the young down to 70 fm.

¹⁾ This single valve is erroneously given in Posselt as "2 spec.".

²⁾ It is consequently misleading, when the length is given as 120^{mm}. in Consp. Faunæ groenlandicæ.

³⁾ I omit stating the various places where it has been found, as the material at hand consists for the most part of young and small specimens, whilst adults are rarely brought home, owing to the large space they take up.

⁴⁾ On the south and south-east coasts, however, large empty shells have been taken at several places at greater depths, down to 90 fm.

Distribution. On the North American side *Cyprina islandica* occurs from Cape Hatteras to the Newfoundland Bank and the southern part of the Gulf of St. Lawrence¹⁾. On the European side it is distributed from the south-west of France (Arcachon) to the Murman Coast and White Sea²⁾; towards the west it reaches over the Færoes to Iceland; from the Kattegat it reaches into the Sound and through the Belts down into the south-western Baltic³⁾. *Cyprina islandica* is consequently, as I have already more fully shown on an earlier occasion⁴⁾, a distinctly boreal form, a result that Prof. Brögger has also come to from a consideration of its late immigration into southern Norway⁵⁾. The vertical distribution is ca. 4—50 fm., but the young may be met with in greater depths⁶⁾.

In geologically very late (postglacial) deposits it has been found as far north as at Spitzbergen, which indicates that the climate of that time was somewhat milder than it is now⁷⁾.

Remarks. Gould & Binney write regarding *Cyprina islandica* (op. cit. p. 131): "It is subject to very little variety". This does not agree with the experience I have gained on going through a number of specimens from Iceland and the Færoes. I find, that the three dimensions of the shell may vary considerably, as will be seen from the measurements given below.

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Reykjavik.....	105 mm.	93 mm.	88.6 %	61.5 mm.	58.6 %
Vestmanhavn	104.5 -	89 -	85.2 -	51 -	48.8 -
Keflavik	102.5 -	83.5 -	81.5 -	58 -	56.6 -
Seydisfjördr	102 -	78 -	76.5 -	51 -	50 -
Reykjavik.....	99 -	82 -	82.8 -	57 -	55.8 -
Onundarfjördr	98.5 -	82 -	83.2 -	50 -	50.8 -
Vidarvik	93 -	88 -	94.6 -	52 -	55.9 -

1) Posselt (l.c.) gives it from Labrador and Packard as his authority, but it is not mentioned in the latter's "View of the recent Invertebrate Fauna of Labrador" (Mem. Boston Soc. Nat. Hist. vol. I, Part II, 1867, p. 262), nor in the later lists of the Molluscan fauna of Labrador by W. H. Dall and Katharine Bush. The northern boundary for its occurrence at N. America is fixed, I find by the following statement of Whiteaves: "Although recorded by Fabricius as a Greenland shell, this species has not yet been found in the Gulf of St. Lawrence, north of the Baie des Chaleurs" (Catal. of the Marine Invertebrata of Eastern Canada, p. 130; Geol. Survey of Canada, 1901). W. is not right however in his reference to Fabricius' *Venus islandica* (Fauna groenlandica, 1780, p. 411), as this is obviously not identical with Linné's *Venus (Cyprina) islandica*, but with *Cardium (Serripes) groenlandicum* Chemnitz.

2) Cattie states, that it has also been taken in the eastern (the "cold") part of the Murman Sea (Les Lamellibranches du "Willem Barents". Bijdragen tot de Dierkunde, 1886), but Knipowitsch has never found it there (Zur Kenntniss der geol. Gesch. der Fauna des Weissen und des Murman-Meeress, p. 24. Verhandl. Kais. Russ. Mineral. Gesellschaft. St. Petersburg. 2. Ser., Bd. XXXVIII, No. 1), so that it must be in any case extremely rare.

3) In his lists showing the distribution of the Mollusca taken by the Swedish Expeditions of 1875 and 1876, Leche has given *C. islandica* as occurring in the Bering Sea (K. Sv. Vet.-Akad. Handl. Bd. 16, No. 2, 1878, p. 81), and this statement appears again in Posselt (l.c.); some mistake in writing or printing must have crept in here, as the species is not mentioned in any of the lists published by Dall, Crosse, Edg. Smith or Krause on the Mollusca of the Bering Sea.

4) Ad. S. Jensen: Studier over nordiske Mollusker. II. *Cyprina islandica*. Vidensk. Medd. naturh. Foren. Kbhvn., 1902, p. 33.

5) Brögger: Om de sen-glaciale og post-glaciale nivåforandringer i Kristianiafeltet, 1900—01, p. 573.

6) A. C. Johansen has shown, that small (young) specimens can be met with even in the abyssal region, as Jeffreys' statement of the occurrence of *C. islandica* W. of Ireland down to 1215 fm. refers to quite small individuals (Vid. Medd. Naturh. Foren. Kbhvn., 1901, p. 44).

7) Cf. my paper on *Cyprina islandica* l.c. and Jensen & Harder in: "Postglaziale Klimaveränderungen, Stockholm 1910, p. 400.

Astartidæ.

Astarte borealis Chemnitz.

Pl. IV, figs. 1a—f.

Venus borealis Chemnitz (partim), Couch. Cab. VII, 1784, p. 26, Pl. 39, fig. 412 (non figs. 413—414¹). — *Tridonta borealis* Sars, Moll. Reg. Arct. Norv., 1878, p. 50, Pl. 5, fig. 8²).

Astarte arctica Møller, Index Moll. Groenl., 1842, p. 19. — *Astarte semisulcata* Mörch, Rink's Greenland, 1857, p. 92; Vidensk. Medd. Naturh. Foren., 1867, p. 95; *ibid.* 1868, p. 222; Arctic Manual, 1875, p. 132; Rink's Dan. Greenland, 1877, p. 441. — *Astarte borealis* Posselt, Medd. om Gronland, XIX, 1895, p. 71, Pl. I, figs. 8—12 (var. *sericca* Poss.); *ibid.* XXIII, 1898, p. 61; Jensen, *ibid.* XXIX, 1909, p. 335.

The "Ingolf" has taken this species at:

St. 33.	Davis Strait.....	35 fm.	1 living, 1 dead spec. and 1 valve.
- 35.	— —	362 -	1 valve of a young spec.
- 86.	W. of Iceland	76 -	8 valves of young spec.
- 124.	N. - —	495 -	1 valve.
- 125.	- - —	729 -	1 —
- 110.	N. E. of —	781 -	4 valves (corresponding).
- 120.	— - —	885 -	4 — —
- 116.	S. of Jan Mayen.....	371 -	4 — —
- 117.	- - - —	1003 -	1 valve.
- 113.	- - - —	1309 -	1 —

West Greenland.

A. borealis is common along the Danish part of the coast; further north, it is found at Port Foulke on Smith Sound (Hayes), on the American side even at Dumbbell Harbour at 82°30' N.L. ("Alert & Discovery"); the bottom-soil is mud, sand and clay. The depths recorded lie between 5—50 fm.³). The maximum length is 44^{mm}.

East Greenland.

Here the species has been taken by Danish, Swedish and German Expeditions at quite a dozen places on the stretch from Angmagssalik to Shannon Island (ca. 65°30'—75°30' N.L.), in depths of 3—40 fm. The maximum length is 44^{mm}.

¹) Fig. 413 obviously represents *Astarte crenata* Gray, fig. 414 *A. sulcata* d. C.

²) A fairly detailed synonymy-list for this species of many names is given by Kobelt: Prodr. Moll. Test. Mar. Europ., 1888, p. 394.

³) As will be seen, the species is certainly taken in the Davis Strait at the considerable depth of 362 fm., but as the shell in question is of a young specimen, the occurrence cannot be considered as normal.

Jan Mayen.

A. borealis has been taken here by the Norwegian North-Atlantic Expedition at 10–15 fm. (Friele), the Austrian Expedition at 65–90 fm. (Becher, sub. nom. *A. borealis* Ch. and *A. producta* Sow.) and the Danish Expedition of 1900 at 15 and 50 fm.

Iceland.

On the west coast a large number of specimens have been taken at many localities, so that the species must be common here. From the north coast and especially from the east coast, on the other hand, we have *A. borealis* only from a few places and it would thus seem to be comparatively rare in these parts of Iceland. — It occurs on sand, clay and mixed bottom-soil; the depths recorded for living specimens lie between 3 and 31 fm. The maximum length is 47^{mm}.¹⁾

The various localities are as follows.

East Iceland:

Berufjördr, Djupivogr	10 fm.	2 valves.
Seydisfjördr, at Skulavig	6 - , black sand.	1 spec.
Lodmundarfjördr	ca. 20 - , from stomach of haddock.	1 —
Gunnólfsvik.		7 valves.

These few occurrences might indicate, as mentioned, that *A. borealis* is comparatively rare on the east coast; and we can hardly consider it due to chance, that this species especially has not been taken by the collectors, when a species of similar size and occurrence such as *A. elliptica* is to hand from the east coast in large numbers and from rather many localities (cf. p. 109).

On referring to Dr. A. C. Johansen, who has explored the coasts of Iceland, this zoologist has kindly given me the following information, which agrees well with what has been said above: "In my notes from Iceland I find *Astarte borealis* recorded from the beach at Seydisfjördr, but not from Bakkafjördr, Berufjördr or Hamarsfjördr. As I have noted it from the beach on the south-west and west coasts, from Vestmannaeyjar, Reykjavik, Stykkisholmur and Arnarfjördr, this would indicate, that it is commoner on the shores of the south-west and west coasts than those of the east coast".

It may however be added, at the same time, that Nils Odhner, who has only had a relatively small material at his disposal for his paper: "Marine Mollusca of Iceland"²⁾ is able, nevertheless, to record *A. borealis* from a locality on the east coast, namely:

Berufjördr	9–30 fm.	Many spec.
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The largest of our specimens is 44^{mm}. long, of Dr. Odhner's 46^{mm}.

North Iceland:

Thistil Fjördr	10–24 fm., sand and "coral".	5 spec.
Vidarvik	13 ^{1/2} - , black sand.	6 spec. & 5 valves.

¹⁾ Some separate valves, which are only labelled "Iceland", reach however a much larger size, namely 52–56^{mm}.

²⁾ Arkiv för Zoologi, Bd. 7, 1910, No. 4.

Axarfjörðr	30 fm., sand and stones.	1 spec.
Skjálfandi Bugt.	31 - , fine black sand.	1 —
Husavík	7 ¹ / ₂ —10 -	1 valve.
Öfjörð		1 —
Skagastrand		1 —

Odhner l. c. records it as taken at:

Raufarhöfn	30 fm.	Many spec.
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The largest of the specimens to hand is 40^{mm}. long.

The same almost may be said regarding this part of the coast as about East Iceland; we might have expected to find *A. borealis* very common on the north coast, and it is thus remarkable that there is so little material from there.

West Iceland:

Höfnvík	10 fm.	3 spec.
Adalvík.	5 ¹ / ₂ —9 -	2 —
Hesteyrarfjörðr.	15—17 ¹ / ₂ -	5 valves.
Isafjörðr		3 spec. & 1 valve.
— , beach.		1 — & 1 —
Skutilsfjörðr		1 spec.
—	5—13 -	1 —
Önundarfjörðr.	ca. 9 -	2 —
Dyrafjörðr		3 —
— , inside Thingnæs.	10—12 ¹ / ₂ - , mud and small stones.	4 valves.
65°56' N. L., 24°30' W. L.	37 -	2 —
Arnarfjörðr, beach.		2 —
Talknafjörðr		2 spec.
65°32' N. L., 24°38' W. L.	22 - , stones.	3 —
Stykkisholmr, beach.		1 valve.
Grundarfjörðr		1 spec. & 1 valve.
Olafsvík		1 —
Hvalfjörðr	5—13 -	1 valve.
—	24 -	1 —
Krossvík.	8 - , shell-gravel, blue clay, stones.	5 spec. & 20 valves.
Faxafjörðr	15—16 - , fine black sand.	1 — & 2 —
—	17 - , coarse sand.	2 — & 14 —
—	14—29 -	3 valves.
—	25 -	1 valve.
— , mouth of Kollafjörðr.	9 ¹ / ₂ —11 - , fine black sand and ooze.	4 spec. & 17 valves.
— , off Kollafjörðr.	8—11 ¹ / ₂ - , ooze and stones.	6 — & 9 —

Faxafjördr, 1 mile E. N. E. of Helgasker	11 $\frac{1}{2}$ fm.	1 spec.
— , 1 — W. of Helgasker . . .	13—16 - , shell-gravel and stones.	10 valves.
— , 7 miles N. N. E. of Skagens Light	17—20 $\frac{1}{2}$ - , sand and shells.	1 spec. & 10 valves.
Reykjavik		1 —
— , beach.		1 —
—	8 -	1 — & 3 —
— (Engey)	7—8 $\frac{1}{2}$ - , ooze.	1 —
Hafnarfjördr		3 —
—	3—4 - , ooze.	1 —

The largest specimen is 47^{mm}. long.

South Iceland:

Vestmannaeyjar, beach.		5 spec.
— , harbour	$\frac{1}{2}$ —0 fm.	7 —
—	30 - , gravel.	3 — & 3 valves.
—	49 - , clay with a little mud.	1 valve.
— , Heimaey, beach.		3 spec. & 23 —
63°21' N.L., 17°31' W.L.	69 - , black sand.	1 valve.
63°21' — 17°15' —	58 - , sand, stones, shell-gravel.	1 —
63°42' — 16°32' —	29 -	3 spec.

The largest specimen is 39^{mm}. long.

[The Færoes.]

