

MARY DORA ROGICK

BERGENS MUSEUM

HYDROGRAPHICAL AND BIOLOGICAL INVESTIGATIONS

IN

NORWEGIAN FIORDS

By

O. NORDGAARD

THE PROTIST PLANKTON AND THE DIATOMS IN BOTTOM SAMPLES

BY

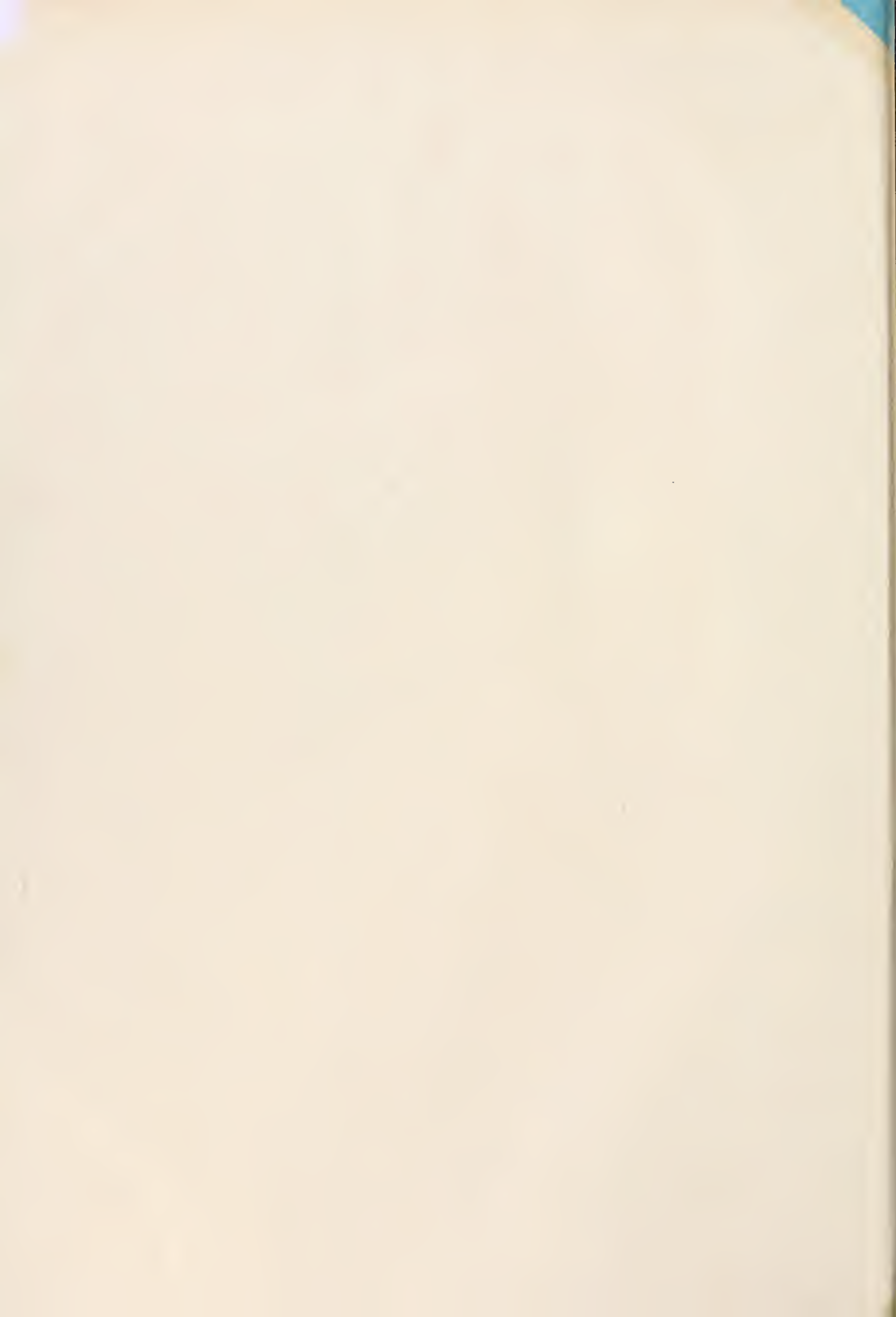
E. JØRGENSEN

WITH 21 PLATES AND 10 FIGURES IN THE TEXT



BERGEN  
JOHN GRIEG  
1905

1896-1-2



MARY DORA ROGICK

### III. BOTTOM-LIFE.

## NOTES.

When dredgings have been made, soundings, both at the start and finish of the haul, have generally been taken. So that when, for instance, Oxsund 450—630 m. is noted, it is to be understood that the depth was 630 m. where the dredge was thrown out, and 450 m. where the dredging was ended.

# A. Results of Dredgings.

## a. Dredging stations. 1899—1900.

Nr.	Date	Name	Dept in metres	Temperature of the bottom layer C°	Salinity of the bottom layer ‰	Nature of the bottom	Remarks
1	1899 13 <sup>1</sup> / <sub>2</sub>	Henningsværstrømmen	20—40	1.75	33.42	Stones and <i>Lithothamnion</i>	Between Ost- and Vestvaago.
2	14 <sup>1</sup> / <sub>2</sub>	Liland, Ostnesfjord	30—40			Clay	Ostvaago, Lofoten.
3	—	Langstrand	50—70			Pebbles	Ostvaago, Lofoten.
4	15 <sup>1</sup> / <sub>2</sub>	Skroven—Guldbrandsøerne				Clay	Ostlofoten.
5	16 <sup>1</sup> / <sub>2</sub>	Brettesnes—Skroven	350—410	6.3	35.08	Clay	Ostlofoten.
6	—	Mouth of Raftsund	250—300			Clay	Between Hindo and Ostvaago.
7	—	At Digermulen	100—150			Stones and sand	In Raftsund.
8	17 <sup>1</sup> / <sub>2</sub>	Oxsund	450—630	6.3	35.08	Clay	Between Hammero and Lundo.
9	18 <sup>1</sup> / <sub>2</sub>	Sagfjord	200	6.4	34.89	Clay	At the inner end of Furnnesvæggen.
10	22 <sup>1</sup> / <sub>2</sub>	Mortsund I	230	6.6	35.03	Clay	SE of Mortsund.
11	—	Mortsund II				Clay	SE of Mortsund.
12	—	Mortsund III	100—120			Sand and stones	SE of Mortsund.
13	1 <sup>1</sup> / <sub>3</sub>	Moskenstrømmen I	204	6.6	34.97	Sand and clay	Between Væro and Moskeneso.
14	—	Moskenstrømmen II	150	5.9	34.40	Shells and stones	Between Væro and Moskeneso.
15	3 <sup>1</sup> / <sub>3</sub>	Kirkfjord I	108—130	2.7	33.48	Clay	At little inside the Vorfjord.
16	—	Kirkfjord II	50	2.5	33.40	Clay?	In the middle of the Kirkfjord.
17	—	Kirkfjord III	70—80			Clay and stones	At Tennes.
18	—	Kirkfjord IV	30—50			Shells and clay	In the Vorfjord.
19	4 <sup>1</sup> / <sub>3</sub>	Reine I	150	6.7	34.70	Sand	11 miles SE of Reine.
20	6 <sup>1</sup> / <sub>3</sub>	Ure I	230	6.8	34.97	Clay	9 <sup>1</sup> / <sub>2</sub> miles SSE of Ure.
21	—	Henningsvær I	140	6.2	34.52	Rocky	6 miles SW b W 1 <sup>1</sup> / <sub>2</sub> W of Henningsvær.
22	10 <sup>1</sup> / <sub>3</sub>	Risværflaket	150—180	1.6	33.40	Clay	Outside the Ogstfjord, off the Pundsletvaag.
23	14 <sup>1</sup> / <sub>3</sub>	Ogstfjord I	100	2.1	33.10	Clay	At the head of the fjord.
24	16 <sup>1</sup> / <sub>3</sub>	Tranodybet	450—530	6.3	35.06	<i>Lophohelia</i>	Between Trano and Lodingen.
25	—	Tranodybet	607—640	6.3	35.06	Clay	Between Trano and Lodingen.
26	17 <sup>1</sup> / <sub>3</sub>	Kanstadfjord, inside the ridge	30—90	1.6	33.48	Sand, clay and stones	At Hindo.
27	—	Kanstadfjord, outside the ridge	95	4.4	34.06	Rocky	At Hindo.
28	22 <sup>1</sup> / <sub>3</sub>	Røsthavet	350—500	4.05	35.13	?	68° 3' N., 10° 0.5' E.
29	24 <sup>1</sup> / <sub>3</sub>	Rost I	120	4.25	34.60	Fragments of shells	Outside Rost.
30	—	Rost II	100	4.85	34.79	Pebbles and fragm. of shells	Outside Rost.
31	25 <sup>1</sup> / <sub>3</sub>	Rost II	150	6.7	35.11	Fragments of shells	Inside Rost.
32	28 <sup>1</sup> / <sub>3</sub>	Tysfjord I	500	6.3	35.11	<i>Lophohelia</i>	Inside Skarberget.
33	7 <sup>1</sup> / <sub>4</sub>	Stene	120—200	6.6	34.99	Rocky	Vestlofoten.
34	—	Reine	100	4.5	34.42	Rocky	Vestlofoten.
35	—	Moskenstrømmen	90	4.1	34.29	Stones	Between Moskeneso and Væro.
36	11 <sup>1</sup> / <sub>4</sub>	Gaukværo	250	5.2	34.86	Clay	68° 34' N., 14° 17' E.
37	14 <sup>1</sup> / <sub>4</sub>	Malangenfjord	380	4.1	34.67	Clay	Off Stønnesbotn.
38	—	Malangen II	100—200			Clay, Rocky	Between Stønnesbotn and Lysbotn.
39	—	Malangen III	200	3.7	34.54	Clay, Rocky	Between Stønnesbotn and Lysbotn.
40	15 <sup>1</sup> / <sub>4</sub>	Stønnesbotn	40—80			Rocky	At Senjen Island.
41	19 <sup>1</sup> / <sub>4</sub>	Kvænangen II	90	0.75	34.21	Clay, Stones	At Noklen island.
42	20 <sup>1</sup> / <sub>4</sub>	Jokelfjord I	110	1.0	34.29	Clay	At the head of the fjord.
43	—	Jokelfjord II	80			Clay	At the head of the fjord.
44	21 <sup>1</sup> / <sub>4</sub>	Jokelfjord III	110	1.4	34.35	Rocky	Off Tverfjord.
45	—	Kvænangen	300—343	2.3	34.49	Clay	Between Spildern and the northern mainland.
46	24 <sup>1</sup> / <sub>4</sub>	Ingohavet	270—315	3.45	35.24	Rocky	71° 10' N., 23° 10' E.
47	25 <sup>1</sup> / <sub>4</sub>	Troldfjordsund	30—40			Sand	Between Ingo and Rolfso.
48	—	Breisund	100	1.7	34.54	Sand, Rocky	Between Havo and Hjelmso.
49	26 <sup>1</sup> / <sub>4</sub>	Repvaag harbour	10			Sand	In Porsangerfjord.
50	27 <sup>1</sup> / <sub>4</sub>	Porsangerfjord	200	0.2	34.48	Clay, Rocky?	Between Great and Little Tamso.
51	—	Porsangerfjord	70			Rocky	Between Great and Little Tamso.
52	—	Porsangerfjord	30—50			Pebbles, <i>Lithothamnium</i>	Between Great and Little Tamso.
53	3 <sup>1</sup> / <sub>5</sub>	Lyngenfjord II	250	2.85	34.97	Clay	Off the Kaatfjord.
54	—	Lyngen III	320	3.65	34.84	Clay	Between ytre Gamvik and Ulo.
55	1900 23 <sup>1</sup> / <sub>3</sub>	Ostnesfjord I	20—30			Stones and <i>Lithothamnium</i>	At the head of the fjord.
56	—	Ostnesfjord II					Between Vaterfjord and Folstad.
57	—	Ostnesfjord III					Off Helle.
58	28 <sup>1</sup> / <sub>3</sub>	Balstad	150—180				Vestlofoten.
59	30 <sup>1</sup> / <sub>3</sub>	Landego	400	6.2	35.13	Clay	67° 22' N., 14° 4' E.
60	—	Arno	300—400	6.55	35.18	Rocky	67° 11' N., 14° 2' E.
61	—	Sund harbour	0			Sand	In Gildeskaal.
62	31 <sup>1</sup> / <sub>3</sub>	Morsdalfjord (S. Beierfjord)	50—150			Clay	Between Sandhorno and Sund.