Landt records "*Venus borealis*" as "taken at the bottom of Vestmanhavni Fjord"¹⁾, and Mörch states, that a very large specimen of *Astarte semisulcata* Leach was received from the pastor P. Holm, who had collected at the Færoes²⁾. As *A. borealis* has not been found however during the extensive investigations of recent years, these records probably are mistakes, and I believe myself entitled to remove *A. borealis* from the fauna of the Færoes, unless certain records are forthcoming.

Remarks. At Iceland and Greenland *Astarte borealis* is very variable, both in regard to form and sculpture of the shell and the structure of the periostracum.

Periostracum. On the Icelandic specimens the periostracum may form a thin layer, smooth or finely fibrous towards the margin, or it may be somewhat thicker and as if frayed; the smooth periostracum is most frequently fairly light-coloured, yellowish-brown and somewhat glistening, the fibrous kind is darker, brown or almost quite black.

In the West Greenland specimens the periostracum varies in the same way.

In all my specimens from East Greenland the periostracum is brown to swarthy, thick and bast-like.

¹⁾ Landt: Forsøg til en Beskrivelse over Færøerne, 1800, p. 289.

²⁾ Mörch l. c. 1868, p. 95.

It seems as if the periostracum were thickest and most frayed in arctic specimens, as this characteristic is seen not only in the specimens from East Greenland (and in part those from West Greenland [and Iceland]), but also in (my) specimens from Spitzbergen and the Kara Sea¹).

Sculpture. The shell may be, apart from the fine lines of growth, quite smooth or more or less distinctly folded, at the umbones only or more or less far down on the shell. The folds sometimes appear as fine and dense, sometimes coarser ribs with wider intervals, and these ribs may sometimes in the adult specimens reach at least halfway down on the shell.

Form. At Iceland the form is relatively high and more or less convex, as will be seen from the following measurements:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Vestmannaeyjar	44 mm.	38 mm.	86.4 %	17 mm.	38.6 %
Reykjavik	43 -	36.2 -	84.2 -	17.75 -	41.3 -
—	42 -	34 -	81 -	15.5 -	36.9 -
—	38 -	33.5 -	88.2 -	17 -	44.7 -
Faxafjördr	37 -	32.25 -	87.2 -	14.25 -	38.5 -
—	36.5 -	32.5 -	89 -	16 -	43.8 -
—	34.75 -	29 -	83.5 -	16.5 -	47.6 -
Seydisfjördr	44.25 -	34.25 -	77.4 -	20.25 -	45.8 -

At West Greenland similar forms occur, but here also — though apparently not very frequently along the more southern (Danish) part of the coast — we find a greatly compressed form (var. *placenta* Mörch²) = *Astarte Richardsoni* Reeve³), of which I may give the following measurements as example:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
West Greenland	39 mm.	31 mm.	79.5 %	12.25 mm.	31.4 %

At East Greenland we find more or less compressed, often strikingly elongated forms⁴) as will be seen from the following measurements:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Turner Sound	44 mm.	35 mm.	79.5 %	18 mm.	40.9 %
— —	40 -	30 -	75 -	14.25 -	35.6 -
Tasiusak	32.5 -	27.2 -	83.7 -	13 -	40 -
—	29 -	24.5 -	84.5 -	10.5 -	36.2 -
Hekla Havn	29 -	21.5 -	74.1 -	9.5 -	32.8 -
Forsblads Fjord	27 -	20 -	74.1 -	8.25 -	30.6 -

¹) C. G. Joh. Petersen's statement regarding *A. borealis* in Danish waters seems to me of interest in this connection: "the epidermis is here (i. e. in specimens from the Belts and Baltic) much more frayed than in the Kattegat specimens" (Det vidensk. Udbytte af Kanonbaaden Hauch's Togter, 1893, p. 75). Compare also in this connection A. Krogh: "The tension of carbonic acid affecting the structure and preservation of molluscan shells"; Medd. om Grønland, XXVI, 1904, p. 387.

²) Mörch: Catal. des Moll. du Spitzberg. Mém. Soc. Malacol. Belgique, T. IV, 1869, p. 22.

³) Reeve in Belcher: The last of the Arctic Voyages, II, 1855, p. 397, Pl. 33, fig. 7.

⁴) For such specimens Posselt (l. c.) has set up a special variety, *sericea*, on account of the elongated form of the shell, the thick epidermis and its silk-like sheen; in my opinion it cannot be kept separate from the variety *placenta* Mörch.

The following figures on Pl. IV may serve as illustrations of the above-mentioned, varying form and structure in *Astarte borealis*:

Fig. 1a represents a specimen without folds and with an almost smooth (fibrous only at the margin), fairly light-coloured periostracum. The shell is rather convex, as is seen from fig. 1b. Western Iceland.

Fig. 1c represents a very high form, with quite narrow folds on the uppermost part of the shell and with fairly thick, fibrous periostracum on the lowest part. Western Iceland.

Figs. 1d and 1e represent a strongly compressed form (var. *placenta* Mörch) with distinct folds on the uppermost part of the shell. Western Greenland.

Fig. 1f represents a very elongated form (var. *sericca* Posselt). East Greenland.

Distribution. *Astarte borealis* is an arctic and circumpolar species. In Norway it is said not to live south of Bergen¹⁾, nor has it been taken living in the Skagerak or Northern Kattegat; but after this break in its distribution it appears again in the south-western Kattegat and reaches through the Sound and Belts, increasing in numbers but decreasing in size, down into Kiel Bay and thence south of Lolland to a little east of Bornholm (C. G. Joh. Petersen). It is said to occur in the middle of the North Sea²⁾, but empty shells only have been found at Scotland, the Hebrides and Shetland. On the American side the southern boundary lies at New England, in the Pacific at Alaska, the Aleutians and Kamtschatka. — Its bathymetric distribution is 3—260 fm.³⁾

Astarte Montagu Dillwyn.

Pl. IV, figs. 2 a—c.

Venus compressa (non Linné) Montagu, Test. Brit. Suppl., 1808, p. 43, Pl. 26, fig. 1; (*Astarte*) Forbes & Hanley, Hist. Brit. Moll., I, 1853, p. 464, Pl. 30, fig. 1; Jeffreys, Brit. Conchol., II, 1863, Pl. 37, fig. 3. — *Venus Montagu* Dillwyn, Descript. Catal. Recent Shells, I, 1817, p. 167. — *Nicania Banksii* Leach, Ross' Voyage of Discovery, 1819, Append. p. 62; Sars, Moll. Reg. Arct. Norv., 1878, p. 51, Pl. 6, fig. 1. — *Nicania striata* Leach, l. c. p. 62. — *Astarte globosa* Møller, Index Moll. Groenl., 1842, p. 19; Reeve, Belcher's Last of the Arctic Voyages, 1855, p. 398, Pl. 33, fig. 6. — *Astarte Warhami* Hancock, Ann. Mag. Nat. Hist., vol. 18, 1846, p. 336, Pl. 5, fig. 15—16. — *Astarte pulchella* Jonas, Philippi, Abbild. u. Beschreib. neuer Conchyl., II, 1847, p. 60, Pl. 1, fig. 12. — *Astarte fabula* Reeve, l. c. p. 398, Pl. 33, fig. 5⁴⁾.

Astarte Banksii Møller, Index Moll. Groenl., 1842, p. 19; Mörch, Rink's Gronland, 1857, p. 20; Vidensk. Medd. Naturh. Foren. 1868, p. 223; Arctic Manual, 1875, p. 132; Rink's Dan. Greenland, 1877, p. 441; Posselt, Medd. om Gronland, XIX, 1895, p. 73, Pl. 1, figs. 1—4; *ibid.* XXIII, 1898, p. 68;

¹⁾ C. G. Joh. Petersen's reference to it as living in Christiania Fjord (Om de skalbærende Molluskers Udbredningsforhold, 1888, p. 46) is based on a mistake, caused by Asbjørnsen; Brøgger has explained (Om de senglaciale og post-glaciale nivåforandringer i Kristianiafeltet, 1900—01, p. 581), that Asbjørnsen's "*A. semisulcata*" was not *A. borealis* but a form of *A. elliptica*.

²⁾ Schrader: Lamellibranchiaten der Nordsee (Inaug.-Dissert.), 1910, p. 43.

³⁾ As a rule the boundary is placed at a depth of ca. 60 fm., but greater depths — down to 260 fm. — are recorded by Friele & Grieg (Norw. North-Atlantic Exped., Mollusca III, 1901, p. 24) from Spitzbergen.

⁴⁾ For further references to the extensive synonymy see Kobelt: Prodr. Moll. Test. Mar. Europ., 1888, p. 395, under *Astarte Banksii* Leach.

Jensen, *ibid.*, XXIX, 1909, p. 333. — *Astarte striata* Møller l. c., p. 20; Mörch l. c. 1857, p. 20; 1875, p. 132; 1877, p. 441. — *Astarte pulchella* Mörch, l. c. 1857, p. 20; 1875, p. 132; 1877, p. 441. — *Astarte Montaguï* Mörch, Vidensk. Medd. Naturh. Foren. 1867, p. 95; *ibid.* 1868, p. 223.

The "Ingolf" has taken *A. Montaguï* at the following places:

St. 35.	Davis Strait.....	362 fm.	1 valve.
- 33.	- - - - -	35 -	2 valves.
- 86.	W. of Iceland (Brede Bugt)....	76 -	30 -
- 87.	- - - - -	110 -	2 -
- 104.	N. E. of Iceland.....	957 -	4 -
- 113.	S. E. of Jan Mayen.....	1309 -	5 -

Remarks. In the figures 2a—c on Pl. IV I have compared 3 specimens, which seem to me to illustrate the main types of this very variable species within the faunistic region dealt with here.

Fig. 2a represents *A. Montaguï* Dillw. *typica*, a short and high, somewhat triangular form; the anterior end is a little elongated-rounded, the posterior end shorter, strongly sloping downwards, truncate; the umbones lie a little behind the middle of the shell.

Fig. 2b represents *A. Montaguï* Dillw. var. *striata* (Leach) Sars, a more elongated form, which stands midway between the foregoing and the following.

Fig. 2c represents *A. Montaguï* Dillw. var. *Warhami* Hancock, the shell of which is elongated, elliptical, in general rounded both in front and behind; the umbones lie almost in the middle of the shell.

The measurements of the three specimens, which I have chosen as types, are as follows:

	Length	Height	Height Length	Breadth	Breadth Length
<i>A. Montaguï typica</i>	14 mm.	13 mm.	92.9 %	7.5 mm.	53.6 %
- — var. <i>striata</i>	15 -	13 -	86.7 -	8 -	53.3 -
- — - <i>Warhami</i> ...	22 -	16.75 -	76.1 -	9.5 -	43.2 -

These three forms are not at all sharply separated, however; all transitions may occur. In discussing the separate geographical regions further opportunity will be taken to mention the variability of this species.

West Greenland.

Here the species is common, from the southernmost parts up to Cape York; on the American side it has been taken as far north as 80° N.L. It occurs most frequently at depths of 5—50 fm., but is also met with at greater depths.

At West Greenland the variety *striata* is by far the most predominant, and along with it occurs rather frequently the variety *globosa* Møller, which is characterized by an extremely tumid form; the typical form and the variety *Warhami* are comparatively rare. At the same time it must be remembered, however, that all possible transitional stages exist between the forms mentioned.

The maximum length is 23 mm.

The measurements of some specimens will illustrate the form-relation among the varieties mentioned.

A. Montagui typica:

Length	Height	Height Length	Breadth	Breadth Length
20 mm.	18.5 mm.	92.5 %	11.5 mm.	57.5 %
16 -	15 -	93.7 -	9.25 -	57.8 -
15 -	14 -	93.3 -	9 -	60 -
14 -	13 -	92.9 -	8.25 -	58.9 -
12.8 -	12 -	93.8 -	7.25 -	56.6 -

A. Montagui var. globosa:

17 -	15 -	88.2 -	11 -	64.7 -
14.5 -	12.75 -	85.2 -	9.5 -	65.5 -
11.8 -	11.5 -	97.5 -	8.2 -	69.5 -
11.5 -	10.5 -	91.3 -	7.2 -	62.6 -
11.5 -	11.25 -	97.8 -	8 -	69.6 -
10.5 -	10.25 -	97.6 -	7.25 -	69 -

A. Montagui var. striata:

23 -	19.75 -	85.9 -	12 -	52.2 -
19.8 -	16.75 -	84.6 -		
19 -	16.5 -	86.8 -	9.5 -	50 -
18.5 -	16 -	86.5 -	9.25 -	50 -
17 -	14.75 -	86.8 -	8.5 -	50 -
15 -	13 -	86.7 -	8 -	53.3 -

A. Montagui var. Warhami:

19 -	15 -	78.9 -	9.25 -	48.4 -
17.75 -	14 -	78.9 -	9 -	50.7 -
14.5 -	11.25 -	77.6 -	7 -	48.3 -
12.75 -	9.75 -	76.5 -	6.5 -	51 -

East Greenland.

Here *A. Montagui* has been taken at 15 localities between Angmagssalik and Sabine Island (65°40'—74°32' N.L.), at depths of 3—50 fm. The largest specimen is 24.2 mm. long.

The majority of the specimens at hand belong to the variety *Warhami*, in a form which is generally rather compressed but is sometimes rather tumid; the variation in this regard will be seen from the accompanying measurements.

A. Montagu var. *Warhami*:

Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
24.2 mm.	18.5 mm.	76.4 ‰	8.25 mm.	34.1 ‰
23.5 -	16.5 -	70.4 -	8.5 -	36.2 -
23 -	18 -	77.8 -	9.75 -	42.2 -
22.5 -	18 -	80 -	12 -	53.3 -
22 -	17.25 -	78.4 -	8.75 -	39.8 -
22 -	16.75 -	76.1 -	9.5 -	43.2 -
20.5 -	15.75 -	76.8 -	8.5 -	41.5 -
20.5 -	15.5 -	75.6 -	8 -	39 -
20.5 -	16.5 -	80.5 -	9 -	43.9 -
20 -	16 -	80 -	10 -	50 -

The concentric ribs frequently reach right down to the ventral margin, but other specimens are only ribbed on the umbonal region or to the middle of the shell, showing on the rest of the shell only fine lines of growth (= *Astarte fabula* Reeve).