Nr.	Date	Name	Depth metres	Temperature of the bottom layer C°	Salinity of the bottom layer ‰	Nature of the bottom	Remarks
63	1900 31 <sup>3</sup> / <sub>4</sub>	N. Beiersfjord.....	50			Fragments of shells	Between Sandhornø and Beieren.
64	—	Skjerstadvfjord I.....	30—50			Sand, Clay	The head of Skjerstadvfjord.
65	—	Skjerstadvfjord II.....	100—185	3.35	33.99	Clay	1 <sup>1</sup> / <sub>2</sub> miles from the end.
66	—	Skjerstadvfjord III.....	230	3.2	33.99	Rocky	
67	—	Skjerstadvfjord IV.....	330	3.15	34.04	Clay	
68	3 <sup>3</sup> / <sub>4</sub>	Skjerstadvfjord VI.....	100—150			Clay	At Fauske.
69	—	Skjerstadvfjord VII.....	470—490	3.15	33.99	Clay	Off Fauske.
70	—	Skjerstadvfjord VIII.....	490			Clay	
71	—	Skjerstadvfjord IX.....	30—50			Rocky	
72	—	Skjerstadvfjord X.....	10—30			<i>Lithothamnion</i>	Mouth of the Misværdfjord.
73	—	Skjerstadvfjord XI.....	50			Shells	Misværdfjord.
74	4 <sup>4</sup> / <sub>4</sub>	Skjerstadvfjord XVI.....	10—20			Sand	Inside Saltstrømmen.
75	5 <sup>5</sup> / <sub>4</sub>	Saltenfjord I.....	15—20			Sand, Clay	Seivaagen.
76	—	Saltenfjord II.....	320—370	6.65	35.13	Clay	Inside the mouth.
77	6 <sup>6</sup> / <sub>4</sub>	Foldenfjord I.....	530	6.55	35.00	Clay	Between Hjerto and the southern mainland.
78	7 <sup>7</sup> / <sub>4</sub>	Grøto.....	6—24			Sand	

In the list of animals collected, I have also included some which I caught during a short trip to Finmark in the mouths of August and September 1894. I have added the year (1894), after the name of place, for all such.

## b. Outcome of Dredgings.

### *Porifera*.<sup>1)</sup>

W. LUNDBECK, Mag. scient., Copenhagen, determ.

*Asbestopluma pennatula*, O. SCHMIDT.

The Lyngen Fiord, 300 m.

*Cladorhiza abyssicola*, M. SARS.

The Salten Fiord, Skroven (Vest Fiord), 400 m.

*Bubaris vermiculata*, BOWERBANK.

Reine (the Vest Fiord), 150 m.

*Stylocordyle borealis*, LOVÉN.

The Skjerstad Fiord, 230 m.

*Tentorium semisuberites*, O. SCHMIDT.

The Skjerstad Fiord, 230 m.

*Halicnemis verticillata*, BOWERBANK.

Moskøenstrømmen, 200 m.

*Trichostemma hemisphaericum*, M. SARS.

The Lyngen Fiord, 250 m.

*Tethya lynceurium*, JOHNST.

The Porsanger Fiord, 200 m.

*Craniella cranium*, MÜLL.

The Sag Fiord, 200 m.

### *Hydrozoa*.

#### *Hydroida*.

MISS BONNEVIE, Kristiania, determ. Remarks by the author.

*Corymorpha sarsi*, STEENSTRUP.

Mehavn (1894).

*Tubularia imbricosa*, LIN.

Svolvær (1894); Balstad (1896); Breisund, 100 m.; the Porsanger Fiord, 200 m.

*Tubularia larynx*, ELL. & SOL.

Nordkyn (1894).

*Tubularia variabilis*, BONN.

The Porsanger Fiord, 200 m. This species has previously been found at Rauberget in the Trondhjem Fiord, and by the Norwegian North Atlantic Expedition at stations 325 and 362.

*Tubularia humilis*, ALLMAN.

Svolvær (1894); Nordkyn (1894).

*Perigonimus repens*, WRIGHT.

Balstad (1896). Has been observed from Bergen to Lofoten.

*Dicoryne conferta*, ALDER.

Svolvær (1894).

*Hydractinia echinata*, FLEMMING.

Svolvær (1894); Balstad (1896).

*Eudendrium ramcum*, PALL.

The Østnes Fiord.

<sup>1)</sup> Not many sponges were found, but those which were obtained were classified at once by Mag. LUNDBECK, together with material belonging to the Danish Ingolf expedition. Only a few species are noted here, the names of which Mr. LUNDBECK has kindly furnished me with.



*Eudendrium insigne*, HINCKS.

Moskenstrømmen. Only collected on the Norwegian coast in Moskenstrømmen.

*Eudendrium tenellum*, ALLMAN.

Moskenstrømmen.

*Halecium halecinum*, LIN.

Napstrømmen (1896); the North Cape (1894).

*Halecium labrosum*, ALDER.

Moskenstrømmen; the North Cape (1894).

*Halecium tortile*, BONN.

Balstad (1897). Up to the present, only known from Balstad (Lofoten).

*Halecium scutum*, CLARK.

The North Cape (1894); Nordkyn (1894).

*Halecium sessile*, NORMAN.

The North Cape (1894).

*Halecium schneideri*, BONN.

Nordkyn (1894).

*Lafoëa serpens*, HASSAL.

The Ingo Sea, 300 m.; Nordkyn (1894).

*Lafoëa abietina*, M. SARS.

Moskenstrømmen; Balstad (1897); The Ingo Sea, 300 m.; The North Cape (1894).

*Lafoëa gracillima*, ALDER.

Balstad (1897); The Ingo Sea, 300 m.; Malangen 100—200 m.

*Lafoëa dumosa*, FLEMMING.

Hammerfest (1894).

*Lafoëa fruticosa*, M. SARS.

Moskenstrømmen; Balstad (1897); Malangen, 100—200 m.; Hammerfest (1894); Sværholt (1894); The Porsanger Fiord, 200 m.

*Lafoëa symmetrica*, BONN.

The Ingo Sea, 300 m. This species has been found, in addition to the place here mentioned, at station 313 (The Norw. North Atl. Exp.).

*Campanularia verticulata*, LIN.

Malangen, 100—200 m.; Hammerfest (1894); The North Cape (1894); The Porsanger Fiord; Nordkyn.

*Campanularia geniculata*, MÜLL.

Svolvær (1894); The North Cape (1894); Nordkyn (1894).

*Campanularia dichotoma*, LIN.

The North Cape (1894).

*Campanularia hyalina*, HINCKS

Balstad (1897); The Porsanger Fiord, 200 m. Up to this time, the most northerly known limit was The Trondhjem Fiord.

*Campanularia johnstoni*, ALDER.

Balstad (1897); Hammerfest (1894); Mehamn (1894).

*Campanularia hincksi*, ALDER.

Balstad (1897).

*Campanularia calyculata*, HINCKS.

The North Cape (1894); Nordkyn (1894).

*Campanularia rotabilis*, LIN.

Moskenstrømmen; Balstad (1897).

*Campanularia syringa*, LIN.

Balstad (1897).

*Sertularella polyzonius*, LIN.

Hammerfest (1894); Breisund, 100 m.; The North Cape (1894); Nordkyn (1894).

*Sertularella trienspidata*, ALDER.

Moskenstrømmen; Hammerfest (1894); Ingohavet, 300 m.; Breisund; The North Cape (1894).

*Dynamena pumila*, LIN.

Malangen.

*Dynamena taurisca*, LIN.

Moskenstrømmen; Svolvær (1894); Hammerfest (1894).

*Thuiaria abietina*, LIN.

Moskenstrømmen; Hammerfest (1894); Nordkyn (1894).

*Thuiaria argentea*, ELL. & SOL.

The North Cape (1894).

*Thuiaria filicula*, ELL. & SOL.

Balstad (1897); Breisund, 100 m.; The North Cape (1894); Nordkyn (1894); Mehamn (1894).

*Thuiaria articulata*, PALL.

Malangen, 100—200 m.

*Thuiaria thuja*, LIN.

Svolvær (1894); Breisund, 100 m.; The North Cape (1894).

*Hydrallmania falcata*, LIN.

Svolvær (1894); The Kanstad Fiord, 20—90 m.

*Aglaophenia integra*, G. O. SARS.

Ingohavet, 300 m.

*Aglaophenia pourtalesi*, VERRILL.

Ingohavet, 300 m. The previously known distribution extended from Espevær to the Trondhjem Fiord.

*Antennularia antennina*, LIN.

Hammerfest (1894); Breisund.

Papers about hydroids: KRISTINE BONNEVIE, Hydroida. The Norw. North Atl. Exp.

On p. 98 *et seq.* of this work will be found a complete list of papers.

## Scyphozoa.

### *Lucernaria quadricornis*, MÜLL.

Hammerfest (1894); Møhavn (1894); The Skjerstad Fiord.

M. Sars has given a detailed description of this animal.<sup>1)</sup> He notes the following places where it has been found: Glesvær, Solsvik, Florø, Kinn, all of these being on the Bergen coast. My locality in the Skjerstad Fiord (S. XVI) lies just inside Saltstrømmen. Here several specimens of *Lucernaria* were found on algae at a depth of from 10—20 m.

## Anthozoa.

### Alcyonaria.

JAMES A. GRIEG determ. Remarks by the author.

#### *Alcyonium digitatum*, LIN.

The Skjerstad Fiord (S. X), 10—30 m. The locality in the Skjerstad Fiord is the northern limit for this species as far as is now known. Its distribution, according to Dr. WALTER MAY, is confined to Norway and England.<sup>2)</sup>

#### *Paraspongedes fruticosa*, M. Sars.

The Skjerstad Fiord (S. III), 230 m.; the sea NW of Røst, 700 m.; The Porsanger Fiord, 200 m.

The species is common in the Arctic Sea.

#### *Paraspongodes rosea*, DAN. & KOR.

Balstad, 80 m.

#### *Paramuricea placomus*, LIN.

Arnø, 300—400 m.

The species has not, up the present, been found north of this place. In „Beretning om en zoologisk Reise (1849)“ M. Sars mentions the following animals belonging to this group: *Prinnou lepadifera*, LIN., from the Ox Fiord and Hammerfest, and *Paragorgia arborea*, LIN., from the Ox Fiord. The last mentioned species has been taken at two stations (183—260 m.) in the Murman Sea by the Austro-Hungarian Expedition.<sup>3)</sup>

#### *Isidella hippuris*, GUNNERUS.

The Sag Fiord, 200 m.; Tranødybet, 607—640 m.; Oxsund, 600 m.; Brettesnes-Skroven, 350—400 m.

STORM has caught this species in the Trondhjem Fiord, according to GRIEG<sup>4)</sup>, and GUNNERUS mentions it from Smølen. Under the name of *Mopsea borealis* it is fully described by G. O. Sars<sup>5)</sup> from specimens caught at the fishing station Skroven in Lofoten.

#### *Pennatula aculeata*, DAN. & KOR.

At Risvær (Lofoten), 150—180 m.

#### *Kophobelemnion stelliferum*, O. F. MÜLL.

The Salten Fiord, 320—380 m., Landego, 400 m.

<sup>1)</sup> Cfr. *Fauna littoralis Norvegiæ*, Part I, pag. 20.

<sup>2)</sup> Cf. WALTER MAY, Beiträge zur Systematik und Chorologie der Alcyonaceen, p. 104. Abdruck aus der jennaischen Zeitschrift f. Naturw. Vol. XXXIII. N. F. XXVI.

<sup>3)</sup> Cf. STUNBERG, Faunen på och kring Novaja Semlja, p. 163.

<sup>4)</sup> Bidrag til kjendskaben om de nordiske alcyonarier, p. 5. Berg. Mus. Aarb. 1893.

<sup>5)</sup> On Some Remarkable Forms of Animal Life, I, p. 50, pl. V, figs. 1—23.

According to GRIEG<sup>1)</sup>, this species was known from the Kristiania Fiord to the Trondhjem Fiord. Its northern limit is now the Vest Fiord.

#### *Cladiseus gracilis*, DAN. & KOR.

The Skjerstad Fiord, 230 m.

GRIEG mentions that the type-specimen was from Slotholmen in Nordland (l. c. p. 18). The species has also been caught in the Trondhjem Fiord by V. STORM.

## Zoantharia.

JAMES A. GRIEG determ. Remarks by the author.

#### *Ulocyathus arcticus*, M. Sars.

The Salten Fiord, 320 m.; Landego, 400 m.; The Folden Fiord, 530 m.; Oxsund, 600 m.; The Sag Fiord, 200 m.; Mortsund, 200 m.; Ure, 250 m.; Reine, 150 m.; The Lyngen Fiord, 300 m.

During his expedition in the summer of 1849, MICHAEL Sars found this peculiar species in the Ox Fiord, and in the account a short description was given of it. Later on, it was thoroughly described.<sup>2)</sup> A contribution respecting its anatomy has been made by Miss EMLY ARNESEN.<sup>3)</sup> The Austro-Hungarian expedition collected this species at two stations in the Murman Sea. (183 m., 230 m.)

#### *Lophohelia prolifera*, PALL.

Tranødybet, 450—530 m.; The Tys Fiord (T. I), 500 m.

This species was seen in large quantities especially at the place last mentioned. The *Lophohelia*-reef at the mouth of the Tys Fiord is, as far as I know, the most northerly which has hitherto been observed. Later on in this treatise, I will refer somewhat more in detail to this interesting formation.

## Actiniaria.

Dr. CARLGREN, Stockholm, determ. Remarks by the author.

#### *Protanthea simplex*, CARLGR.

The Tys Fiord (T. I) 500 m. On *Lophohelia prolifera*, PALL. CARLGREN says, in a written communication to me, that *Protanthea* is only found in Bohuslen and on the Norwegian coast. The distribution of this species hitherto known is Bohuslen—Lofoten.

#### *Edwardsia andresi*, DAN.

The Lyngen Fiord (L. III), 300 m.; The Skjerstad Fiord, 320 m.

It was caught by the Norw. North Atl. Exp. at St. 253 (The Skjerstad Fiord, 481 m.).<sup>4)</sup>

#### *Paraedwardsia areurea*, CARLGR. nov. gen. nov. sp.

The Skjerstad Fiord, 320 m.

The new genus and species will later on be thoroughly described by Dr. CARLGREN. In a written communication to me he says:—„*Paraedwardsia* is characterized by 8 complete mesenteries like *Edwardsia*, but the scapus in *Paraedwardsia* is furnished with

<sup>1)</sup> Oversigt over Norges pennatulider, p. 16. Berg. Mus. Aarb. 1891.

<sup>2)</sup> *Fauna littoralis Norvegiæ*. Part II, p. 73, pl. 10, figs. 18—27.

<sup>3)</sup> Beiträge zur Anatomie und Histologie von *Ulocyathus arcticus* etc. Archiv f. Math. og Naturv. Vol. XX. Nr. 9.

<sup>4)</sup> Cfr. DANIELSEN, Actinida, p. 111.



papilla like *Halcompa*, and foreign bodies (grains of sand) are fastened to these papillæ.

*Bolocera tuediæ*, JOHNST.

The Malangen Fiord, 380 m.; Stønnesbotn, 40—80 m.

*Tealia (Madoniactis) lofotensis*, DAN.

Stønnesbotn, 40—80 m.; The Ogs Fiord I, 100 m.  
The Norw. North Atl. Exp. caught this species in Saltstrømmen.

*Actinostola callosa*, VERR.

Stønnesbotn, 40—80 m.; The Jøkel Fiord, 80—100 m.

This species was also observed in several other fiords, but no specimen was preserved.

*Metridium dianthus*, ELLIS.

Kvænangen II, 90 m.

M. SARS in his account of his expedition in 1849 says that this form was commonly found between the pebbles on the beach in the Ox Fiord and at Hammerfest.

*Chondractinia digitata*, O. F. MÜLL.

The Ogs Fiord, 100 m.; Stønnesbotn, 40—80 m.; Malangen, 100—200 m.; The Jøkel Fiord I, 100 m.; The Porsanger Fiord, 200 m.

This form is very common in the fiords of Northern Norway.

*Chondractinia nodosa*, FABR.

The Porsanger Fiord, 200 m. (3 specimens).

This is surely the first time that this genuine arctic species is noted from any Norwegian fiord. The Norw. North. Atl. Exp. collected it at St. 290 (between Norway and Beeren Eiland. DANIELSEN<sup>1</sup>) mentions it under the name of *Actinauge (Verrill) nodosa* FABR.

CARLGRÉN says in a written communication that he has numerous specimens of FABRICIUS' species from Greenland, Spitzbergen and Beeren Eiland. At the same time, he gives the important information that *Actinida nodosa*, FABR. is not identical to the chief variety of *Actinauge nodosa*, VERRILL. The latter has therefore since been named *Actinauge verrilli*. On the other hand, CARLGRÉN declares that *Actinauge nodosa* var. *tuberculosa*, VERR. = *Chondractinia nodosa*, FABR., which species is also found on the east coast of North America.

*Epizoanthus erdmanni*, DAN.

Malangen, 380 m.; Lyngen II, 280 m.; Lyngen III, 300 m.; Kvænangen, 300—343 m.

The Norw. North Atl. Exp. took this species at four different places.

*Isozoanthus (Epizoanthus) arborescens*, DAN.

Mortsund I, 200 m.; Tranodybet, 607—640 m.

DANIELSEN<sup>2</sup>) notes this species from St. 149 (The Vest Fiord). CARLGRÉN has classified *Isozoanthus* as a new genus, which differs from *Parazoanthus* in wanting a ring sinus.

**Crinoidea.**<sup>1)</sup>

JAMES A. GRIEG determ.

*Rhizocrinus lofotensis*, M. SARS.

Tranodybet, 640 m.; Oxsund, 600 m.; The Sag Fiord, 200 m.; Brettesnes, 350—400 m.; Reine, 150 m.; Moskenstrømmen, 200 m.

*Antedon tenella*, RETZIUS.

The Beier Fiord, 30—150 m.; The Skjerstad Fiord, 330—490 m.; The Tys Fiord, 500 m., Malangen, 100—200 m.

**Ophiuroidea.**

JAMES A. GRIEG determ.

*Ophiura albida*, FORBES.

The Salten Fiord, 15—20 m.; Grøto, 4 m.; The Østnes Fiord, 30 m.; The Troid Fiord, 40 m.

*Ophiura sarsi*, LÜTKEN.

Numerous specimens both from the outer and inner fiord districts, 30—600 m., and on soft as well as hard bottom.

*Ophiura robusta*, AYRES.

The Skjerstad Fiord, on hydroids; The Ogs Fiord, 100 m.; The Kirk Fiord, 30—50 m.; The North Cape (1894).

*Ophiura carnea*, M. SARS.

The Sag Fiord, 100 m.

*Ophiocten sericeum*, FORBES.

Was seen at a number of stations, both out at sea and in the fiords, 100—160 m.

*Amphilepis norvegica*, LUNGMAN.

Landego, 300—400 m.; The Salten Fiord, 220—380 m.; The Folden Fiord, 530 m.; Oxsund, 600 m.; Brettesnes—Skroven, 350—400 m.; Tranodybet, 640 m.

*Ophiopholis aculeata*, LIN.

Exceedingly common at most of the stations, 10—700 m.

*Ophiacantha bidentata*, RETZ.

Commonly distributed. Especially numerous in the Ogs Fiord, the Porsanger Fiord etc.

*Ophiacantha abyssicola*, G. O. SARS.

Sea NW of Rost, 300—500 m.

*Ophiacantha spectabilis*, G. O. SARS.

Arno, 300—400 m.; The Tys Fiord, 500 m.; Tranodybet, 450—530 m.

*Ophiotrix fragilis*, O. F. MÜLLER.

Rost, 100 m.

*Ophiocolex glaucialis*, MÜLL. & TROSCH.

The Skjerstad Fiord, 470—490 m.; The Salten Fiord, 220—380 m.; Landego, 200—400 m.; The Folden Fiord, 530 m.; The

<sup>1</sup>) Actinida, p. 42.

<sup>2</sup>) Actinida, p. 129.

<sup>1</sup>) Cfr. GRIEG, Oversigt over det nordlige Norges echinodermer. Berg. Mus. Aarb. 1902, No. 1.

Sag Fiord, 200 m.; The Tys Fiord, 500 m.; Skroven, 200—400 m.; Kvænangen, 300—343 m.