Some few specimens belong to the variety *striata*, which in my opinion — as already mentioned — is only a shorter form than *Warhami*¹⁾; to try and keep them distinct owing to the different colour of the periostracum is not correct, as the variety *Warhami*, for example, may begin as straw-yellow and end as dark-brown. — For the sake of comparison I may give here the measurements of the few specimens from East Greenland:

A. Montagu var. *striata*:

Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
21.5 mm.	17.5 mm.	82.6 ‰	9.75 mm.	45.3 ‰
19 -	16 -	84.2 -	10.25 -	53.9 -
17.5 -	14.5 -	82.9 -	9 -	51.4 -

Only one specimen (from Hekla Havn) is so short in form, that it can be referred to the typical *Astarte Montagu*; it has the following measurements:

Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
14 mm.	12.75 mm.	91.1 ‰	7.75 mm.	55.3 ‰

This specimen also differs in its sculpture, the shell only showing fine lines of growth and not the usual concentric ribs.²⁾

Jan Mayen.

None of the Danish Expeditions have found it here, but it is stated to have been taken by the Norwegian North-Atlantic Expedition as the variety *globosa* at a depth of 195 fm. (Friele) as also by the Austrian Expedition at a depth of 105 fm. (Becher).

¹⁾ The "*Astarte Banksii* Leach var. *Warhami*" of Posselt in his East Greenland Molluscs (l. c. 1895; Pl. I, figs. 3-4) has to be referred in my opinion to the variety *striata* owing to the relative shortness of the shell.

²⁾ It is this specimen which is figured by Posselt, l. c., figs. 1-2, under the name of *Astarte Banksii* Leach.

Iceland.

A. Montagui has been taken in large quantity on the west coast, in part also on the east coast; from the south coast there are but few specimens and from the north coast only one, but whether this is due to imperfect collections or to the actual scarcity of the species on the north coast. I am unable to say¹⁾. The depths noted lie between ca. 8—50 fm. On the west coast it reaches to 19^{mm.}, and on the east coast to a very considerable size, namely 26.2^{mm.}

The various localities are as follows.

East Iceland:

Myre Bugt.....	26 fm.	1 valve.
Berufjördr, Djupivogr.....	6—9 - , mud with black sand.	50 spec.
Month of Berufjördr.....	54—41 - , ooze.	1 —
64°58' N. L., 13°25' W. L.....	40 -	4 — & 27 valves.
Breiddalsvik.....	14 -	2 — & 1 valve.
Vattarnes.....	20—16 -	1 —
Vidfjördr.....	8—12 -	1 —
—.....	15 -	2 —
Nordfjördr.....	40 -	9 —
Seydisfjördr.....	15—20 -	1 —
— , the month.....	38—14 - , mud.	12 —
— , off Brimnes....	40 - , ooze and clay.	1 —

The specimens from East Iceland belong in part to the variety *striata*, in part to the typical form or to transitional stages between the two, as will be seen from the following measurements:

Locality	Length	Height	Height Length	Breadth	Breadth Length
Djupivogr.....	26.2 ^{mm.}	23 ^{mm.}	87.8 °	12.5 ^{mm.}	47.7 °
—.....	24.7 -	22.25 -	90.1 -	11.2 -	45.3 -
—.....	22.5 -	18.75 -	83.3 -	12 -	53.3 -
Berufjördr.....	16 -	14.5 -	90.6 -	8 -	50 -
Vattarnes.....	17 -	14.5 -	85.3 -	9.2 -	54.1 -
Seydisfjördr.....	22 -	19.25 -	87.5 -	10 -	45 -
—.....	21.2 -	19 -	89.6 -	10.2 -	48.2 -
—.....	20.5 -	18.5 -	90.2 -	10 -	48.8 -
—.....	20.2 -	17.8 -	88.1 -	10 -	49.5 -
—.....	20 -	18 -	90 -	10 -	50 -
—.....	20 -	17.2 -	86 -	10 -	50 -
—.....	19.5 -	17 -	87.2 -	9.25 -	47.4 -
—.....	19 -	17 -	89.5 -	9 -	47.4 -
Nordfjördr.....	21.8 -	18.75 -	86 -	10.8 -	49.5 -
—.....	21.5 -	19 -	88.4 -	11.75 -	54.7 -
—.....	20.2 -	18.25 -	90.3 -	9.5 -	47 -

¹⁾ As Odhner in his list over the comparatively small collection of marine Mollusca from Iceland in the Stockholm Museum records the species from 2 localities from the north coast (Arkiv för Zoologi, Bd. 7, No. 4, 1910, p. 20), the first view seems to be the most probable one.

North Iceland:

From here we have only a small specimen (12.5^{mm}. long) from

Axarfjördr 30 fm., sand and stones. 1 spec.

But, in addition, Odhner (l.c.) records it from the following localities on the north coast, up to 18^{mm}. in length:

Raufarhöfn 35 fm. 13 spec.
Siglufjördr 12 - Many spec.

West Iceland:

Skutilsfjördr. 9 spec.
Dyrafjördr. 1 -
Talknafjördr. 7 -
N. W. of Talkni. 1 valve.
Patreksfjördr 10—20 fm. 1 spec.
— 14 - 3 - & 5 valves.
Grundarfjördr. 1 -
— 12 - 2 -
Hvalfjördr 24 - 75 spec. & ca. 100 valv.
Faxafjördr 25 - 2 valves.
— , mouth of Kollafjördr 9¹/₂ - 1 spec. & 40 valves.
— — — — — 9¹/₂—11 - , fine black sand and ooze. 10 — & ca. 100 valv.
— , off Kollafjördr 8—11¹/₂ - , ooze and stones. 3 - & - 225 —
— — — — — 10 - ca. 100 valves.
— , Keflavik 15—16 - , fine black sand. 6 spec. & 135 valves.
— , 2 miles N. E. of Keflavik 19¹/₂—20¹/₂ - , ooze. 110 valves.
— , 1 mile E. N. E. of Helgasker Vager 11¹/₂ - 1 spec.
— , 4.3 miles W. ³/₄ S. of Helgasker Vager 25 - 2 spec. & 55 valves.
E. of Videy 9—10 - , fine sand and ooze. 4 valves.
Reykjavik. 6 spec. & 11 valves.
— , beach. 20 valves.
— (Engøy) 7—8¹/₂ - , ooze. 2 spec.
Hafnarfjördr 25 - , fine black sand and ooze. 11 valves.
Skagi 21 - 1 valve.

The maximum length is 19^{mm}.

By far the great majority of the West Icelandic specimens belong to the typical *A. Montagu*¹⁾.

Thus, all the specimens from the southern part of the west coast belong to the typical form, as will be seen from the following examples:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Grundarfjördr	18.3 mm.	17 mm.	92.9 %	10 mm.	54.6 %
—	17 -	15.7 -	92.4 -	9 -	52.9 -
Engey	17.2 -	15.8 -	91.9 -	8 -	46.5 -
Hafuarfjördr	17.2 -	16 -	93 -	10 -	58.1 -
—	16.5 -	15.8 -	95.8 -	10 -	60.6 -
E. N. E. of Helganes	13.5 -	13 -	96.3 -	7.5 -	55.6 -
Keflavik	14 -	13 -	92.9 -	7.5 -	53.6 -

The typical *A. Montagu* also occurs on the northern part of the west coast, but by side of it we find moreover somewhat more elongated specimens, which approach to or may be entirely referred to the variety *striata*: this is seen from the following measurements:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Talknafjördr	18.2 mm.	16 mm.	87.9 %	9 mm.	49.4 %
—	16.8 -	15.2 -	90.5 -	8.5 -	50.6 -
—	15 -	14 -	93.3 -	8 -	53.3 -
Patreksfjördr	19 -	16.5 -	86.8 -		
—	17 -	15.2 -	89.4 -	8.75 -	51.5 -
—	15.7 -	14 -	89.2 -	8 -	51 -
—	14 -	13 -	92.8 -	7.5 -	53.6 -

South Iceland:

Vestmannaeyjar	30 fm., gravel.	5 valves.
—	49 - , clay with a little mud.	1 spec. & 40 valves.
63°24' N. L., 17°5' W. L.	70 -	2 valves.

The maximum length of these specimens, which belong to the typical *A. Montagu*, is 14 mm.

Færoes.

Here the species is common at depths of ca. 5—50 fm. The maximum length is 19.8 mm.

The various localities are as follows:

Viderejde	10 fm.	1 spec. & 6 valves.
Klaksvig	10—15 -	1 — & 7 —

¹⁾ A specimen from Grundarfjördr is even so high and short, with the posterior margin sloping so steeply, that it resembles the form figured by Brown under the name of *Crassina obliqua* (Illustr. Conchol. Great Britain and Ireland, 1827, Pl. 18, fig. 6), but in the second edition of his work given as a variety of *Crassina striata* (Illustr. Rec. Conchol. Gr. Britain and Ireland, 1844, p. 96, Pl. 38, fig. 6). Its measurements are as follows: height 17.5 mm., length 17.5 mm., breadth 10.5 mm. This characteristic form also occurs at the Færoes.

Klaksvig.....	11 fm., from rhizoids of Laminaria.	1 spec.
Bordövig.....	7—10 - , black sand and small stones.	30 — & 14 valves.
—	10 - , sand.	5 — & 4 —
Fundingsfjord.....	12—ca. 20 - , coarse sand and clay.	2 — & 2 —
Andefjord.....	16—23 -	2 — 1 valve.
Skaalefjord.....	4—5 -	1 valve.
Kongshavn		2 spec.
—	12—16 - , small stones, sand & ooze.	3 — & 14 valves.
—	ca. 50 -	33 — & 90 —
Vestmansund.....	- 70 -	12 valves.
Vestmanhavn	3 ¹ / ₂ —5 - , fine black sand.	ca. 125 spec. (small).
—	5—6 - , fine black sand.	10 spec. & 70 valves.
Sörvaag.....	14—16 ¹ / ₂ - , ooze.	1 valve.
Midvaag, beach		1 —
Thorshavn		3 —
Nolsö, deep hole at north end	ca. 100 fm.	1 spec. & 1 valve.
Vaagfjord.....	10 -	1 —
5 miles S. S. E. of Bispen.....	50 -	8 valves.
13 — W. by S. of Munken.....	- 150 -	1 valve.

The Færoese specimens belong to the typical *A. Montagu*, though sometimes with a tendency in the direction of var. *striata*, as will be seen from the measurements below:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Klaksvig	20.6 mm.	19.5 mm.	94.7 %.	9.8 mm.	49 %.
Andefjord	19.8 -	17.5 -	88.4 -	10 -	50.5 -
—	16.8 -	15.5 -	92.3 -	8.75 -	52.1 -
Nolsö	17.2 -	15.2 -	88.4 -	7.8 -	45.3 -
Kongshavn.....	17 -	15.3 -	90 -	8.2 -	48.2 -
—	16 -	14.2 -	88.8 -	8.2 -	51.3 -
—	15.8 -	15 -	94.9 -	8.5 -	53.8 -
—	15.5 -	13.8 -	89 -	8 -	51.6 -
—	14.7 -	13 -	92.9 -	7.5 -	51 -
—	14 -	13.5 -	96.4 -	8 -	57.1 -
—	14 -	13 -	92.2 -	7.5 -	53.6 -
Vaagfjord	14 -	12.7 -	90.7 -	7 -	50 -
Fundingsfjord	12.8 -	11.8 -	92.2 -	7.2 -	56.3 -
Viderejde	13 -	11.7 -	90 -	7 -	53.8 -

Concluding remarks. It may be seen from the foregoing, that there is a certain regularity in the variation of the species, since the form becomes elongated on the whole in the same degree as the marine climate becomes more severe. At the Færoes and the southern West Iceland we have only the short *A. Montagu typica*, though sometimes with a tendency in the direction of the slightly more elongated variety *striata*; at northern West Iceland the variety *striata* begins to appear

and at East Iceland it occurs commonly together with the typical *Montagui*. At West Greenland the variety *striata* is by far the most predominant, and at the same time the still more elongated variety *Warhami* is appearing; lastly, at East Greenland the variety *Warhami* is almost the only form. Accompanying the elongation of the form we also find an increase in the maximum length, namely from ca. 19–20 mm. at the Færoes and West Iceland to 23–26 mm. at East Iceland and Greenland.

Distribution. *Astarte Montagui* is circumpolar in arctic seas. Towards the south it reaches to the Aleutians and Vancouver Island in the Pacific, and in the Atlantic to Massachusetts and the Channel.

Astarte sulcata da Costa.

Pl. IV, figs. 3 a–c.

Pectunculus sulcatus da Costa, Brit. Conchol., 1778, p. 192. — *Astarte sulcata* Forbes and Hanley, Hist. Brit. Moll., I, 1853, p. 452, Pl. 30, figs. 5–6¹⁾ & Pl. 133, fig. 4; G. O. Sars, Moll. Reg. Arct. Norv., 1878, p. 52.

Astarte sulcata Posselt (partim), Medd. om Gronland, XIX, 1895, p. 72; *ibid.* XXIII, 1898, p. 65.