*Ophiocolex purpureus*, DÜB. & KOR.

The Tys Fiord, 500 m.

*Gorgonocephalus lamarki*, MÜLL. & TROSCH.

The Sea west of Ingo, 300 m.

### *Asteroidea.*

JAMES A. GRIEG determ.

*Pontaster tenuispinus*, DÜB. & KOR.

From a number of stations between Salten Fiord and Malangen, 100—640 m.

*Plutonaster parelii*, DÜB. & KOR.

Balstad, 150 m.; The Folden Fiord, 530 m.; Svolvær (1894); Sværholt (1894).

*Ctenodiscus crispatus*, RETZ.

Of very common occurrence on the mud in the basins of the fiords between the Skjerstad and Porsanger fiords, 30—530 m.

*Leploptychaster arcticus*, M. SARS.

From numerous stations, 30—400 m.

*Astropecten irregularis*, PENNANT.

Seivaagen (Salten Fiord), 15—17 m.

*Psilaster andromeda*, MÜLL. & TROSCH.

The Beier Fiord, 50 m.; The Skjerstad Fiord, 30—50 m.; Landego, 200—400 m.; The Folden Fiord, 530 m.; Mortsund (Vest Fiord), 200 m.; the mouth of Raftsund, 250—300 m.

*Pentagonaster granularis*, RETZ.

The Salten Fiord, 320—380 m.; The Ostnes Fiord, 130 m.; Reine, 100 m., Mortsund, 200 m.; Balstad, 150 m.; Moskenstrømmen, 200 m.; Rost, 150 m.; Malangen, 100—200 m.; The North Cape (1894); Sværholt (1894).

*Hippasterias phrygiana*, PARELIUS.

The Skjerstad Fiord, 230 m.; Sværholt (1894).

*Poraniamorpha rocea*, DAN. & KOR.

The Folden Fiord, 530 m.

*Solaster papposus*, LIN.

The Skjerstad Fiord, 10—30 m.

*Solaster endeca*, RETZ.

Balstad, 30—70 m.; The Ostnes Fiord, 30 m.

*Solaster syrtensis*, VERR.

The Beier Fiord, 50 m.

*Pteraster pulvillus*, M. SARS.

Henningsvær, 150 m.; Sværholt (1894).

*Pteraster militaris*, O. F. MÜLLER.

The Tys Fiord, 500 m.; Tranødybet, 450—530 m.; Reine (Vest

Fiord); Sea W of Ingo, 300 m.; The Jøkel Fiord, 100 m.; Sværholt (1894).

*Cribrella sanguinolenta*, O. F. MÜLLER.

Common, especially on the Lofoten banks, 30—300 m.

*Pedicellaster typicus*, M. SARS.

Balstad (Vest Fiord), 80 m.

*Stichaster roseus*, O. F. MÜLLER.

The Ostnes Fiord, 130 m.

*Asterius glacialis*, LIN.

Moskenstrømmen, 90 m.; The Kanstad Fiord, 30—90 m.; Breisund, 100 m.

*Asterius mülleri*, M. SARS.

Occurs from a number of stations between The Skjerstad Fiord and Sværholt, 10—250 m.

*Asterius lincki*, MÜLL. & TROSCH.

The Kanstad Fiord, 90 m.; The Jøkel Fiord, 60—100 m.

*Asterius rubens*, LIN.

From several localities in Lofoten.

*Brisinga coronata*, G. O. SARS.

The Folden Fiord, 530 m.

### *Echinoidea.*

JAMES A. GRIEG determ.

*Echinus norvegicus*, DÜB. & KOR.

Moskenstrømmen, 200 m., Rost, 150 m.

*Echinus elegans*, DÜB. & KOR.

The Tys Fiord, 500 m.

*Echinus esculentus*, LIN.

Malangen, 100—200 m.

*Strongylocentrotus droebachiensis*, O. F. MÜLL.

From 13 places between Skjerstad Fiord and Sværholt.

*Echinoceyamus pusillus*, O. F. MÜLL.

Skroven (Vest Fiord), 200—400 m.; Moskenstrømmen 90 m.; Rost, 100 m.

*Schizaster fragilis*, DÜB. & KOR.

Landego, 300—400 m.; The Kanstad Fiord, 30—90 m.; The Kirk Fiord, 70—100 m.; Malangen, 100—200 m.

*Sputangus purpureus*, O. F. MÜLL.

The Skjerstad Fiord, 330 m.; The Ostnes Fiord; Moskenstrømmen, The North Cape (1884), Sværholt (1894).

*Echinocardium cordatum*, PENNANT.

Sværholt (1894).

*Echinocardium flavescens*, O. F. MÜLL.

The Salten Fiord, 15—20 m., Stene (Vest Fiord), 120—200 m.; Troldfiordsund, 40 m.; Sværholt (1894).

**Holothurioidea.**Dr. HJALMAR ÖSTERGREN, Upsala, determ.<sup>1)</sup>*Stichopus tremulus*, GUNNERUS.The Salten Fiord, 320—380 m.; Landego, 300—400 m.; Balstad, 150 m.; Balstad (13/4 1897), in the stomach of cod (*Gadus callarias*).*Bathyploetes nutans*, M. SARS.

The Folden Fiord, 530 m.; Oxsund, 600 m.

*Mesothuria intestinalis*, ASCANIUS.

The Folden Fiord, 530 m.; Oxsund, 600 m.

*Cucumaria frondosa*, GUNNERUS.Balstad (1897): Reine, in the stomachs of cod (*Gadus callarias*); Rost, in the stomachs of cod; Troldfiordsund, 30—40 m.*Cucumaria hispida*, BARRETT.

The Salten Fiord, 320—380 m.; Landego 300—400 m.; The Sag Fiord, 200 m.; Oxsund, 600 m.; Skroven, 200—400 m.; Brettesnes, 350—400 m.; Tranodybet, 607—640 m.

*Phyllophorus pellucidus*, FLEMING.Digermulen, 100—150 m.; Kvænangen, 90 m.; Rost, in the stomachs of haddock (*Gadus aeglefinus*).*Psolus phantapus*, STRUSSENFELDT.

The S. Beier Fiord, 30—150 m.; The Ostnes Fiord, 50—70 m.; Mehavn (1894).

*Lapidoplar buski*, M'INTOSH.

The Kirk Fiord, 50 m.

*Myriotrochus rinki*, STEENSTRUP.

The Lyngen Fiord, 250 m.; Kvænangen, 300—343 m.; The Jokel Fiord, 100 m.

*Myriotrochus vitreus*, M. SARS.

Brettesnes, 350—400 m.

**Nemertinea.<sup>2)</sup>**

Dr. R. C. PUNNETT, Cambridge, determ.

*Lineus scandinavienensis*, PUNNETT, n. sp.

The Jokel Fiord, 100 m.

*Lineus cinereus*, PUNNETT, n. sp.The Tys Fiord, 500 m., on *Lophohelia*.*Eunemertes nordguardi*, PUNNETT, n. sp.

The Salten Fiord, 200 m.; Balstad, 150 m.

*Amphiporus pusillus*, PUNNETT, n. sp.

Lofoten (exact locality uncertain).

*Amphiporus magnus*, PUNNETT, n. sp.The Tys Fiord, 500 m.; on *Lophohelia prolifera*.*Amphiporus thompsoni*, PUNNETT.

Balstad, 50 m.; The Porsanger Fiord, 200 m.

*Drephanophorus borealis*, PUNNETT.

The Lyngen Fiord II, 250 m.

**Annelida.****Polychaeta.**

O. BIDENKAP, Kristiania, and G. M. R. LEVINSEN, Copenhagen, determ. Remarks by the author.

*Harmothoe oculinarum*, STORM.

Gaukværo, 250 m.

The species had previously been known as distributed from Bømmeløen to The Trondhjem Fiord.

*Harmothoe mollis*, M. SARS.

Reine (Vest Fiord), 150 m.

According to BIDENKAP<sup>1)</sup> this species is rare on the Norwegian coast.*Harmothoe rarispina*, M. SARS.

The Skjerstad Fiord (S. XVI); Malangen, 100—200 m.; Lyngen III, 300 m.; Kvænangen, 300—343 m.; The Porsanger Fiord, 200 m.

*Harmothoe propinqua*, MALMGREN.

Henningsværstrømmen, 20—40 m.

The northern limit for this species hitherto was The Trondhjem Fiord.

*Harmothoe sarsi*, KINBERG.

The Sag Fiord, 200 m.; Lyngen III, 300 m.; The Jokel Fiord, 100 m.

*Harmothoe nodosa*, M. SARS.

Malangen, 100—200 m.; The Skjerstad Fiord, 10—20 m.; Breisund, 100 m.

*Harmothoe imbricata*, LIN.

Napstrømmen (Lofoten); Troldfiordsund, 40 m.; Sværholt (1894); The Kjølle Fiord (1894).

*Harmothoe impar*, JOHNST.

The S. Beier Fiord, 50—150 m.; The Skjerstad Fiord, 230 m.; The Tys Fiord, 500 m.; Ingøhavet (hav = sea), 300 m.

*Harmothoe clarigera*, M. SARS.

The list of places where found is lost. The species has previously been caught near Christiansund by M. SARS and in The Trondhjem Fiord by STORM. I caught specimens in 1899, my district was then The Beier Fiord—The Porsanger Fiord. So that this species is also found north of the arctic circle.

<sup>1)</sup> Cf. ÖSTERGREN, The Holothurioidea of Northern Norway. Berg. Mus. Aarb. 1902.<sup>2)</sup> A description of the new species here mentioned will be found in Dr. PUNNETT's treatise, On the Nemerteans of Norway. Bergens Mus. Aarb. 1903, Nr. 2.<sup>1)</sup> O. BIDENKAP, System. oversigt over Norges Annulata Polychaeta. Krist. Vid. Selsk. Forh. 1894. No. 10.



*Harmothoe asperrima*, M. SARS.

Malangen, 100—200 m.

Hitherto the northern known limit for this species had been Bodo.

*Lepidonotus squamatus*, LIN.

Svolvær (1894); Napstrømmen (1897), 30—40 m.

*Lepidonotus cirrosus*, PALL.

The Beier Fiord, 50 m.; The Sag Fiord, 200 m.

*Lepidonotus amundseni*, MALMGREN.

Stonnesbotn, 40—80 m.

The Trondhjem Fiord was previously the northern limit for this species.

*Aphrodite aculeata*, LIN.

Moskenstrømmen, 200 m.; Tranødybet, 607—640 m.

*Laetmonice filicornis*, KINBERG.

The Folden Fiord, 530 m.; Landego, 200—400 m.; Oxsund, 600 m.; The Sag Fiord, 200 m.; Tranødybet, 607—640 m.; Gaukvarø, 250 m.; Malangen, 100—200 m.

*Leanira tetragona*, KINB.

The Skjerstad Fiord (several places); The Salten Fiord, 200 m.; Landego, 200—400 m.; The Folden Fiord, 530 m.; Risvær, 150—180 m.; Malangen, 380 m.