The "Ingolf" has taken this species at:

St. 94.	Off South-East Greenland	204 fm.	4.1° C.	1 spec.
- 16.	W. of Iceland	250 -	6.1° -	1 valve.
- 98.	- - -	138 -	5.9° -	2 spec. and several hundred separate valves, mostly of very small specimens.
- 86.	- - - (Brede Bugt)	76 -		1 large valve and many quite small.
- 87.	- - -	110 -		ca. 20 valves.
- 89.	- - -	310 -	8.4° -	1 spec. & 1 valve.
- 9.	- - -	295 -	5.8° -	4 spec. & ca. 20 valves.
- 8.	S. W. of Iceland	136 -	6.0° -	10 separated valves of young specimens.
- 85.	- - -	170 -		ca. 20 spec. & many valves.
- 84.	- - -	633 -	4.8° -	1 valve.
- 81.	- - -	485 -	6.1° -	6 ancient valves.
- 73.	- - -	486 -	5.5° -	1 valve.
- 6.	S. E. of Iceland	90 -	7.0° -	Some fragments of larger valves and a number of valves, separate or connected, of quite small specimens.

West Greenland.

Posselt records *A. sulcata* from Igaliko Fjord, Sukkertoppen and the fjord off Upernivik; of these I have seen one specimen labelled as coming from the first-named locality, but in appearance it is so "European", that I think it not unlikely that some exchange of labels has taken place.

¹⁾ In the explanation of the figures under the Plate, fig. 6 is given under the synonym *A. Danmoniensis*, fig. 5 by a type-error as *A. triangularis*.

East Greenland.

Here there occurs a comparatively closely ribbed form of *A. sulcata*, which has been taken off the south-eastern ("warm") part by Nordenskjöld's Expedition (1883) at 130 fm. depth and by the Ingolf-Expedition at St. 94 in 204 fm., as also by the Amdrup Expedition off Angmagssalik at a depth of 140 fm. The maximum length is 23 mm. — Further, Möbius¹⁾ records it from north-eastern Greenland, but I feel certain that this record is due to some mistake.

[Jan Mayen].

Becher records the species from here²⁾, but I am convinced that his record refers to a form of *A. crenata* Gray (cf. *A. crenata* var. *inflata*, p. 117); *A. sulcata* is perfectly clearly, from the results of the Ingolf-Expedition, a distinctly warm-water form.

Iceland.

In addition to the stations mentioned of the Ingolf-Expedition, *A. sulcata* has later been taken at the following places:

63°15' N. L., 22°23' W. L.	170—114 fm.	6 spec. & 24 valves.
63°18' - - 21°30' - -	94 -	1 — - 1 —
63°05' - - 20° 7' - -	293 -	15 valves.
62°57' - - 19°58' - -	500 -	1 valve.
63°21' - - 17°31' - -	69 - , black sand.	1 —
63°21' - - 17°15' - -	58 - , sand, stones, shell-gravel.	3 spec. and 12 valves.
63°24' - - 17° 5' - -	70 - , black sand with stones and shells.	1 spec. and 3 valves.

Thus, taken on the whole, *A. sulcata* may be said to be fairly common off western and southern Iceland; living specimens have been taken at depths of 58—310 fm., but dead shells even at a depth of 633 fm. The maximum length is 26 mm.

The Færoes.

From the investigations of recent years the Zoological Museum has obtained *A. sulcata* from the following places.

Fundingsfjord	12—20 fm., coarse sand and clay.	9 spec. & 34 valves.
Nolsö, deep hole at north end	ca. 100 -	4 — & 6 —
62°29' N. L., 5°17' W. L.	160 - , stones and sand.	1 — & 5 —
62°29' - - 4°52' - -	112 - , sand.	2 spec.
62°17½' - - 4°57' - -	144 - , clay and stones.	2 —
13 miles S. of Myggenæsholm	70 -	1 spec. & 9 valves.
S. W. of Myggenæs	135 -	18 — & 165 —

¹⁾ Die zweite Deutsche Nordpolarfahrt in d. Jahren 1869 u. 1870. Wiss. Ergebn., II, 1874, Zoologie, p. 251.

²⁾ Die Österr. Polarstation Jan Mayen, Beob.-Ergebn., III, 1886, p. 71.

61°15' N. L., 9°35' W. L.	ca. 475 fm.	90 valves.
61° 7' - - 9°30' - -	440 -	12 spec. & 185 valves.
61° 9' - - 7°54' - -	181 - , sand and shells.	4 — & 2 —
61°10' - - 5°46' - -	160 - , sand with stones and shells.	2 — & 1 —
5 miles S. S. E. of Bispen	50 -	1 —
16 miles E. by S. of south point of Nolsö ca.	80 -	2 — & 9 —
12 miles S. S. E. of Akralejte	150 -	70 — & 42 —
13 miles W. by S. of Munken	ca. 150 -	25 —

A. sulcata has thus been taken at various places round about and in part also at the Færoes at depths of (12) 20—440 fm. It reaches a length up to 29^{mm}.

Remarks. Compared with other *Astarte* species, *A. sulcata* is subject to comparatively little variation, so far as the present geographical region is concerned. The most important variation — so far as I can see — consists in a tendency of the number of ribs to increase somewhat in the western part of the geographical region of the species; in specimens from off the south-eastern Greenland the ribs are so dense, that their number — in specimens of 19—23^{mm}. in length — amounts to ca. 35—42, whilst the number in typical specimens, 21—23^{mm}. in length, from the Færoes is ca. 30—33.

The form may vary somewhat, as will be seen from the following measurements of some specimens, most different from one another in regard to the three dimensions:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
East Greenland	23 ^{mm} .	18.25 ^{mm} .	79.3 %	11.2 ^{mm} .	48.7 %
— —	20.25 -	15.5 -	76.5 -	9.5 -	46.9 -
— —	20.25 -	15.75 -	77.8 -	8.5 -	42 -
Iceland	24 -	19.75 -	82.3 -	12.75 -	53.1 -
—	23.5 -	21 -	89.4 -	12 -	51.1 -
Færoes	26 -	21.5 -	82.7 -	13.5 -	51.9 -
—	23.5 -	17.75 -	75.5 -	12.5 -	53.2 -
—	22 -	18.2 -	82.7 -	12 -	54.5 -

As a further illustration of the change of form in this species as a whole, I may give here the measurements of 3 specimens, which I have dredged along with many others N. E. of Shetland, at a depth of 150—220 fm.

Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
26 ^{mm} .	21.5 ^{mm} .	82.7 %	12 ^{mm} .	46.2 %
25 -	19.5 -	78 -	11.75 -	47 -
25 -	21.75 -	87 -	13 -	52 -

In illustration of the variability with regard to the number of concentric ribs, the following examples are represented on Pl. IV:

Fig. 3 a. A typical specimen from the Færoes,

Fig. 3 c. A specimen with comparatively closely-placed ribs, from East Greenland.

Distribution. On the European side *Astarte sulcata* is distributed from the western part of the Murman Coast (Knipowitsch) to the Mediterranean and west coast of North Africa; it goes down into the Kattegat. Over the Færoes it reaches to the southern and western coasts of Iceland and to Denmark Strait off the south-eastern Greenland. The bathymetric distribution is 5—ca. 1000 fm.

Astarte elliptica Brown.

Pl. IV, figs. 4 a—g.

?*Venus compressa* Linné, Mantissa Plantarum Altera, 1771, Regni Animalis App., p. 546. — *Crassina elliptica* Brown, Ill. Conchol. Great Britain and Ireland, 1827, Pl. 18, fig. 3; Ill. Rec. Conchol. Great Brit. and Ireland, 1844, p. 96, Pl. 38, fig. 3. — *Astarte compressa* Sars, Moll. Reg. Arct. Norv., 1878, p. 53¹⁾.

Astarte semisulcata Møller, Index Moll. Groenl., 1842, p. 19. — *Astarte compressa* Mörch, Rink's Gronland, 1857, p. 91; Vidensk. Medd. Naturh. Foren. 1867, p. 95; *ibid.* 1868, p. 222; Arctic Manual, 1875, p. 131; Rink's Dan. Greenland, 1877, p. 441; Posselt, Medd. om Gronland, XIX, 1895, p. 72, Pl. I, figs. 5—7 (var. *depressa* Poss.); *ibid.* XXIII, 1898, p. 66; Jensen, *ibid.*, XXIX, 1909, p. 339.

The "Ingolf" has taken this species at:

St. 86.	W. of Iceland	76 fm.	12 valves of young (mostly quite young) specimens.
- 87.	- - -	110 -	5 valves of young specimens.
- 113.	S. of Jan Mayen	1309 -	2 valves.
- 104.	N.W. of Iceland	957 -	1 valve of a young specimen.

West Greenland.

Here the species occurs commonly from the southernmost parts up to Melville Bay, on mud, clay, shell and stone ground. The depths noted for living specimens lie between 10 and 235 fm.²⁾ The maximum length amounts to 36 mm.

East Greenland.

A. elliptica has been taken by Danish Expeditions at Angmagssalik, Cape Dalton, in Scoresby Sound and Forsblads Fjord, (3) 10—30 (50) fm., on mud, clay and stony ground, as also by the Germania Expedition at northern East Greenland (Möbius, as *A. sulcata*). The maximum length amounts to 30 mm.

[Jan Mayen.]

Here, curiously enough, the species has not been met with. Posselt (l. c. 1898, p. 67) records it from Jan Mayen and Copenhagen Museum as the authority or source, but this is due to some mistake, as our Museum possesses no specimen of *A. elliptica* from this island.

¹⁾ For the remaining synonyms cf. Kobelt: Prodr. Moll. Test. Mar. Europ. 1888, p. 392.

²⁾ A living, adult specimen from this considerable depth has been taken at 66°49' N. L., 56°28' W. L.

Iceland.

Here *Astarte elliptica* is common round the island; it occurs both on sand, ooze, mud and mixed bottom-soil; living it is taken at depths of 5—60 fm., once of 100 fm. The maximum length is 38.5^{mm}.

The various localities are as follows:

East Iceland:

Berufjördr, Djupivogur.....	6—9 fm., mud with black sand.	25 spec.
— mouth.....	54—41 - , ooze.	13 —
Faskrudsfjördr.....	50—20 - , blue clay.	1 — & 1 valve.
64°58' N. L., 13°25' W. L.....	40 -	1 — & 44 valves.
Eskifjördr.....	0—12 -	2 —
Vidfjördr.....	15 -	17 —
Nordfjördr.....	22 -	4 —
—.....	40 -	8 — & 6 valves.
Seydisfjördr.....	9—5 -	1 —
— , month.....	38—14 - , mud.	24 —
— , month.....	ca. 40 - , stomachs of haddock.	1 valve.
—.....	50—20 - , blue clay.	2 spec.
65°42' N. L., 13°57' W. L.....	60 -	1 —
Bakkafjördr.....	28—20 - , sand mixed with clay.	4 — and 2 valves.
—.....	32—25 - , sand mixed with clay.	22 — and 30 valves.
—.....	52—43 - , sand mixed with clay.	7 — and 5 valves.

The largest specimen is 38^{mm}. long.

North Iceland:

Thistilfjördr.....	10—24 fm., sand and "coral".	2 spec.
—.....	50 - , clay with many stones.	30 valves.
Axarfjördr.....	22 - , mud.	14 spec.
Skjálfandi Bugt.....	21 - , black sand.	5 —
— —.....	31 - , fine sand.	19 —
4 miles E. of Brik Skær.....	100 -	1 —
Husavik in E. 4 miles.....	42 -	4 —
66°17' N. L., 18°13' W. L.....	52 -	1 valve.
Øfjord.....		40 spec.
— just S. of Hrisey.....	18 - , clay.	5 —
Veidileysa.....	21—25 -	7 —

The largest of these specimens are 35^{mm}. long.

West Iceland:

Hesteyrarfjördr, at the head	15—17 ¹ / ₂ fm.	1 spec. & 30 valves.
Onundarfjördr	9 -	21 -
Dyrafjördr, inside Thingnæs	10—12 ¹ / ₂ - , mud and small stones.	2 - & 40 valves.
—	13 -	2 -
Fossfjördr	44 -	1 -
Talknafjördr		42 -
N. W. of Talkni		2 - & 2 valves.
Patreksfjördr	5 -	5 -
—	14 -	1 -
Grundarfjördr		1 -
Hvalfjördr	24 -	50 - & 70 valves.
Faxafjördr	15 -	5 -
—	25 -	1 valve.
— , mouth of Kollafjördr	9 ¹ / ₂ —11 - , fine black sand and ooze.	1 spec. and 30 valves.
— , off Kollafjördr	8—11 ¹ / ₂ - , ooze and stones.	11 valves.
— — —	10 -	1 spec. & 10 valves.
— , Keflavik	15—16 - , fine black sand.	3 - and 80 valves.
— , ca. 2 miles N. E. of Keflavik	19 ¹ / ₂ —20 ¹ / ₂ - , ooze.	21 valves.
— , 1 mile E. N. E. of Helgasker Vager	11 ¹ / ₂ -	7 spec.
— , 4.3 miles W. ³ / ₄ S. of Helgasker Vager	25 -	40 valves.
Reykjavik (Eugey)	7—8 ¹ / ₂ -	5 -
— , roads	8 -	1 spec.
Hafnarfjördr	25 - , fine black sand and ooze.	1 - and 14 valves.

The largest of these numerous specimens is 38.5^{mm}.

South Iceland:

Vestmannaeyjar	30 fm., shell-gravel.	2 valves.
—	49 - , gray, fatty clay.	4 spec. & 4 valves.

The largest specimen is 27^{mm}. long.

Færoes.

Here *A. elliptica* seems to be common at depths of 3—50 fm. The maximum length is 37^{mm}.

The separate localities at which the species has been taken are as follows:

Viderejde	10 fm.	4 valves.
Kvannesund, between Viderö and Bordö	4—6 -	1 spec.