*Eumida sanguinea*, ORSTED.

The Skjerstad, 20 m.

*Phyllodoce maculata*, LIN.

The Beier Fiord, 30—150 m.; The Skjerstad Fiord, 330 m.; The Salten Fiord, 15—20 m.; The Kirk Fiord, 70—80 m.; Sværholt (1894).

*Eteone depressa*, MALMGREN.

The Kirk Fiord, 70—80 m.

This species is not mentioned in BIDENKAP'S list of the Polychaeta of Norway. Later on, however, BIDENKAP found a specimen at Horsnes in The Lyngen Fiord.<sup>1)</sup> It is known from Greenland, Spitzbergen and Novaja Semlja.

*Nephtys malmgreni*, THÉEL.

The Kanstad Fiord, 30—90 m.; Risværflaket, 150—180 m.; Gaukvarø, 250 m.; Lyngen II, 250 m.; Kvænangen, 300—353 m.; The Jøkel Fiord, 80 m.

*Nephtys incisa*, MALMGREN.

Svolvær (1894); Malangen, 380 m.; The Jøkel Fiord, 100 m.; BIDENKAP mentions Lofoten as the northern limit, but this must now be changed to Kvænangen and the Jøkel Fiord.

*Nephtys ciliata*, MÜLLER.

The S. Beier Fiord, 50 m.; Landego, 200—400 m.; Svolvær (1894); The Ogs Fiord, 100 m.; The Kirk Fiord, 50—40 m.; Digermulen, 100—150 m.; The Kanstad Fiord, 30—90 m.; Stonnesbotn, 40—80 m.; Malangen, 100—200 m.; Kvænangen, 300—343 m.; The Jøkel Fiord, 80 m.

*Nephtys coeca*, FABR.

The Beier Fiord, 30—150 m.; The Ogs Fiord I, 100 m.; mouth of Raftsundet, 250—300 m.; Svolvær (1894); Henningsvær I, 150 m.; The Kirk Fiord, 30—50 m.

*Glycera capitata*, ORSTED.

The Skjerstad Fiord X, 10—30 m.; Skroven, 200—400 m.; Rost II, 100 m.; Sværholt (1894).

*Stauvocephalus erucaeformis*, MALMGREN.

Balstad, 150 m.

*Lumbrineris fragilis*, MÜLLER.

The Kirk Fiord, 70 m.

*Onuphis conchylega*, M. SARS.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord I, 30—50 m.; The Ostnes Fiord; The Kanstad Fiord, 30—90 m.; Lyngen III, 250 m.; The Jøkel Fiord, 100 m.; The Porsanger Fiord, 70 m.

*Onuphis quadricuspis*, M. SARS.

Ure I (Vest Fiord), 200—250 m.

*Hyalinoecia tubicola*, MÜLLER.

Svolvær (1894).

Christiansund was the previously known northern limit.

*Nereis pelagica*, LIN.

The Skjerstad Fiord XIII, 110 m.; Troldfiordsund, 40 m.; Breisund, 100 m.; Sværholt (1894); The Kjølle Fiord (1894); Nordkyn (1894).

*Leodice norvegica*, LIN.

The Beier Fiord, 50 m.; The Skjerstad Fiord, 30—50 m.; The Tys Fiord I, 500 m.; The Kanstad Fiord, 30—90 m.; Digermulen, 100—200 m.; Henningsvær, 150 m.; Mortsund, 200 m.; Balstad, 150 m.; Rost II, 150 m.; Malangen, 100—200 m.; Kvænangen, 90 m.; Breisund, 100 m.; The Porsanger Fiord, 50 m.

*Leodice gunneri*, STORM.

The Tys Fiord I, 500 m.

*? Cirratulus abranchiatus*, AR. HANSEN.

The Jøkel Fiord II, 80 m.

*Aricia kuppferi*, EHLERS.

Landego, 200—400 m.

This species had previously on the coast of Norway only been found in The Bergen Fiord.

*Trophonia plumosa*, MÜLLER.

Glea (Rost) on the beach; The Ogs Fiord; The Folden Fiord, 530 m.; The Jøkel Fiord; Kvænangen.

*Brada villosa*, RATHKE.

The Skjerstad Fiord, 230 m.; The Salten Fiord I, 15—20 m.; The Folden Fiord, 530 m.

*Brada granulosa*, ARMAUER HANSEN.

Malangen, 100—200 m.; The Porsanger Fiord, 200 m.

The southern limit for this species must thus, for the present,

<sup>1)</sup> Lyngenfjordens evertebratfauna. Tromsø Mus. Aarsh. 20, 1897, p. 95.

be considered to be Malangen. It is new for the fauna of Norway; the places at which The Norw. North Atl. Exp. found it all lie at a considerable distance from the Norwegian coast.

*Brada granulata*, MALMGREN.

Glea (Rost) on the beach; Malangen 100—200 m.; Kvænangen.

*Euphrosyne borealis*, ORSTED.

Malangen, 100—200 m.

*Spinther oniscoides*, JOHNST.

The Porsanger Fiord, 220 m.

According to a written communication from Mr. LEVINSEN, *S. oniscoides*, JOHNST. = *S. major* LEVINSEN = *S. arcticus* ARMAUER HANSEN.

*Eumenia crassa*, ORSTED.

The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 470—490 m.

*Arenicola marina*, LIN.

Sund (Beier Fiord) in sand on the beach.

*Clymene praetermissa*, MALMGREN.

The Kirk Fiord, 100 m.; in large quantities. According to MALMGREN, this species is common on clay bottom in Finmarken.

*Nicomache lumbriculis*, MALMGREN.

The Skjerstad Fiord III, 130 m.; The Ogs Fiord I, 100 m.; Stønnesbotn, 40—80 m.; Lyngen III, 300 m.; Kvænangen, 300—343 m.

*Maldane biceps*, M. SARS.

The Skjerstad Fiord III, 230 m.; Landego, 200—400 m.

*Pectinaria hyperborea*, MALMGREN.

The Skjerstad Fiord I, 30—50 m.; The Kirk Fiord III, 70—80 m.; The Ostnes Fiord, The Ogs Fiord, 100 m.; The Jøkel Fiord, 100 m.

*Pectinaria koreni*, MALMGREN.

Malangen, 350 m.

BIDENKAP mentions this species only from the west and south coast of Norway. The northern limit must now be moved much higher, viz. right up to Malangen.

*Terebellides strömi*, M. SARS.

The Skjerstad Fiord, 230 m.; mouth of Raftsund, 250 m.; Malangen, 100—200 m.; Lyngen III, 300 m.; Kvænangen, 300—343 m.; The Jøkel Fiord II, 80 m.; The Porsanger Fiord, 70 m.

*Artacama proboscidea*, MALMGREN.

Lyngen III, 300 m.

This species has not often been collected on the Norwegian coast. Prof. ESMARK found it at Nakholmen in the Kristiania Fiord, and G. O. SARS at Lofoten.

*Thelepus circinnatus*, FABR.

The Skjerstad Fiord IX, 40—50 m.; The Kirk Fiord IV, 30—50 m.; Napstrømmen, 30—40 m.; Henningsværstrømmen, 20—40 m.; Kvænangen, 90 m.; Breisund, 100 m.; The Porsanger Fiord, 200 m.

*Amphitrite cirrata*, MÜLLER.

Kvænangen, 90 m.; The Porsanger Fiord, 200 m.

*Amphitrite groenlandica*, MALMGREN.

The Jøkel Fiord II, 80 m.

BIDENKAP mentions that this species has rarely been found at Vadsø by M. SARS and G. O. SARS. Thus it is new from Vest Finmarken.

*Terebella debilis*, MALMGREN.

The Ostnes Fiord (1894).

*Euchone papillosa*, M. SARS.

Kvænangen, 300—343 m.

*Chone infundibuliformis*, KRÖYER.

The Salten Fiord I, 15—20 m.; The Følden Fiord, 530 m.

*Dasychone dalyelli*, KÖLLIKER.

Kvænangen, 90 m.

BIDENKAP gives Bodo as the northern limit, this must now be altered to Kvænangen.

*Sabella paronia*, SAVIGNY.

The Sag Fiord, 200 m.; Gaukvær, 250 m.; Malangen, 100—200 m.; The Jøkel Fiord II, 80 m.

*Sabella fabricii*, KRÖYER.

Kvænangen, 90 m.

*Potamilla neglecta*, M. SARS.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord XVI, on *Hydroïda*: The Jøkel Fiord II, 100 m.; Breisund, 100 m.

The hitherto known southern limit on the Norwegian coast for this species was Tromsø. It must now be changed to be Beier Fiord.

*Potamilla reniformis*, MÜLLER.

Nordkyn (1894) in numbers.

*Leptochone steenstrupi*, KRÖYER.

Svolvær (1894).

*Filigrana implexa*, BERKLEY.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord II, 230 m.; Mortsund (Vest Fiord) 100 m.; Nordkyn (1894).

*Pomatocerus triquetus*, MÖRCH.

The Jøkel Fiord, 80 m.

Common on stones and shells.

*Hydroïdes norvegica*, GUNNERUS.

Digermulen, 100—150 m.; Lyngen III, 300 m.

Common on stones and shells.

*Placostegus tridentatus*, FABRICIUS.

Gaukværø, 250 m.; The Jøkel Fiord, 100 m.; Hammerfest (1894).

*Ditrupe arietina*, MÜLLER.

Röst I, 120 m.; Balstad, 150 m.; Stene (Vest Fiord), 200 m.; Ure I (Vest Fiord), 200—250 m.; Svolvær (1894); Gaukværø, 250 m.; Sværholt (1894).



*Sternaspis fossor*, SIMPSON.

The Beier Fiord, 50—150 m.

This is a new species of Norwegian fauna. LEVINSEN,<sup>1)</sup> who has classified my specimen from the Beier Fiord, gives it the following distribution: Iceland, Greenland and North America.

*Gephyrea*.*Echiurus pallasi*, GUÉR.

Sund at the Morsdal Fiord, on the beach, several specimens (LEVINSEN determ.).

*Bryozoa or Polyzoa*.

Determ. by author.

*Cheilostomata*.*Gemellaria loricata*, LIN.

The Troid Fiord Sund, 30—40 m.; Nordkyn, 30 m.

*Menipea ternata*, ELLIS and SOLANDER.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord II, 100—185 m.; Balstad (The Vest Fiord), 30—50 m.; Mortsund III (The Vest Fiord), 100 m.; Hemingsværstrømmen, 20—40 m.; The Ostnes Fiord, 130 m.; The Ogs Fiord I, 100 m.; Stonesbotn, 40—80 m.; The Troid Fiord Sund, 30—40 m.; The North Cape (1894); The Porsanger Fiord, 70 m.

It was var. *gracilis* which occurred at most of the above mentioned places.

*Menipea jeffreysi*, NORMAN.

Mortsund III, 100 m.; Moskenstrømmen, 200 m.

*Menipea normani*, NORDGAARD.

The sea NW of Røst, 700 m.

This species is easily recognized by the pedunculate avicularia on the front wall.

*Scrupocellaria scabra*, I. VAN BENEDEN.

Balstad, 30—50 m.; Groto, 6—24 m.; The Kanstad Fiord, 30—90 m.; The Troid Fiord Sund, 30—40 m.; The North Cape (1894); Nordkyn (1894).

*Caberea ellisi*, FLEMING.

The Beier Fiord, 50—150 m.; Balstad (The Vest Fiord), 30—50 m.; The Ostnes Fiord; Malangen, 100—200 m.; Stonesbotn, 40—80 m.; Kvænangen II, 90 m.; Ingohavet, 300 m.; Breisund, 100 m.; The Porsanger Fiord, 200 m.; Nordkyn (1894).

*Bicellaria alderi*, BUSK.

Moskenstrømmen, 200 m.; Reine I (The Vest Fiord), 150 m.; The Sea NW of Røst, 700 m.

*Bugula elongata*, NORDGAARD.

The Beier Fiord, 50—150 m.; Røst II, 150 m.; The Kirk Fiord III, 70—80 m.; Svølvær (1894); Malangen, 100—200 m.; Breisund, 100 m.; Mehavn (1894).

<sup>1)</sup> Cf. LEVINSEN, Systematisk-geografisk oversigt over de nordiske *Annulata*, *Gephyrea*, *Chatognathi* et *Balanoglossi*. Vid. Med. Nat. Foren. Kjøbenhavn, 1882 and 1883.

*Bugula purpurotincta*, NORMAN.

Malangen, 100—200 m.

*Bugula murrayana*, JOHNSTON.

Pl. III, fig. 8.

The Beier Fiord, 50—150 m.; Moskenstrømmen, 90 m.; The Kirk Fiord II, 50 m.; The Ogs Fiord I, 100 m.; Malangen, 100—200 m.; Stonesbotn, 40—80 m.; Breisund, 100 m.; The Troid Fiord Sund, 30—40 m.; The Porsanger Fiord, 200 m.; Nordkyn (1894).

*Kinetoskias smitti*, DAN. and KOREN.

The Ostnes Fiord; The Oxsund, 100 m.; The Sag Fiord, 200 m.; Tranødybet, 607—640 m.; Malangen, 100—200 m.

Lofoten was the hitherto known northern limit for this species. It must now be changed to Malangen.

*Cellaria fistulosa*, LIN.

Moskenstrømmen, 90 m.; Malangen, 100—200 m. The northern limit is now moved from Lofoten to Malangen.

*Flustra carbasus*, ELLIS and SOLANDER.

Pl. III, fig. 1.

Balstad (The Vest Fiord), 100 m.; Svølvær (1894); Breisund, 100 m.; The Porsanger Fiord, 200 m.; Mehavn (1894).

*Flustra securifrons*, PALLAS.

Pl. III, fig. 2.

Røst II, 150 m.; Moskenstrømmen, 90 m.; Mortsund (The Vest Fiord), 100 m.; Malangen, 100—200 m.; Breisund, 100 m.; The Porsanger Fiord, 200 m.; Vardø (on *Pecten islandicus*).

*Flustra membranaceo-truncata*, SMITT.

Pl. III, figs. 3, 4.

The Skjerstad Fiord XVI; The Skjerstad Fiord III, 230 m.; The Ogs Fiord I, 100 m.; Malangen, 100—200 m.; The Troid Fiord Sund, 30—40 m.; The North Cape (1894).

*Flustra barleci*, BUSK.

Pl. III, figs. 5, 6.

Røst II, 150 m.; Arno (The Vest Fiord), 300—400 m.

*Flustra abyssicola*, M. SÆRS.

Pl. III, Fig. 7.

The sea NW of Røst, 700 m.; Reine (The Vest Fiord), 100 m.; Balstad (The Vest Fiord), 150 m.; Mortsund (The Vest Fiord), 100 m.; Brettesnes—Skroven, 350—400 m.; The Ox Sund, 600 m.; The Sag Fiord, 200 m.

*Membranipora<sup>1)</sup> pilosa*, LIN.

Napstrømmen (Lofoten), 10 m.; Svølvær (on algae), Groto (on algae); The Troid Fiord Sund (on algae).

*Membranipora membranacea*, LIN.

The Troid Fiord Sund, 30—40 m., on algae; Nordkyn, on *Laminaria*.

<sup>1)</sup> NORMAN, in his work Notes on the Natural History of East Finmark (Ann. Mag. Nat. Hist., Ser. 7, Vol. XI), has divided the genus *Membranipora* into several others. I have not yet had time, however, to form a definite opinion about this division, so I prefer here to retain the old nomenclature.

*Membranipora lineata*, LIN.

Hammerfest (1894).

*Membranipora arctica*, D'ORBIGNY.

Kvænangen, on algae; The North Cape (1894); Nordkyn (1894).

*Membranipora craticula*, ALDER.

On an ascidian near Hammerfest (1894); The Lakse Fiord (collected by SPARRE SCHNEIDER).

*Membranipora cymbaeformis*, HINCKS.

The North Cape (1894) on algae.

*Membranipora trifolium*, S. WOOD.

The Ostnes Fiord, 50—70 m.; Digermulen, 100—150 m.; Stonesbotn, 40—80 m.; The Jøkel Fiord III, 100 m.; Hammerfest (1894).

*Membranipora minor*, BUSK.

Pl. III, fig. 11).

Røst II, 150 m., on *Waldheimia*; Moskenstrømmen II, 150 m., on *Waldheimia*; Digermulen, 100—150 m., on stone; Malangen, 100—200 m., on *Waldheimia*.

*Lepadia (Membraniporella) nitida*, JOHNSTON.<sup>1)</sup>

Røst II, 150 m.; Nordkyn (1894).

*Gephyrotes (Cribrilina) nitido-punctata*, SMITT.

Moskenstrømmen II, 150 m.; Nordkyn (1894). LOVÉN had specimens from Hammerfest.

*Cribrilina cryptoecium*, NORMAN.<sup>2)</sup>

The Kjølle Fiord (1894); Nordkyn (1894).

*Cribrilina annulata*, FABR.

The North Cape (1894).

*Microporella ciliata*, PALLAS.

Svolvær (1894), Sværholt (1894).

*Microporella impressa*, AUDOUIN.

Ingøhavet, 300 m., on stones; Breisund, 100 m., on stones.

*Doryporella<sup>3)</sup> spatulifera*, SMITT.

Breisund, 100 m., on *Rhynchonella psittacea*. An excellent illustration of the zooecia in this peculiar species, will be found in WATERS (Bryozoa from Franz-Josef Land. Journ. Linn. Soc., XXVIII, pl. 12, fig. 6).

*Harmeria<sup>4)</sup> scutulata*, BUSK.

Nordkyn (1894), on stones.

*Tessatrodoma gracile*, M. SARS.

Mortsund III, 100 m.; Digermulen, 100—150 m.; The Sag Fiord, 200 m., on dead branches of *Isidella hippuris*; Tranødybet,

607—640 m., on dead branches of *Isidella hippuris*; Malangen, 100—200 m.; Ingøhavet, 300 m.

*Porina tubulosa*, NORMAN.

Hammerfest (1894): The Lakse Fiord (collected by SPARRE-SCHNEIDER).

*Hippothoa hyalina*, LIN.

Groto, 6—24 m., on algae; The Trold Fiord Sund, 30—40 m., on algae; Breisund, 100 m., on an ascidian. This species has sometimes been mentioned as a *Schizoporella*, sometimes as a *Celleporella*.

*Hippothoa divaricata*, LAMOUROUX.

Tromsø (collected by SCHNEIDER); The Lakse Fiord (collected by SCHNEIDER).

*Schizoporella alderi*, BUSK.

Moskenstrømmen, 90 m., on stones; The Ostnes Fiord, 50—70 m.; Hammerfest (1894); Ingøhavet, 300 m.; Sværholt (1894).

*Schizoporella sinuosa*, BUSK.

Pl. III, figs. 9, 10.

Moskenstrømmen, 90 m., on stones and *Waldheimia*; The Ostnes Fiord, 50—70 m., on stones and coal; Digermulen, 100—150 m., on stones; Malangen, 100—200 m., on *Modiola modiolus*. Operculum (cfr. fig. 10) presents a divergent appearance from the genus *Schizoporella*, and the species *sinuosa* ought indeed to be removed.

*Schizoporella linearis*, HASSALL.

Pl. V, fig. 26.

Moskenstrømmen, 90 m., on shells.

*Schizoporella unicornis*, JOHNSTON.

Pl. V, figs. 23—25, 27.

„Glea“ (Røst), on the beach.

The specimens from Røst differ somewhat from those I have collected in the Hjelte Fiord, near Bergen, but the variations are not so great as to make a new species necessary. Besides fig. 23 agrees well with HINCKS' figures in Brit. Mar. Pol.

On comparing opercula<sup>1)</sup> of *Schizoporella unicornis* from the Hjelte Fiord and from Røst, it was found that those from the latter place were somewhat larger. (Cfr. figs. 24, 27). The zooecia in the specimens from Røst also had a rather wider sinus on the proximal edge of the oral aperture. The species has a wide distribution and probably varies very considerably. Lofoten is up to the present the northern known limit, both for *unicornis* and *linearis*.

*Schizoporella caudata*, SMITT.

Pl. IV figs 6, 7.

*Mollia vulgaris, forma candida*, SMITT. Öfvers. Kgl. Vet. Akad. Forh. 1867 (Bihang) pp. 16, 107. pl. 25, fig. 83.

<sup>1)</sup> It is practical to measure the maximum breadth (b, pl. V, figs. 26, 27) and the maximum height (h), when comparing opercula. These measurements may also be found useful in determining species, for, not taking their absolute value into account, in some species b will be larger than h ( $b > h$ ), in others they will be equal in size ( $b = h$ ) and in others less ( $b < h$ ). It is also sometimes useful to take similar measurements of the maximum breadth and height of the mandibles.

<sup>1)</sup> Cfr. NORMAN, Finmark Polyzoa, p. 100.

<sup>2)</sup> Notes on the Natural History of East Finmark. Ann. Mag. Nat. Hist., Ser. 7, Vol. XII, p. 102.

<sup>3)</sup> NORMAN, Finmark Polyzoa, p. 106.

<sup>4)</sup> NORMAN, Finmark Polyzoa, p. 107.



Malangen, 100—200 m., on stone; Hammerfest (1894) on stone.

I have not had any opportunity of seeing STIMPSON'S work (Invertebr. of Gr. Manan), so that I am unable to form any opinion as to the correctness of SMITT'S conclusion that his f. *candida* is the form described by STIMPSON as *Lepralia candida*. But as VERRIEL<sup>1)</sup> classifies STIMPSON'S species as a *Smittia*, and also remarks that „this species has been entirely misunderstood by SMITT and others owing to the imperfection of the original description“, it is certainly safest to give SMITT'S form the designation which I have used here.

*Schizoporella stormi*, n. sp.

Pl. V, figs. 1, 2.