Klaksvig	6—10 fm.	1 spec.
—	10—15 -	40 — & many valves.
—	11 - , from <i>Laminaria</i> rhizoids.	18 —
Arnefjord	0—15 - , hard ground.	1 —
Bordövig	7—10 - , black sand and small stones.	1 valve.
—	10 - , sand with <i>Laminaria</i> .	4 spec.
Andefjord	16—23 -	4 —
Kongshavn	12—16 - , small stones, sand and ooze.	2 —
—	ca. 50 -	ca. 25 spec. & 90 valves.
Vestmanna	3 $\frac{1}{2}$ —5 - , fine black sand.	80 spec.
—	5—6 - , fine black sand.	6 — & 40 valves.
—	10 -	1 —
—	10—30 -	3 valves.
Sörvaag	14—16 $\frac{1}{2}$ - , ooze.	1 spec. & 2 valves.
Nolsö, beach		1 valve.
Trangisvaag	1 $\frac{1}{4}$ —3 -	1 spec. & 2 valves.
—	6—8 -	1 valve.
Vaagfjord	barely 1 -	1 spec.
—	10 -	1 —
S. W. of Myggenæs	135 -	1 valve ¹⁾ .
1 $\frac{1}{2}$ —2 miles off the mouth of Bordövig	20—30 -	1 spec. & 1 valve.

Remarks. The material to hand from the Færoes, Iceland and Greenland shows, that both the form and sculpture vary to a great degree in *Astarte elliptica*.

At the Færoes, however, the character is fairly uniform, it seems. The species appears here with strongly marked folds right from the umbones down to the ventral margin and they only disappear at the very back. It is only in a single specimen that the folds become indistinct a little below the middle of the shell. The form is not specially variable, on the whole rather elongated, more or less compressed, sometimes however somewhat vaulted. Measurements of some of the specimens which differ in dimensions give the following result:

Length	Height	Height Length	Breadth	Breadth Height
30 mm.	23 mm.	76.8 %	11 mm.	36.7 %
31 -	23.5 -	75.8 -	12.5 -	40.3 -
31.25 -	22.5 -	72 -	14 -	44.8 -

At Iceland, on the other hand, we very frequently find forms which lack the folds over a greater or smaller part of the shell; sometimes the folds disappear below the middle of the shell, in other specimens they only reach to the middle of the shell, and some specimens even have folds only

¹⁾ The shell from this considerable depth has a very ancient ("fossil") appearance.

on the umbonal area. Such specimens may have great resemblance and are certainly often confused with the more or less folded varieties of *Astarte borealis* Chemn. ("*A. semisulcata* Leach" etc.)¹⁾; the large ligament projecting over the shell of the last-named as also the more or less fibrous or frayed structure of the periostracum makes the separation in general quite easy. — The form also appears to be very variable, both in relative height and breadth, as will be seen from the following measurements.

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Seydisfjördr	32.25 mm.	23.25 mm.	72.1 %	9.5 mm.	29.5 %
—	31.25 -	21.75 -	69.6 -	12 -	38.3 -
Nordfjördr.....	32.5 -	23.25 -	71.5 -	11.75 -	36.2 -
Dyrafjördr.....	31 -	23 -	74.2 -	14 -	45.2 -
Talknafjördr.....	32 -	25.5 -	79.7 -	14 -	43.8 -

At West Greenland *A. elliptica* is subject to similar variations as at Iceland. In regard to form there are specimens which are even higher and more vaulted than those which go to an extreme in this direction at Iceland, so that we find such dimensions as the following:

Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
31.25 mm.	26.25 mm.	84 %	15.2 mm.	48.6 %
27.25 -	23.25 -	85 -	14.2 -	52.1 -

It has obviously been such specimens as these, which have led Leche to set up the variety *crassa*²⁾.

At East Greenland *A. elliptica* usually appears with folds right down to the ventral margin; not rarely, however, they cease about the middle of the shell. — With regard to the form, this is remarkable on the whole for its elongation, as will be seen from the measurements below; Posselt for this reason set up a special variety *depressa* (for specimens from Hekla Havn³⁾).

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Cape Dalton.....	29.5 mm.	21.5 mm.	72.9 %	12.5 mm.	42.4 %
— —	29.5 -	21.5 -	72.9 -	11.5 -	39 -
Hurry Inlet	27 -	20 -	74.1 -	9.5 -	35.2 -
Hekla Havn.....	23.5 -	16 -	68.1 -	8 -	34 -
— —	22.5 -	16.5 -	73.3 -	7.75 -	34.4 -

The following figures on Pl. IV may serve as illustration of the varying form and sculpture in *Astarte elliptica*, mentioned in the foregoing:

Fig. 4 a and b represent a typical *A. elliptica* (from the Færoes), seen from the side and from above.

¹⁾ For example, both Mörch and Posselt have made mistakes in this direction.

²⁾ Leche: Öfversigt öfver de af svenska expeditionerna till Nowaja Semlja och Jenissej 1875 och 1876 insamlade hafsmollusker, p. 19, Pl. I, figs. 3 a—b. Kongl. Sv. Vet. Akad. Handl., Bd. 16, No. 2, 1878.

³⁾ L. c. 1895, p. 72, Pl. I, figs. 5—7.

Figs. 4 c and d represent a very elongated form (var. *depressa* Posselt), from East Greenland.

Figs. 4 e and f show a very high (and ventricose) form (var. *crassa* Leche), from West Greenland.

Fig. 4 g shows a specimen in which the folds disappear almost about the middle of the shell. From West Greenland.

Distribution. *Astarte elliptica* is an arctic-boreal species, known from the east coast of North America down to New England, from Greenland, Iceland, the Færoes, British Isles, Danish waters down to Bornholm, Norway, north coast of Russia, Kara Sea and Spitzbergen. The bathymetric distribution is 3—235 fm.

Astarte crenata Gray.

Pl. IV, figs. 5 a—m.

Nicania crenata Gray, Parry's first voyage, Suppl. to Append., 1824, p. 242.

Astarte crebricostata Mörch, Rink's Gronland, 1857, p. 91; Vidensk. Medd. Naturh. Foren. 1868, p. 222; Arctic Manual, 1875, p. 131; Rink's Dan. Greenland, 1877, p. 441. — *Astarte crenata* Posselt, Medd. om Gronland, XIX, 1895, p. 71; *ibid.*, XXIII, 1898, p. 64; Jensen, *ibid.*, XXIX, 1909, p. 337.

The "Ingolf" has taken this species at various stations and in three varieties, namely:

forma *typica*

St. 29. Davis Strait..... 68 fm. 0.2° C. 1 spec.

var. *subæquilatera* Sowb.

St. 32.	Davis Strait.....	318 fm.	3.9° C.	Numerous spec.
- 31.	— —	88 -	1.6° -	3 spec.
- 35.	— —	362 -	3.6° -	Numerous spec.
- 28.	— —	420 -	3.5° -	— —
- 27.	— —	393 -	3.8° -	— —
- 115.	Jan Mayen.....	86 -	0.1° -	6 spec. and a number of connected or separated valves.

var. *acuticostata* Jeffr.

St. 116.	S. of Jan Mayen	371 fm.	— 0.4 ° C.	Numerous spec.
- 15.	N. W. of Iceland.....	330 -	— 0.75° -	1 spec.
- 124.	N. of Iceland.....	495 -	— 0.6 ° -	Numerous spec.
- 126.	- - —	293 -	— 0.5 ° -	1 valve.
- 128.	- - —	194 -	0.6 ° -	4 spec.
- 106.	E. of Iceland.....	447 -	— 0.6 ° -	5 —
- 3.	Between Færoes and Iceland...	272 -	0.5 ° -	3 spec. & 4 valves.

and also at the following station, where the variety cannot be determined:

St. 127. N. of Iceland..... 44 fm. 5.6° C. 1 spec. & 1 valve (both small).

Astarte crenata is an extremely variable species and has given rise to not a few "species"; these I can only recognize as nominal, as my material contains transitions between them. The specimens living in the waters of Iceland, Jan Mayen and Greenland must, therefore, in my opinion, be arranged under the following varieties: forma *typica*, var. *subaequilatera* Sowb., var. *crebricostata* Mc. Andr. & Forb., var. *inflata* Hägg and var. *acuticostata* Jeffr.

Forma *typica*.

Pl. IV, figs. 5 a, b and c.

Astarte crenata Reeve, Conchol. Icon. XIX, 1874, *Astarte*, sp. 9, Pl. 2, fig. 9. — *Astarte oblonga* Sowerby, Thes. Conchyl. II, 1855, p. 781, Pl. 167, fig. 19. — *Astarte crenata* Gray f. *typica* Jensen, Medd. om Grønland, XXIX, 1909, p. 337.

The shell oval, more or less convex, with numerous (ca. 50), relatively low, concentric ribs, which disappear on the posterior part of the shell; periostracum light-coloured, yellowish.

In its typical shape (Pl. IV, figs. 5 a and b) it is quite characteristic, but this again is subject to great changes¹⁾. The ribs may be fewer and more prominent (Pl. IV, fig. 5 c), so that the boundary towards var. *subaequilatera* vanishes. All three dimensions are subject to considerable variations, as will be seen from the accompanying measurements:

Locality	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Hurry Inlet	23 mm.	17.5 mm.	76.1 %.	10.5 mm.	45.7 %.
Cape Hope	23.5 -	17.5 -	74.5 -	11.25 -	47.9 -
S. E. of Sabine Island	23.5 -	18.2 -	77.4 -	12.5 -	53.2 -
— - — —	26.5 -	21.5 -	81.1 -	12 -	45.3 -

This form occurs at East Greenland, where the Danish Expeditions²⁾ have taken it at the following places:

Hurry Inlet	50 fm., clay with stones.	Numerous spec.
Cape Hope	121 - — — —	3 spec.
Cape Tobin	120 -	1 spec.
72°24' N. L., 19°42' W. L.	130 -	1 living & 2 empty spec.
72°51' - - 20°23 $\frac{1}{2}$ ' W. L.	124 - , clay.	1 spec. (empty).
72°53' - - 20°36' W. L.	96 -	6 —
73°24' - - 20° - -	106 -	2 —
S. E. of Sabine Island	110 - , fine clay with stones and gravel.	10 spec. & some valves.

and the Swedish Expedition of 1900 at the following places:

72°25' N. L., 17°56' W. L.	ca. 160 fm., stones and sand.	5 spec.
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¹⁾ For some very short and convex specimens Hägg has set up the variety *incostata* (Ark. f. Zoologi, Bd. 2, Nr. 2, 1904, p. 37, Pl. 1, figs. 11-12); a similar form, likewise with weakly developed and very densely placed ribs, is in our Museum from Umanak in West Greenland (cf. the following).

²⁾ *A. crenata* has for the first been taken at East Greenland (Shannon Isl., 30 fm.) already in 1869-70 by "Die zweite Deutsche Nordpolarfahrt" (cf. Wissenschaftl. Ergebnisse, II, 1874, p. 252 under the name of *Astarte crebricostata*).

74°35' N. L., 18°15' W. L.	79 fm., mud and stones.	2 spec.
Off Mackenzie Bay	58 - , mud.	10 —
and the Belgica Expedition at the following places ¹⁾ :		
75°58.5' N. L., 14°08' W. L.	158 fm., bottom-temp. 0.4° C.	4 spec.
77°35.5' - - 18°12' - -	28 - , — — — 1.79° -	16 —

Thus, at East Greenland the typical *A. crenata* has been taken at 13 localities from 70°36' N. L. — 77°35.5' N. L., and at depths of 50—160 fm. The largest specimens are 28 mm.

From West Greenland I have only seen it from the above-mentioned St. 29 of the "Ingolf" and from Umanak, 250 fm., but I imagine that quite a number of the specimens, which Posselt records in Consp. Faun. Groenl. simply as "*Astarte crenata*", belong to the typical form. The specimens to hand from Umanak are remarkably short and on the whole much convex, as will be seen from the measurements below:

Length	Height	Height Length	Breadth	Breadth Length
21.5 mm.	16.3 mm.	75.8 %	11.6 mm.	54 %
18.75 -	15.5 -	82.7 -	10.2 -	54.4 -
18 -	14.2 -	78.9 -	10.2 -	56.9 -
17.5 -	14 -	80 -	9 -	51.4 -
17 -	14 -	82.4 -	10.2 -	60 -

Var. *subaequilatera* Sowerby.

Pl. IV, figs. 5 d and e.

Astarte subaequilatera Sowerby, Thes. Conchyl. II, 1855, p. 780, Pl. 167, fig. 13; Reeve, Conchol. Icon. XIX, 1874, sp. 5, Pl. I, fig. 5.

This resembles the typical *crenata* in the oval form of the shell, but the concentric ribs are fewer in number and coarser; the periostracum on the whole darker, yellowish-brown, olive-coloured or brown.

The form is besides subject to great variation, as will appear clearly from the measurements below; it varies from the elongated-oval or elliptical to the orbicular, somewhat triangular:

Locality	Length	Height	Height Length	Breadth	Breadth Length
Ingolf St. 27	27 mm.	21.5 mm.	79.6 %	13.5 mm.	50 %
— - -	26.5 -	19.5 -	73.6 -	11.5 -	43.4 -
— - 32	24.5 -	18.25 -	74.5 -	10.75 -	43.9 -
Julianehaab	24.5 -	21.5 -	87.8 -	14.3 -	58.4 -
Jan Mayen	30 -	22 -	73.3 -	14 -	46.7 -
— —	27.75 -	21.75 -	78.4 -	14.5 -	52.3 -

¹⁾ Grieg, in Duc d'Orléans: Croisière océanographique, 1909, p. 534.

The ribbing may also be subject to some variation, in regard to denseness and strength.

This variety is common at West Greenland; apart from the "Ingolf" stations mentioned before I have seen specimens from the following localities:

Julianehaab.

Mouth of Ameralik Fjord (as a short, convex, rather densely ribbed form).

66°49' N. L., 56°28' W. L. 235 fm., sand and ooze. 44° C.

Disko Bay. 65 -

Quite a number of the localities which Posselt notes from West Greenland under *Astarte crenata* Gray (Medd. om Gronland, XXIII, 1898, p. 64), also refer probably to the variety *subaequilatera*. — The largest specimens are 30^{mm}. long.

At Jan Mayen, in addition to at the "Ingolf" St. 115, it has been taken by the Danish Expedition of 1900 at a depth of 55 fm., on ooze mixed with coarser material. The Austrian Polar Station took it on the north side of the island, at a depth of 75—95 fm. (Becher l. c. p. 70). The maximum length is 30^{mm}.

From Denmark Strait there is a single valve from 64°42' N. L., 27°40' W. L., 426 fm. (W. of Iceland).

Var. *crebricostata* Mc. Andr. & Forbes.

Pl. IV, figs. 5 f and g.

Astarte crebricostata Mc. Andr. & Forbes, Ann. Mag. Nat. Hist. XIX, 1847, p. 98, Pl. 9, fig. 4; Forbes & Hanley, Brit. Moll. I, 1853, p. 456, Pl. 30, fig. 9; Sowerby, Thes. Conchyl. II, 1855, p. 780, Pl. 167, fig. 10; Reeve, Conchol. Icon. XIX, 1874, *Astarte*, sp. 10, Pl. 2, fig. 10; Sars, Moll. Reg. Arct. Norv., 1878, p. 54, Pl. 5, fig. 7.

In this variety the ribbing is very like that in the foregoing, but the shell is in general more triangular or oval-cordiform and has the umbones moved more in front. It is however very close to the var. *subaequilatera* and cannot always be kept separate from this.

It occurs at North and East Iceland, whence we have it from the following localities:

Skagestrands Bugt.	119 fm.	5 spec.
66°17' N. L., 18°13' W. L.	52 -	1 —
Husavik in E. by S.	47—58 -	1 —
Thistil Fjördr	50 - , clay with many stones.	4 — & 85 valves.
66°32' N. L., 15°15' W. L.	75 -	3 valves.
Bakkafjördr	52—43 - , clay mixed with sand.	1 spec.
Seydisfjördr	50—20 -	1 —
—	38—14 - , mud.	

The largest specimen is 31^{mm}. long.

Var. *inflata* Hägg.

Pl. IV, figs. 5 h and i.

Astarte crenata Gray var. *inflata* Hägg, Arkiv för Zoologi, Bd. 2, Nr. 2, 1904, p. 37, Pl. I, figs. 4—6; Jensen, Medd. om Gronland, XXIX, 1909, p. 338.

The shell is ventricose, approximating to the obliquely square, with the upper and lower margins almost parallel, the anterior end short, rounded, the posterior end truncate; the concentric ribs in general rather numerous and strong, sometimes however less prominent or even vanishing on a larger or smaller part of the shell (very rarely even quite wanting, so that the shell only shows a fine striation). Periostracum yellow or brownish-yellow.

It is a small form; I have not seen any specimen larger than 19^{mm}.

Some measurements will show its limits of variation, from the oblong-trapeziform to almost quadratic, as also the more or less ventricose.

Length	Height	Height Length	Breadth	Breadth 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 -

The number of ribs may rise to ca. 40 and fall to ca. 24 or even fewer, as the umbonal region is frequently without folds; quite smooth specimens, as mentioned, may also occur. In small specimens the ribs are frequently sharp, almost as in the following variety.

This variety has been taken at the following places at East Greenland by Danish Expeditions:

Forsblads Fjord	ca. 50 fm., clay with stones.	5 spec.
— —	90—50 - , clay with stones.	Numerous spec.
74°17' N. L., 15°20' W. L.	127 - , clay with stones.	2 spec.
and by the Swedish Expedition of 1900 at:		
72°25' N. L., 17°56' W. L.	ca. 160 fm., stones and sand.	7 spec.
Mouth of Franz Josefs Fjord	106—158 ¹ / ₂ - , mud.	1 --
and S. of Jan Mayen by the Danish Expedition of 1891 at:		
70°21' N. L., 8°25' W. L.	160 fm., clay.	2 spec. (empty).

I presume that it was this variety, of which the Austrian Station took 3 specimens on the north side of Jan Mayen, at a depth of 75—95 fm.; E. Becher determined them as *Astarte sulcata* d. C. (Österr. Polarst. Jan Mayen, III, 1886, p. 71), but the latter is a warm-water form and the present variety has some resemblance to it.

Var. *acuticostata* Jeffreys.

Pl. IV, figs. 5 k, l and m.

Astarte acuticostata Jeffreys M. S., Friele, Nyt Mag. f. Naturvidensk. 23 Bd., 1877, 3 Hft., p. 1; *ibid.* 24 Bd., 1879, p. 223; Jahrb. Deutsch. Malacozool. Gesellsch. 6 Bd., 1879, p. 267, Pl. 4, fig. 8;

Jeffreys, Proc. Zool. Soc. 1881, p. 711, Pl. 61, fig. 9; Posselt, Medd. om Gronland, XIX, 1895, p. 70; Friele & Grieg, Norw. North-Atl. Exped., Zoology, Moll. III, 1901, p. 25; Friele, Bergens Museums Aarbog, 1902, No. 3, p. 4. — *Astarte crenata* Gray var. *acuticostata* Jensen, Medd. om Gronland, XXIX, 1909, p. 338; Grieg, in Duc d'Orléans, Croisière océanographique, 1909, p. 534.

The form almost as in the foregoing variety, forming a shorter or longer, oblique quadrangle (sometimes a rhomb), more or less convex; the concentric ribs numerous (ca. 25—40), strong and more or less sharp, in part lamellar and imbricate. Periostracum yellow. Maximum length 13 mm.

In its typical development, with lamella-like, somewhat imbricate folds it is a very characteristic form, which might well be taken as a "good" species, but there are transitions, which with their more rounded ribs connect it with the preceding variety and through this with the more divergent forms of the species *crenata* Gray. I can thus agree with the view put forward by Friele in the year 1879 (l. c.), that *Astarte acuticostata* Jeffreys is only a pygmy form of *A. crenata* Gray¹⁾; it comes very near especially to the var. *inflata* and may be regarded as a form derived from this and connected with deeper water. I have therefore taken the advanced step of including the present form as a variety under *A. crenata*, whereas Friele, the last time he has mentioned it (l. c. 1902), still retains the distinct specific name *A. acuticostata*.

For the rest, it is also rather variable however in regard to form. The anterior end, for example, may sometimes be very short, sloping abruptly downwards, sometimes more projecting; the posterior end is frequently high as if slightly expanded, but at other times the greatest height lies further forward. Some measurements will illustrate the variation in the proportions:

	Length	Height	$\frac{\text{Height}}{\text{Length}}$	Breadth	$\frac{\text{Breadth}}{\text{Length}}$
Ingolf St. 116	13 mm.	11 mm.	84.6 %	7.5 mm.	57.7 %
— - —	12.3 -	10 -	81.3 -	7 -	56.9 -
— - 106	12 -	10 -	83.3 -	6.3 -	52.5 -

In addition to from the "Ingolf" stations mentioned above, it is also present from East Greenland, from:

N. of Stewart Island	158 fm., clay with stones.	2 spec.
Fleming Inlet	118 - , clay.	1 —

At East Greenland it has also been taken by the "Belgica" at:

75°58.5' N. L., 14°08' W. L.	158 fm., bottom-temp. 0.40° C.	1 spec.
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Further, we have it from:

70°32' N. L., 8°10' W. L. (S. of Jan Mayen)	470 fm.	1 spec.
63°03' N. L., 9°28' W. L. (N. W. of Færoes).	275 - , botm.-temp. 0.97 C.	1 spec. & 1 valve.

¹⁾ Against this we have seemingly Friele and Jeffreys' statement, that the inner margin in *A. acuticostata* is smooth, but in my material I have found specimens with crenulated margin.

62°35' N. L., 4° 4' W. L. (E. of the Færoes)

335—345 fm., clay, botm.-temp. —0.90 C. 2 spec. & 1 valve.

62°40' - - 1°56' E. L. (between the Færoes

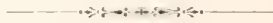
and Norway) 360 - , botm.-temp. —0.3 C. 3 spec.

The Norwegian North Atlantic Expedition took it off Spitzbergen, Jan Mayen, East Iceland and northern and western Norway, at depths of 223—649 fm. and temperatures of as a rule below 0° C. (down to —1.3° C.), more rarely a little above 0° C. (to 1.5° C.). The Expeditions "Lightning" and "Porcupine" took it in the Færoe Channel, at depths of 345—550 fm. and temperatures of ca. 0° C.

We may say regarding the variety *acuticostata* Jeffr., consequently, that it is mainly bound to the "cold area", but that it may also occur on the boundary region to the cold area¹⁾.

Distribution. *Astarte crenata* Gray is an arctic species, which is known from the north and east coast of America down to Maine, Greenland, Jan Mayen, North and East Iceland, Norway down to the Lofotens, Murman Sea, Barents Sea, Spitzbergen, Kara Sea and Polar Sea of Siberia. The bathymetric distribution is 5—650 fm.

¹⁾ Jeffreys (l. c.) records *Astarte acuticostata* from the Osterfjord at Bergen, but I think this statement incorrect; Friele and Grieg also say (l. c.), that they have not observed it there, although they have dredged a good deal at the place. — Jeffreys gives Leche as his authority for its occurrence at Nova Zembla, but I have not been able to find, where Leche mentions it.



Corrigenda.

P. 32, l. 17 from bottom, for "410—05 fm." r. "410—705 fm."

Plate I.



Plate I.

Fig. 1. *Anomia patelliformis* L.

- a. The upper valve, showing the position of umbo. $\times 1\frac{1}{2}$. The Færoes.
- b. The lower valve, showing the size and form of the notch. $\times 1$. South Iceland, ca. 20 fm.
- c. The upper valve from the inside, showing the two muscular impressions (one of the adductor, one of the byssus muscle). $\times 1$. The Færoes.

— 2. *Anomia squamula* L.

- a. The upper valve, showing the position of the umbo. $\times 1\frac{1}{2}$. West Iceland (Dyrafjördr).
- b. The lower valve of the same specimen, showing the size and form of the notch. $\times 1\frac{1}{2}$.
- c. The upper valve from the inside, showing the two muscular impressions (one of the adductor, one of the byssus muscle). $\times 1\frac{1}{2}$. South Iceland, 58 fm.
- d. Var. *aculeata* Müller. The upper valve showing the spinous surface. $\times 1\frac{1}{2}$. West Iceland, 19 $\frac{1}{2}$ fm.

— 3. *Anomia ephippium* L.

- The upper valve from the inside, showing the three muscular impressions (one of the adductor, two of the byssus musculature). $\times 1$. The Mediterranean.

— 4. *Pecten islandicus* Müller.

- a. A part of the shell, to show the rasp-like structure, characteristic of the species. $\times 7$. Of a specimen from East Iceland, 35—55 fm.
- b. The rasp-like structure disappears on the lower part of the shell, where the radiating ribs lie very close and are covered with scales. $\times 10$. Of a specimen from West Iceland, 4—7 fm.
- c & d. A very small specimen to show that its sculpture is quite different from that of the older. $\times 11$. East Iceland, 52—43 fm.

— 5. *Pecten aratus* Gmelin.

- a & b. A specimen with well marked, primary ribs. $\times 1$. S. W. of Iceland, 295 fm. (Ingolf St. 9).
- c & d. A specimen with the radiating ribs more equally developed. $\times 1$. S. of Iceland, 268 fm.
- e. A part of the shell figured in 5 d; the radiating ribs are rough from small, down-turned scales (almost as in *P. islandicus*, comp. fig. 4 b, but it lacks the intercostal rasp-like structure of the latter). $\times 12$.

— 6. *Pecten septemradiatus* Müller.

- a & b. A specimen with relatively many folds and provided with small spines, especially on the left valve (var. n. *scaber*). $\times 1$. S. W. of Iceland, 295 fm. (Ingolf St. 9).
- c. A part of the left valve to show that the radiating striae are densely beset with sharp scales. $\times 9$.

— 7. *Pecten frigidus* Jensen.

- a, b & e. A specimen from the Norwegian Sea, 1010 fm. (Ingolf St. 119). $\times 1\frac{1}{2}$.
- c & d. A specimen from the Norwegian Sea, 1060 fm. (Ingolf St. 118). $\times 1\frac{1}{2}$.
- f. A very young specimen from the Ingolf St. 119. $\times 7$.