On a stone from the North Cape (1894), a *Schizoporella* was found, which I suppose to be a new species. The zooecia, which were rather broad in proportion to their length, had a single row of pores along the margin, together with a few small pores on the frontal side (cf. fig. 1). No oocia were present in the colonies, but large avicularia were found under and a little to the side of the oral aperture. The mandible was very pointed. The surface of the zooecia was finely granulated and had weak radial stripes. The zooecia were separated by distinct lines, and it may be mentioned as a peculiarity that there is a crossline (l, fig. 1) by the oral aperture. I think the species will easily be kept distinct from others on account of the distinct opercular ribs (o. r., fig. 2). I have this species both from the North Cape and Hammerfest.

I have taken the liberty of naming this species after the manager of the zoological collection, V. STORM, in Trondhjem.

*Schizoporella hexagona*, n. sp.

Pl. V, figs. 12, 13.

Formed a little crust on stone from Kvænangen II, 90 m.

It is possibly this species which SMITT has illustrated on pl. 25, fig. 79<sup>2)</sup> under the name of *Mollia vulgaris*, forma *ansata*.

It is easily recognized by its six-sided zooecia whose frontwall is punctured, but not perforated. The zooecia are separated by distinct lines. On my specimen there were neither oocia nor avicularia.

A characteristic feature of this species is the large proximal lobe of the operculum (fig. 13). In the operculum  $b < h$ .

*Schizoporella levinsenii*, n. sp.

Pl. V, figs. 3, 4.

Kvænangen II, 90 m., on stone.

The zoarium formed a crust on a stone. In a dried state, the majority of the zooecia were of a deep red colour. The zooecia have a few pores on the frontal wall, and between the pores there are hollows (reminding one of a thimble). The oocia, which are nearly ball shaped, are furnished with deeper hollows, but are not pierced. There were no avicularia on the colonies which I have had an opportunity of examining. The proximal border of the oral aperture is straight with a marked sinus in the middle.

The operculum has a lobe which answers exactly to the sinus mentioned (fig. 4). In the operculum  $b > h$ .

I have taken the liberty of calling this species after the Inspector of the Museum in Copenhagen, G. M. R. LEVINSEN.

*Schizoporella reticulato-punctata*, HINCKS.

Pl. IV, figs. 16, 17.

1867. *Escharella porifera*, forma *edentata*, SMITT, Krit. Förteckn. etc. Öfv. Kgl. Vet. Akad. Förh. 1867. (Bihang), p. 9, pl. 24, fig. 39.
1877. *Lepralia reticulato-punctata*, HINCKS, Polyzoa from Iceland and Labrador. Ann. and Mag. Nat. Hist., ser. 4, vol. 19, p. 103, pl. 10, figs. 3, 4.
1884. *Lepralia reticulato-punctata*, LORENZ, Bryozoen von Jan Mayen, p. 88.
1887. *Escharella reticulato-punctata*, LEVINSEN, Dijnphna Togtets zool-bot. Udbytte, p. 318, pl. 27, fig. 4.
1895. *Smittia reticulato-punctata*, NORDGAARD, Syst. fort., Berg. Mus. Aarb. 1894—95, No. II, p. 27.
1897. *Smittia reticulato-punctata*, BIDENKAP, Bryozoen von Ost-Spitzbergen. Zool. Jahrb., vol. 10, p. 623.
1900. *Schizoporella harmsworthi*, WATERS, Bryozoa from Franz Josef Land. Journ. Linn. Soc. Zool., vol. 28, p. 65, pl. 9, figs. 10—12.
1903. „*Lepralia*“ *reticulato-punctata*, NORMAN, Notes on the Nat. Hist. of East Finmark. Ann. and Mag. Nat. Hist., ser. 7, vol. 12, p. 122.

Hammerfest (1894); the North Cape (1894); the Porsangerfjord, 200 m., Nordkyn (1894).

In my list of Norwegian *Cheilostomata* I entered this species as a *Smittia*, but on closer examination it became clear that the species cannot be left there. Neither can it be considered to be a *Lepralia*, as HINCKS does.

I at first thought of setting it up as the type for a new genus, together with SMITT'S *Escharella porifera*, forma *typica* and the one which I described as *Smittia lineata*, but on further consideration, I have not ventured to start a new genus. In all three species mentioned, there is a distinct sinus on the proximal margin of the oral aperture, and notwithstanding that the opercula in these three species vary from that which is usual in the genus *Schizoporella*, they have, however, at any rate a trace of a proximal lobe. WATERS has described a form, *Schizoporella harmsworthi*, from Franz Josef Land, which he has identified with SMITT'S *Escharella legentii*, forma *prototypa*. This can hardly be correct. True, the mouth in young zooecia of forma *prototypa* may bear a certain resemblance to the oral aperture in WATERS' species, but there is a great difference in the developed zooecia, *harmsworthi* having a sinus on the proximal margin (cf. WATERS l. c. pl. 9, fig. 10), while forma *prototypa* has a mucro (cf. BIDENKAP, Bryozoen v. Ost Spitzbergen, pl. 25, fig. 3, and also the present work pl. IV, fig. 24).

Besides, in *harmsworthi* the oocia are perforated (cf. WATERS, pl. 9, fig. 10), while in f. *prototypa* they are provided with hollows, reminding one of a thimble. On the other hand, there seems to be complete resemblance between *harmsworthi* and SMITT'S *Escharella porifera*, forma *edentata*, but as this form was raised to the rank of a species by HINCKS in 1877, *harmsworthi* must give way to *reticulato-punctata* which form I consider, as does also WATERS, to be a *Schizoporella*. In one specimen from the Porsanger Fiord, I could plainly see the oral glands at the opening of the tentacular sheath, as illustrated by WATERS.

<sup>1)</sup> Proc. U. S. N. M., Vol. II, 1879, p. 192.

<sup>2)</sup> Krit. Förteckn. Övers. Kgl. Vet. Akad. Förh. 1867 (Bihang).

*Schizoporella porifera*, SMITT.

Pl. V, fig. 32.

*Escharella porifera*, forma *typica*, SMITT. Krit. förteckn., Öfvers. Kgl. Vet. Akad. Förh. 1867 (Bihang), p. 9, pl. 24, figs. 30—32.

As to other synonyms, cfr. NORMAN, Notes on the Nat. Hist. of East Finmark, p. 121.

Napstrømmen (Lofoten), 30—40 m.; Malangen, 100—200 m.; The Jøkel Fiord H. 80 m.; Hammerfest (1894); The Kjølle Fiord (1894); Mehavn (1894).

Both the shape of the mouth and the operculum with its proximal lobe, prove that there is a relationship to *Schizoporella*, (Pl. V, fig. 32). It must, at any rate, be more correct to classify this species as a *Schizoporella* than as a *Smittia* or *Eschara* (*Lepralia*). The southern limit of the species which has been found up to the present is Lofoten; its distribution is arctic.

*Schizoporella lineata*, NORDGAARD.

Pl. V, figs. 33, 34.

1895. *Smittia lineata*, NORDGAARD, System. fortegn. Bergens Mus. Aarb. 1894—95, nr. 2, p. 27, pl. 2, fig. 2.

1903. „*Smittia*“ *lineata*, NORMAN, Notes on the Nat. Hist. of East Finmark. Ann. and Mag. Nat. Hist., ser. 7, vol. 12, p. 122, pl. 9, figs. 14, 15. Nordkyn (1894).

NORMAN has taken this species in East Finmark, on *Escharopsis rosacea*, dredged off Vadsø. He remarks also (l. c.): — „Other specimens in my collection are one received from SMITT taken at Spitzbergen, and named *Escharella auriculata*; others from the Gulf of St. Lawrence (WHITEAVES), and off Holsteinborg, Greenland, in 57 fathoms.“

From this it will be seen that *lineata* has an arctic distribution, and it is probable that what has been stated to be *Schizoporella auriculata*, HASSAL from these latitudes should be transferred to *lineata*. The two species appear to be very closely allied, so that it is easily explained that the arctic form (*lineata*) is confused with the more southern one (*auriculata*).

*Leieschara coarctata*, M. SARS.

Moskenstrømmen, 90 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.

*Leieschara plana*, DAWSON.

The Jøkel Fiord II, 80 m.; Kvænangen, Sværholt (1894).

NORMAN<sup>1)</sup> has made it clear that *Myrionozoum crustaceum*, SMITT = *Lepralia plana*, DAWSON. WATERS is<sup>2)</sup> probably right in placing this species under the genus *Schizoporella*.

*Eschara polita*, NORMAN.

*Lepralia polita*, NORMAN, Ann. Mag. Nat. Hist., ser. 3, vol. 13, p. 87, pl. 11, fig. 1.

Hammerfest (1894), on stone.

In his work on „the Polyzoa of East Finmark“, from which several quotations are taken in this paper, NORMAN has given the reasons for substituting *Eschara* for HINCKS' genus *Lepralia*. The synonyms for *Lepralia polita* may be found in my paper: — „Die

Bryozoen des westlichen Norwegens“. Die Meeresfauna von Bergen, p. 87.

*Eschara moskensis*, n. sp.

Pl. IV, figs. 3—5.

Moskenstrømmen H, on stone, 150 m.

This species is particularly noticeable on account of its large, wide zooecia (fig. 3), which are scantily pierced with small holes in the sides. The oral aperture is partly surrounded by 4—6 short spines. On the surface of the oecium (fig. 4) there are fine punctures, but they are not pierced through. The operculum (fig. 5) is quite solid, and the muscle insertions are very distinct.

It is probable that SMITT<sup>1)</sup> has this form in his paper of 1871, under the name *Discopora megastoma*, for fig. 26 shows no slight resemblance to the above mentioned species. I have, however, given a new name, as I consider that SMITT's *Discopora megastoma* includes two species, neither of them being identical to *Lepralia megastoma*, BUSK. (Cfr. SMITT's illustrations and description just quoted with Crag Polyzoa, p. 55, pl. 8, fig. 5).

*Eschara nordlandica*, n. sp.

Pl. IV, figs. 32—35.

Kvænangen II, 90 m., on stone.

The zooecia large, but not so broad as in the preceding species. The front wall is perforated by conspicuous pores and there are no spines on the edge of the oral aperture. Under the aperture there is a protrusion (umbo). There are raised lines between the zooecia (fig. 32) nearly all over. The oocia are punctured, but not perforated. The operculum is quite solid and has distinct ribs (fig. 35). In fig. 33, it may be seen how these ribs lie against the condyles of the oral aperture.

It is not improbable that this species is included under SMITT's definition *Discopora megastoma*. In SMITT's paper of 1871, the figs. 24, 25 show no little resemblance to the above mentioned species. In his description (l. c., p. 1129), SMITT also mentions a protusion at the front of the zooecium. But there are hardly sufficient grounds for supposing that this species is identical to *Lepralia megastoma*, BUSK. His species has, for instance, „a single row of channelled pores“. On the other hand, there is a stronger resemblance between *Eschara nordlandica* and *Eschara* (*Lepralia*) *pertusa*, ESPEr, according to HINCKS' characterisation of this species in Brit. Mar. Pol. (1888), p. 305, pl. 43, figs. 4, 5. But the shape of the oral aperture seems to be different, as well as the puncturing of the oocia. I think it is quite justifiable to enter it as a new species, for I share the opinion that less harm is done by introducing a new name for a known species than by classing two different species under an old name.