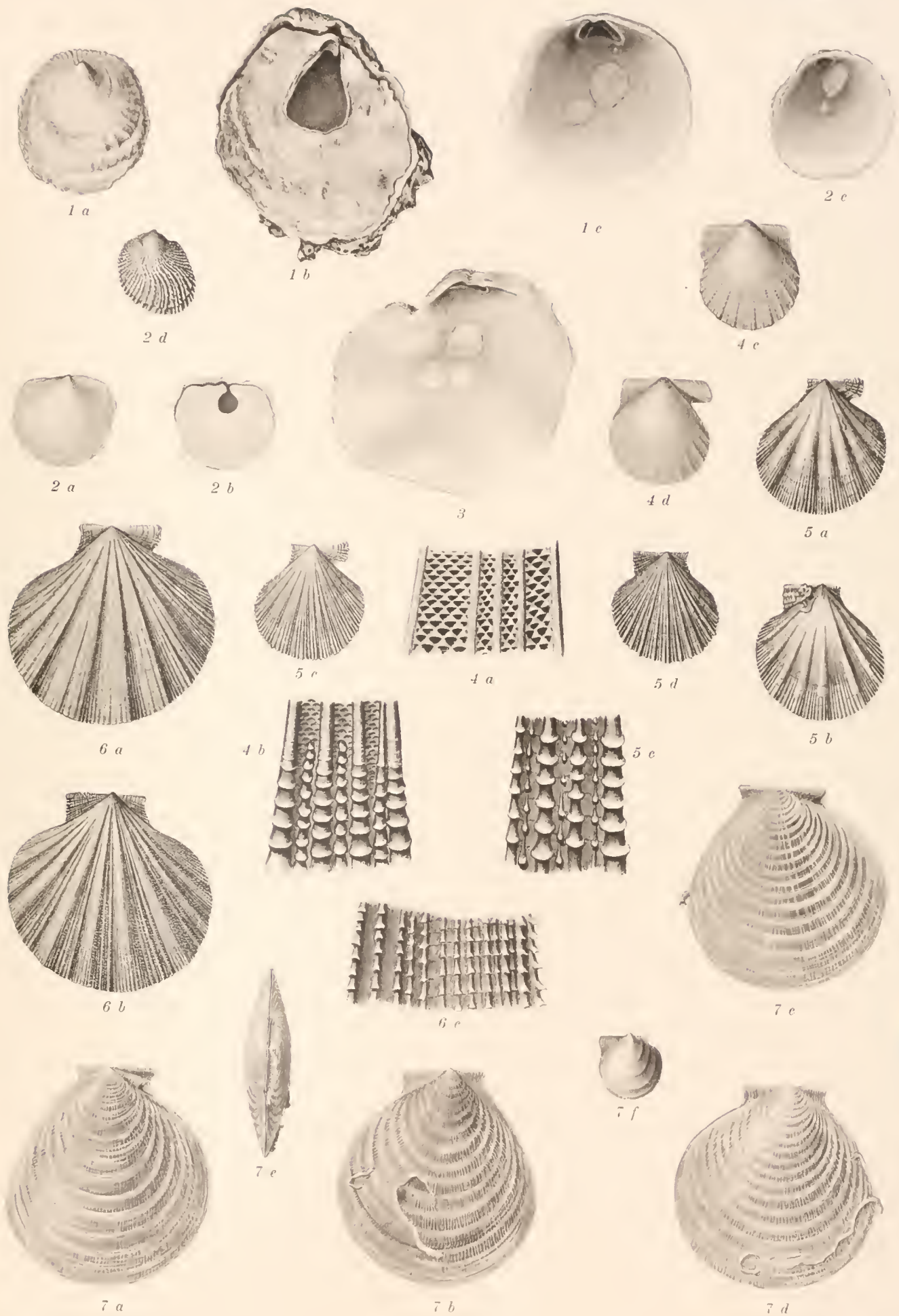


Plate II.

Plate II.

Fig. 1. *Pecten imbrifer* Lovén var. *major* Leche, the left valve.

- a. A specimen with few, distant rows of very small outgrowths. $\times 1\frac{1}{2}$. East Greenland (Forsblads Fjord), 50–90 fm.
 - b. A specimen with many rows of outgrowths. $\times 1\frac{1}{2}$. East Greenland (Forsblads Fjord), 50–90 fm.
 - c. A specimen with larger and fewer, rather vaulted outgrowths. $\times 1\frac{1}{2}$. East Greenland (Forsblads Fjord), 50–90 fm.
 - d. Almost all the vesicular outgrowths are broken off. $\times 1\frac{1}{2}$. S. of Jan Mayen, 86 fm.
 - e. The vesicles are so broad and flat, that they almost meet one another. $\times 1\frac{1}{2}$. East Greenland (Forsblads Fjord), 50–90 fm.
 - f. The vesicles are fused together to concentric wrinkles, which are in general broken, so that only remnants of them remain as sharp combs (var. *lamellosa* Posselt). $\times 2$. West Greenland ($72^{\circ}4' N. L.$, $59^{\circ}50' W. L.$), 227 fm. After Posselt.
 - g. A part of the shell showing the pored outgrowths or vesicles. $\times 12$.
 - h. A single pored vesicle, more magnified.
 - i. A part of a shell, near the umbo, where the vesicles are rubbed off, so that the lines of growth appear like cogs on a cog-wheel. $\times 5$.
2. *Pecten imbrifer* Lovén var. n. *minor*, the left valve.
 - a. A shell in which the very small outgrowths mainly appear only towards the margin. $\times 2$. S. W. of Iceland, 485 fm. (Ingolf St. 81).
 - b. A specimen almost quite smooth. $\times 2\frac{1}{2}$. S. of Iceland, 500 fm.
 3. *Amussium lucidum* Jeffreys.
 - a. A right valve from the outer side. $\times 2$. Denmark Strait, 788 fm. (Ingolf St. 10).
 - b. A left valve from the outer side. $\times 2$. The same locality.
 - c. The same valve as in fig. a, but seen from the inner side. $\times 2$.
 4. *Lima gwyni* Sykes.
 - a & b. A specimen from Norway (Bergen). $\times 1\frac{1}{2}$.
 - c. A part of the shell showing the serrate radiating ribs. $\times 30$.
 5. *Lima hyperborea* Jensen.
 - a & b. A specimen from East Greenland (Forsblads Fjord), 90–50 fm. $\times 1\frac{1}{2}$.
 - c & d. The same specimen seen from in front and from above. $\times 1\frac{1}{2}$.
 - e. A part of the shell showing the sharp radiating ribs. $\times 18$.
 6. *Lima subauriculata* Montagu.
 - a & b. A specimen from West Greenland (Ritenbenk). $\times 3$.
 - c. A part of the shell showing the radiating ribs. $\times 20$.
 7. *Lima similis* n. sp.
 - a & b. A specimen from the Bay of Biscay, 250–790 fm. ("Thor", 1906), $\times 3$.
 - c. A part of the shell showing the radiating ribs. $\times 20$.
 8. *Lima subovata* Jeffreys.
 - a & b. A specimen from Davis Strait, 1435 fm. (Ingolf St. 36). $\times 4$.
 - c. A part of the shell showing the numerous radiating ribs. $\times 20$.
 9. *Lima ingolfiana* n. sp.
 - a. A right valve from W. of Iceland, 568 fm. (Ingolf St. 90). $\times 4$.
 - b. A left valve from S. W. of Iceland, 799 fm. (Ingolf St. 78). $\times 4$.
 - c. The dorsal margin of the shell seen from the inner side. \times ca. 18.
 - d. A part of the shell showing its finely scaled or spined radiating ribs. $\times 30$.
 10. *Lima jeffreysi* Fischer.
 - a. A left valve from S. of Iceland, 500 fm. ("Thor", 1903). $\times 2$.
 - b. A right valve from S. of Iceland, 293 fm. ("Thor", 1903). $\times 2$.
 - c. A part of the shell showing its squamular, radiating ribs. $\times 12$.
 11. *Lima sarsii* Lovén.
 - a & b. A right and a left valve, from Norway (Bergen). $\times 5$ & 4.
 - c. The upper part of the shell seen from the inner side, to show the crenulated cardinal margin. $\times 30$.
 - d. A part of the shell showing its densely and coarsely scaled surface. $\times 30$.

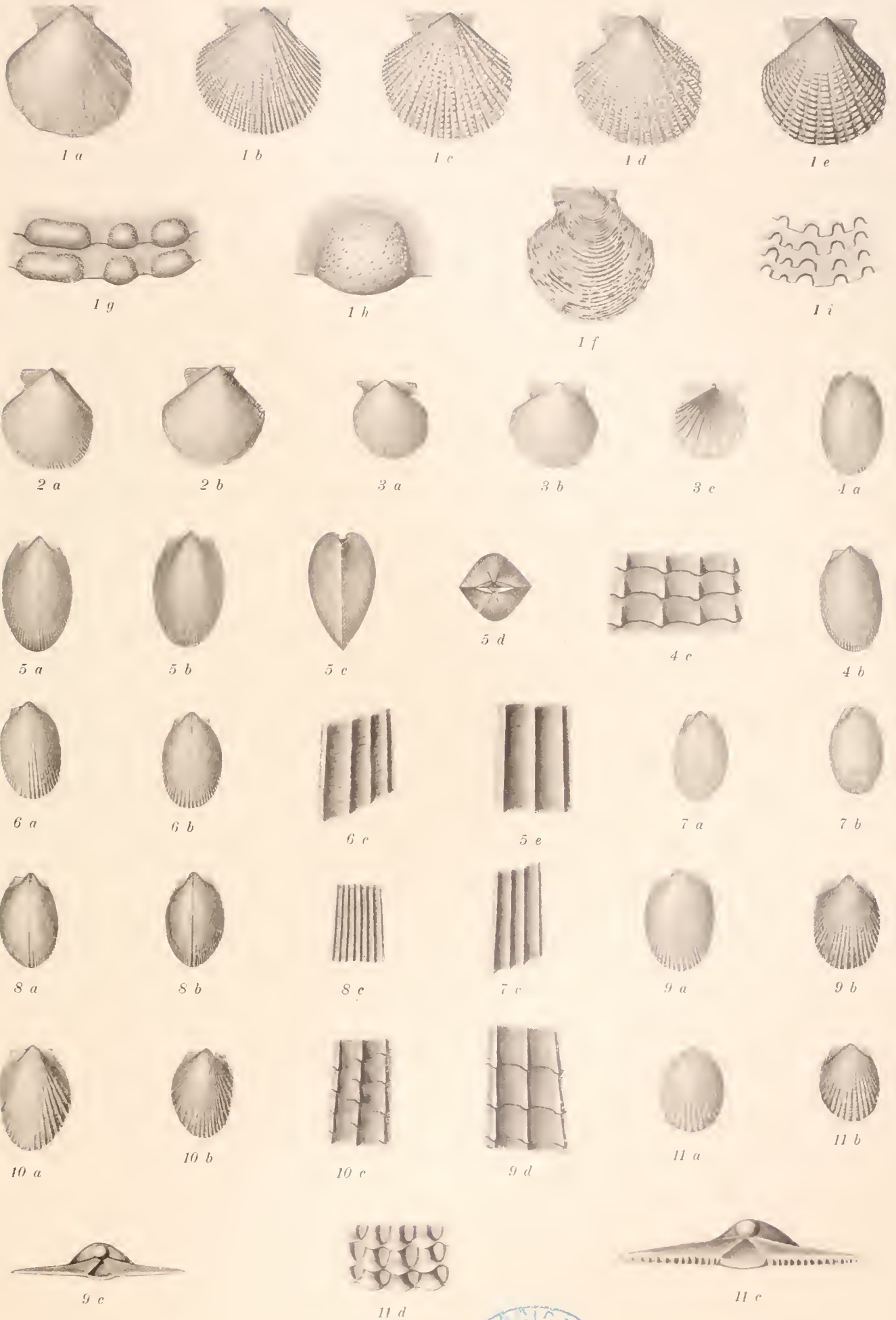


Plate III.

Plate III.

- Fig. 1. *Modiola modiolus* L., young.
a. A left valve from the inner side. $\times 3/4$. Iceland.
b. The anterior end of the same valve. $\times 7$.
- 2. *Modiola phascolina* Philippi.
a. A left valve from the inner side. $\times 1$. Iceland.
b. The anterior end of the same valve. $\times 8$.
- 3. *Idas argenteus* Jeffreys.
a. A left valve from the outer side. $\times 6\frac{1}{2}$. S. of Iceland, 975 fm. (Ingolf St. 67).
b. A left valve from the outer side, without the hairy periostracum. $\times 12$.
c. A specimen from the upper side. $\times 12$.
d. Hinge of right valve. $\times 10$.
e. Hinge of the same. $\times 20$.
- 4. *Modiolaria discors* L. var. *laevigata* Gray.
a. A specimen from Spitzbergen. $\times 1$.
b. Dorsal view of the same. $\times 1$.
- 5. *Modiolaria discors* L. var. *substriata* Gray.
a. A specimen from West Greenland. $\times 1$.
b. Dorsal view of the same. $\times 1$.
c. A part of the middle area to show its "smooth" (simply striated) surface. $\times 8$.
- 6. *Modiolaria discors* L.
a. A specimen from Denmark. $\times 2$.
b. Dorsal view of the same. $\times 2$.
- 7. *Modiolaria corrugata* Stimpson.
a. A specimen from Spitzbergen. $\times 1\frac{1}{2}$.
b. A specimen from West Greenland (Fiskenæsset). $\times 1\frac{1}{2}$.
c. Dorsal view of the same. $\times 1\frac{1}{2}$.
d. A part of the middle area to show its shagreen-like wrinkled surface. $\times 5$.
- 8. *Modiolaria faba* (Müller) Fabricius.
a. A specimen from West Greenland (Ritenbenk). $\times 1$.
b. Dorsal view of the same. $\times 1$.
c. Interior of the right valve. $\times 1$.
- 9. *Cardium fasciatum* Montagu.
a & b. A specimen of the short, strongly ventricose form. $\times 1\frac{2}{3}$. Færoes, 20—30 fm.
c & d. A specimen of the somewhat elongated, not much tumid form. $\times 3$. West Iceland (Onundarfjördr), ca. 12 fm.
e. A specimen with tubercles not only on the anterior and posterior area, but also on the middle area. $\times 6$. West Iceland (Onundarfjördr), ca. 12 fm.
f. That form which was confused by Mörch with *C. edule* L. $\times 1\frac{2}{3}$. Færoes.
g. The same half from in front. $\times 3$.
h. The same half from behind. $\times 3$.
i. A specimen with an obliquely cordiform contour. $\times 8\frac{1}{2}$. Færoes, 135 fm.
k. A specimen half from behind showing an intercostal sculpture in the form of a fine pricking. $\times 5$. West Iceland (Onundarfjördr), ca. 12 fm.
- 10. *Cardium ciliatum* Fabricius.
A very young specimen. $\times 10\frac{1}{2}$. East Iceland (Bakkafjördr), 52—43 fm.
- 11. *Cardium echinatum* L.
A very young specimen. $\times 10\frac{1}{2}$. South Iceland, 17—23 fm.
- 12. *Cardium (Scrippes) groenlandicum* Chemnitz.
a. A very young, strongly sculptured specimen. $\times 6$. West Greenland (Godthaabs Fjord).
b. A very young, comparatively smooth specimen. $\times 5$. West Iceland (Onundarfjördr), 10 fm.

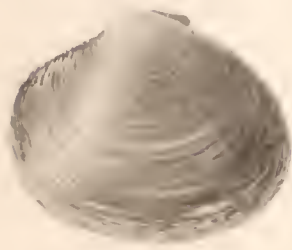


Plate IV.

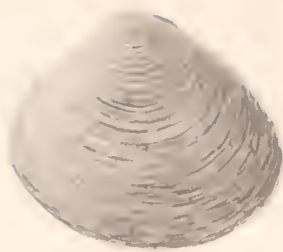
Plate IV.

Fig. 1. *Astarte borcalis* Chemnitz.

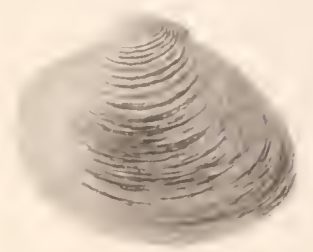
- a. A specimen without folds and with an almost smooth periostracum. $\times 1$. West Iceland, 22 fm.
- b. The same from above.
- c. A very high form, with quite narrow folds on the uppermost part of the shell and with fairly thick, fibrous periostracum on the lowest part. $\times 1$. West Iceland (Faxafjördr), 8—11 $\frac{1}{2}$ fm.
- d & e. A strongly compressed form with distinct folds on the uppermost part of the shell. $\times 1$. West Greenland.
- f. A very elongated form from East Greenland (Hekla Havn). $\times 1\frac{1}{2}$.
- 2. *Astarte Montagu* Dillwyn.
 - a. Forma *typica*, a short and high, somewhat triangular form. $\times 1\frac{1}{2}$. West Iceland (Faxafjördr), 15—16 fm.
 - b. Var. *striata* (Leach) Sars, a more elongated form. $\times 1\frac{1}{2}$. West Greenland (Jakobshavn).
 - c. Var. *Warhami* Hancock, an elongated, elliptical form. $\times 1$. East Greenland (Hurry Inlet), 10 fm.
- 3. *Astarte sulcata* da Costa.
 - a & b. A typical specimen from the Færoes, 150 fm. $\times 1$.
 - c. A specimen with comparatively close-placed ribs, from Denmark Strait off south-eastern Greenland (Ingolf St. 94), 204 fm. $\times 1$.
- 4. *Astarte elliptica* Brown.
 - a & b. A typical specimen from the Færoes (Klaksvig), 10—15 fm. $\times 1$.
 - c & d. A very elongated form, from East Greenland (Hekla Havn). $\times 1$.
 - e & f. A very high and convex form, from West Greenland. $\times 1$.
 - g. A specimen in which the folds disappear almost about the middle of the shell. $\times 1$. West Greenland (Vaigat).
- 5. *Astarte crenata* Gray.
 - a & b. A typical specimen from East Greenland (Hurry Inlet), 50 fm. $\times 1$.
 - c. A specimen with fewer and more prominent ribs. $\times 1$. East Greenland (Cape Hope), 121 fm.
 - d & e. A specimen of var. *subaquilatera* Sowerby. $\times 1$. Davis Strait (Ingolf St. 32), 318 fm.
 - f & g. A specimen of var. *crebricostata* Mc. Andr. & Forbes. $\times 1$. North Iceland (Skagestrands Bugt), 119 fm.
 - h & i. A specimen of var. *inflata* Hägg. $\times 1\frac{1}{2}$. East Greenland (Forsblads Fjord), 90—50 fm.
 - k & l. A specimen of var. *acuticostata* Jeffreys. $\times 1\frac{1}{2}$. S. of Jan Mayen (Ingolf St. 116), 371 fm.
 - m. A part of the shell, more magnified.



1 a



1 c



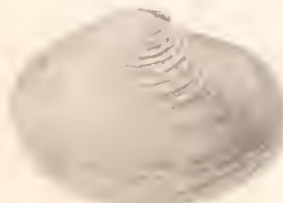
1 d



2 a



1 b



1 f



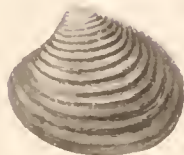
1 e



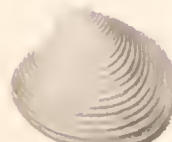
2 b



3 b



3 a



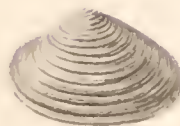
3 e



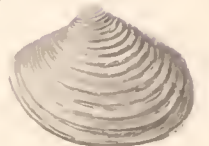
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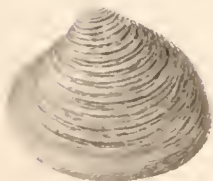
2 c



4 c



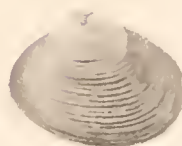
4 a



4 e



4 d



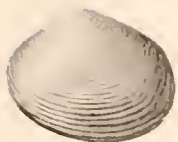
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4 f



4 g



5 a



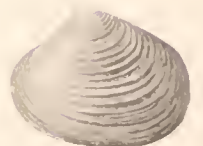
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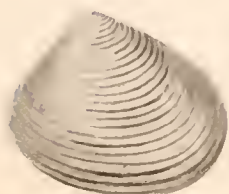
5 g



5 e



5 d



5 f



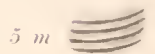
5 i



5 h



5 l



5 m



5 k



THE INGOLF-EXPEDITION

1895—1896.

THE LOCALITIES, DEPTHS, AND BOTTOMTEMPERATURES OF THE STATIONS.

Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.
1	62° 30'	8° 21'	132	7°2	24	63° 06'	56° 00'	1199	2°4	45	61° 32'	9° 43'	643	4°17
2	63° 04'	9° 22'	262	5°3	25	63° 30'	54° 25'	582	3°3	46	61° 32'	11° 36'	720	2°40
3	63° 35'	10° 24'	272	0°5		63° 51'	53° 03'	136		47	61° 32'	13° 40'	950	3°23
4	64° 07'	11° 12'	237	2°5	26	63° 57'	52° 41'	34	0°6	48	61° 32'	15° 11'	1150	3°17
5	64° 40'	12° 09'	155			64° 37'	54° 24'	109		49	62° 07'	15° 07'	1120	2°91
6	63° 43'	14° 34'	90	7°0	27	64° 54'	55° 10'	393	3°8	50	62° 43'	15° 07'	1020	3°13
7	63° 13'	15° 41'	600	4°5	28	65° 14'	55° 42'	420	3°5	51	64° 15'	14° 22'	68	7°32
8	63° 56'	24° 40'	136	6°0	29	65° 34'	54° 31'	68	0°2	52	63° 57'	13° 32'	420	7°87
9	64° 18'	27° 00'	295	5°8	30	66° 50'	54° 28'	22	1°05	53	63° 15'	15° 07'	795	3°08
10	64° 24'	28° 50'	788	3°5	31	66° 35'	55° 54'	88	1°6	54	63° 08'	15° 40'	691	3°9
11	64° 34'	31° 12'	1300	1°6	32	66° 35'	56° 38'	318	3°9	55	63° 33'	15° 02'	316	5°9
12	64° 38'	32° 37'	1040	0°3	33	67° 57'	55° 30'	35	0°8	56	64° 00'	15° 09'	68	7°57
13	64° 47'	34° 33'	622	3°0	34	65° 17'	54° 17'	55		57	63° 37'	13° 02'	350	3°4
14	64° 45'	35° 05'	176	4°4	35	65° 16'	55° 05'	362	3°6	58	64° 25'	12° 09'	211	0°8
15	66° 18'	25° 59'	330	-0°75	36	61° 50'	56° 21'	1435	1°5	59	65° 00'	11° 16'	310	-0°1
16	65° 43'	26° 58'	250	6°1	37	60° 17'	54° 05'	1715	1°4	60	65° 09'	12° 27'	124	0°9
17	62° 49'	26° 55'	745	3°4	38	59° 12'	51° 05'	1870	1°3	61	65° 03'	13° 06'	55	0°4
18	61° 44'	30° 29'	1135	3°0	39	62° 00'	22° 38'	865	2°9	62	63° 18'	19° 12'	72	7°92
19	60° 29'	34° 14'	1566	2°4	40	62° 00'	21° 36'	845	3°3	63	62° 40'	19° 05'	800	4°0
20	58° 20'	40° 48'	1695	1°5	41	61° 39'	17° 10'	1245	2°0	64	62° 06'	19° 00'	1041	3°1
21	58° 01'	44° 45'	1330	2°4	42	61° 41'	10° 17'	625	0°4	65	61° 33'	19° 00'	1089	3°0
22	58° 10'	48° 25'	1845	1°4	43	61° 42'	10° 11'	645	0°05	66	61° 33'	20° 43'	1128	3°3
23	60° 43'	56° 00'			44	61° 42'	9° 36'	545	4°8	67	61° 30'	22° 30'	975	3°0

Only the Plankton-Net used

Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.
68	62° 06'	22° 30'	843	3°4	92	64° 44'	32° 52'	976	1°4	118	68° 27'	8° 20'	1060	-1°0
69	62° 40'	22° 17'	589	3°9	93	64° 24'	35° 14'	767	1°46	119	67° 53'	10° 19'	1010	-1°0
70	63° 09'	22° 05'	134	7°0	94	64° 56'	36° 19'	204	4°1	120	67° 29'	11° 32'	885	-1°0
71	63° 46'	22° 03'	46			65° 31'	30° 45'	213		121	66° 59'	13° 11'	529	-0°7
72	63° 12'	23° 04'	197	6°7	95	65° 14'	30° 39'	752	2°1	122	66° 42'	14° 44'	115	1°8
73	62° 58'	23° 28'	486	5°5	96	65° 24'	29° 00'	735	1°2	123	66° 52'	15° 40'	145	2°0
74	62° 17'	24° 36'	695	4°2	97	65° 28'	27° 39'	450	5°5	124	67° 40'	15° 40'	495	-0°6
	61° 57'	25° 35'	761		98	65° 38'	26° 27'	138	5°9	125	68° 08'	16° 02'	729	-0°8
	61° 28'	25° 06'	829		99	66° 13'	25° 53'	187	6°1	126	67° 19'	15° 52'	293	-0°5
75	61° 28'	26° 25'	780	4°3	100	66° 23'	14° 02'	59	0°4	127	66° 33'	20° 05'	44	5°6
76	60° 50'	26° 50'	806	4°1	101	66° 23'	12° 05'	537	-0°7	128	66° 50'	20° 02'	194	0°6
77	60° 10'	26° 59'	951	3°6	102	66° 23'	10° 26'	750	0°9	129	66° 35'	23° 47'	117	6°5
78	60° 37'	27° 52'	799	4°5	103	66° 23'	8° 52'	579	0°6	130	63° 00'	20° 40'	338	6°55
79	60° 52'	28° 58'	653	4°4	104	66° 23'	7° 25'	957	1°1	131	63° 00'	19° 09'	698	4°7
80	61° 02'	29° 32'	935	4°0	105	65° 34'	7° 31'	762	-0°8	132	63° 00'	17° 04'	747	4°6
81	61° 44'	27° 00'	485	6°1	106	65° 34'	8° 54'	447	-0°6	133	63° 14'	11° 24'	230	2°2
82	61° 55'	27° 28'	824	4°1		65° 29'	8° 40'	466		134	62° 34'	10° 26'	299	4°1
83	62° 25'	28° 30'	912	3°5	107	65° 33'	10° 28'	492	-0°3	135	62° 48'	9° 48'	270	0°4
	62° 36'	26° 01'	472		108	65° 30'	12° 00'	97	1°1	136	63° 01'	9° 11'	256	4°8
	62° 36'	25° 30'	401		109	65° 29'	13° 25'	38	1°5	137	63° 14'	8° 31'	297	-0°6
84	62° 58'	25° 24'	633	4°8	110	66° 44'	11° 33'	781	0°8	138	63° 26'	7° 56'	471	-0°6
85	63° 21'	25° 21'	170		111	67° 14'	8° 48'	860	-0°9	139	63° 36'	7° 30'	702	-0°6
86	65° 03'6	23° 47'6	76		112	67° 57'	6° 44'	1267	-1°1	140	63° 29'	6° 57'	780	-0°9
87	65° 02'3	23° 56'2	110		113	69° 31'	7° 06'	1309	-1°0	141	63° 22'	6° 58'	679	-0°6
88	64° 58'	24° 25'	76	6°9	114	70° 36'	7° 29'	773	-1°0	142	63° 07'	7° 05'	587	-0°6
89	64° 45'	27° 20'	310	8°4	115	70° 50'	8° 29'	86	0°1	143	62° 58'	7° 09'	388	-0°4
90	64° 45'	29° 06'	568	4°4	116	70° 05'	8° 26'	371	-0°4	144	62° 49'	7° 12'	276	1°6
91	64° 44'	31° 00'	1236	3°1	117	69° 13'	8° 23'	1003	-1°0					



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