The name *Lepralia megastoma* is used, in addition to the places above mentioned, also by LORENZ<sup>3)</sup> and BIDENKAP<sup>4)</sup>, the latter also mentions the species as being a *Mucronella*. BIDENKAP remarks that „die stark verkalkten Zooecien haben die ganze Vorderseite mit grossen Poren durchlöchert“, from which it appears extremely likely that the species, which BIDENKAP had before him (from Spitzbergen) was *E. nordlandica*.

1) Övers. Kgl. Vet. Akad. Förh., 1871, p. 1129, pl. 21, figs. 24—26.

2) Crag Pol., p. 55. (Cfr. pl. 8, fig. 5.)

3) Bryozoen von Jan Mayen. Beobachtungsergebnisse der östreich. Polarstation Jan Mayen. III B., p. 89.

4) Fauna arctica (von RÖMER u. SCHAUDIN). B. I. p. 521.

1) Finmark Pol., p. 110.

2) Bryozoa from F. Josef Land, p. 64.



*Eschara sincera*, SMITT.

Pl. III, figs. 12—14.

Balstad (Lofoten): The Ostnes Fiord, 50—70 m., on coal; Digermulen, 150 m., on stone; The Lyngen Fiord, 250 m.; The Jøkel Fiord II, 80 m.; The North Cape (1894); Mehamn (1894).

I have previously classified this species as belonging to the genus *Mucronella*, and although, I now enter it as an *Eschara*, it is not at all because it can be said to be any typical form of this genus.

*Discopora (Umbonula) verrucosa*, ESPER.

In the beach at „Glea“, Røst.

I have previously found this interesting form near Bergen. The northern limit for the species is henceforth Lofoten.

*Discopora (Mucronella) pavonella*, ALDER.<sup>1)</sup>

The Kirk Fiord, 100 m.; The Trold Fiord Sund, 40 m.; Sværholt (1894). From SPARRE SCHNEIDER I have received colonies which he took in the Lakse Fiord.

*Porella minuta*, NORMAN.

Groto, 6—24 m., on algae.

NORMAN was the first to find this species in Norway, he took it in the Bog Fiord and the Lang Fiord (East Finmark).

*Porella concinna*, BUSK.

Breisund, 100 m., on *Rhynchonella psittacea*; Mehamn (1894), on shells.

*Porella aperta*, BOECK.<sup>2)</sup>The Beier Fiord, 30—150 m., on *Pecten vitreus*.*Porella acutirostris*, SMITT.<sup>3)</sup>

Svolvær (1894), on coal from the bottom.

The species is a new one to our fauna.

*Porella princeps*, NORMAN.

Pl. IV, figs. 21—23.

1892. *Monoporella spinulifera*, var. *praeclara*, HINCKS, „The Polyzoa of St. Lawrence“. Ann. and Mag. Nat. Hist., ser. 6, vol. 9, p. 152, pl. 8, fig. 3.

1903. *Porella princeps*, NORMAN, „Notes on the Natural History of East Finmark“. Ann. and Mag. Nat. Hist., ser. 7, vol. 12, p. 114, pl. 9, figs. 8—11.

In the work already mentioned of NORMAN, he has availed himself of the opportunity of describing „a Greenland *Porella*“, to which he has given the name above. This species has now also been shown to be European; for on looking through some dried material from Mehamn (Finmark, 1894), I found a little red colony on *Neptunea despecta*. There is perfect agreement with NORMAN's description, but so as to prevent any doubt with regard to identity, I have illustrated the characteristic operculum (Pl. IV, fig. 21).

Below the oral aperture of the zoecium, a swelling is indicated, both in HINCKS' and NORMAN's figures. Below the swollen frontal wall is the chamber of the avicularium. From this chamber

<sup>1)</sup> Cfr. S. F. HARMER, On the Morphology of the Cheilostomata. Quart. Journ. Mic. Sci. Vol. 46, N. S., p. 296.

<sup>2)</sup> Cfr. NORMAN, Finmark Polyzoa, p. 112 and WATERS, F. J. B., p. 83, pl. 10, figs. 6, 7.

<sup>3)</sup> Cfr. WATERS, F. J. B., p. 83, pl. 10, figs. 1—5.

a passage goes to the lateral walls. (Pl. IV, fig. 23). The mandible of the avicularium is very small. (Pl. IV, fig. 22).

This species has previously been mentioned from St. Lawrence (HINCKS). NORMAN speaks of it (l. c., p. 115) as being „taken by the Valorous“, 1875, off Holsteinborg, W. Greenland, „in 57 fathoms“. Mehamn in Finmark now comes as a third locality. I have also found a little colony on a stone from Hammerfest (1894).

*Porella glaciata*, WATERS.

Pl. V, fig. 5—7.

1868. *Eschara cervicornis*, forma *lepraliae*, SMITT, Öfv. Kgl. Vet. Akad. Förh. 1867 (Bihang), p. 23, pl. 26, figs. 136, 137.

1900. *Porella glaciata*, WATERS, Bryozoa from Franz Josef Land. Journ. Linn. Soc. Zool. Vol. 28, p. 78, text figure 2, 3.

Mehamn (1894), on *Neptunea despecta*.

As a synonym for his *Porella glaciata*, WATERS adds, in the work above referred to, the designation, followed by a note of interrogation, *Eschara cervicornis*, f. *lepraliae*, SMITT.

WATERS remarks (l. c. p. 78): — „The peristome is raised at the side, the avicularian chamber is wide and distinct with the mandible within the peristome, but on the top of a more or less tubular projection.“ If this belongs to the description of *glaciata*, it is not correct. But, on the other hand, this description is applicable to *Porella propinqua*. I have no doubt that SMITT's forma *lepraliae* and WATERS' *glaciata* are identical. It also seems to be certain that it was *glaciata* which I took at Mehamn in Finmark. SMITT's specimens were from Greenland, so that the distribution of the species as at present known is: — Greenland, Finmark, Franz Josef Land.

*Porella struma*, NORMAN.

Balstad (Lofoten), 80 m.; Digermulen, 150 m.; Malangen, 100—200 m.; The Jøkel Fiord, 100 m.; Ingøhavet, 300 m.; The North Cape (1894); The Porsanger Fiord, 70 m.

*Porella lavis*, FLEMING.

Pl. III, fig. 15.

Moskenstrømmen, 90 m.; Balstad, 150 m.; Mortsund III, 100 m.; Malangen, 100—200 m.; The North Cape (1894).

*Porella saecata*, BUSK.<sup>1)</sup>

Pl. III, fig. 16.

Breisund, 100 m.; The North Cape (1894); The Porsanger Fiord, 200 m.

*Porella propinqua*, SMITT.

Pl. IV, figs. 18—20 b.

*Eschara propinqua*, SMITT (part.), Öfv. af Kgl. Vet. Akad. Förh., 1867 (Bihang), pp. 22, 146, pl. 26, figs. 126—129.

*Lepralia propinqua*, HINCKS, Polyzoa from Iceland and Labrador. Ann. Mag. Nat. Hist., ser. 4, vol. 19, p. 103, pl. 10, figs. 5—7.

*Smittia propinqua*, NORDGAARD, Syst. fortegn. marine polyzoa, p. 27. Berg. Mus. Aarbog, 1894—1895.

*Smittia propinqua*, BIDENKAP, Bryozoen von Ost-Spitzbergen, Zool. Jahrbücher, B. 10, 1897, p. 624.

*Smittia propinqua*, BIDENKAP, Die Bryozoen, II. Theil. Fauna arctica (von RÖMER und SCHANDINN), B. I, p. 518.

Hammerfest (1894), on hydroids and *Bugula murrayana*; The North Cape (1894), on hydroids and *Menipea*; Mehamn (1894).

<sup>1)</sup> Cfr. WATERS, F. J. B.; p. 81.



Under the name *Eschara propinqua*, SMITT has entered two forms which undoubtedly are separate species. In the explanation of the illustrations it is mentioned that figs. 131—134 represent zoecia of specimens found in Finmark on *Flustra*. These belong to the species which HINCKS later described as *Porella proboscidea*. In the latter species, the zoecium is unperforated, while it has a characteristic perforation (Pl. IV, fig. 20 b) in *propinqua*.

In *propinqua* the peristome is very elevated on the sides of the oral aperture, and the operculum has a characteristic shape (20 b). Another peculiarity of *propinqua* is the occurrence of small perforations on the backside of the zoarium (fig. 19).

The lateral wall of the zoecium has two multipored rosette-plates.

*Porella proboscidea*, HINCKS.

Pl. IV, figs. 8—11.

*Eschara propinqua*, SMITT (part), Öfvers. Kgl. Vet. Akad. Förh. 1867 (Bihang), p. 22, pl. 26, figs. 130—134.

*Porella proboscidea*, HINCKS, The Polyzoa of the St. Lawrence. Ann. Mag. Nat. Hist., ser. 6, vol. 1, p. 223, pl. 14, fig. 4.

*Porella proboscidea*, NORDGAARD, Syst. fortæg. marine polyzoa. Berg. Mus. Aarb. 1894—95, p. 25, pl. 1, fig. 4.

*Porella skenei*, var. *proboscidea*, WATERS. F. J. B., p. 79, pl. 11, figs. 17, 18.

Hammerfest (1894); The North Cape (1894); Nordkyn (1894); Mehavn (1894).

The avicularian rostrum is much larger in this species than in the foregoing one. (Cfr. figs. 8 and 18).

The Zoecium is poreless, and so is the basal wall of the zoecium.

The opercula are also different with regard to shape. *Proboscidea* is so different from *skenei* that the former can scarcely be considered to be a variety of the latter.

*Palmicellaria skenei* var. *tridens*, BUSK.

Pl. IV, fig. 12.

Moskenstrømmen, 90 m.; Malangen, 100—200 m.; The Porsanger Fiord, 200 m.

With regard to this variety, I beg to refer to my paper: — Die Bryozoen des westlichen Norwegens. Meeresfauna von Bergen, p. 89.

The operculum is, however, not very carefully illustrated there (pl. I, fig. 14), for which reason I give another illustration here (fig. 12).

*Palmicellaria skenei* var. *bicornis*, BUSK.

Pl. IV, fig. 13.

*Lepralia bicornis*, BUSK, A Mon. of the foss. Pol. of the Crag, p. 47, pl. 8, figs. 6, 7.

The Jokel Fiord III, 100 m.

I have also taken this variety in the Trondhjem Fiord.

*Escharopsis (Escharoides) sarsi*, SMITT.

Tromsø Sound, 70 m.

From SPARRE SCHNEIDER, I got a colony which was 17.5 cm. in length and 8 cm. in width.

The cavity of the colony served as a hidingplace for *Ophiopholis aculeata*, *Cribrella* etc. The colony itself was covered with *Thuiaria thuia* and other hydroids.

*Escharopsis rosacea*, BUSK.

Pl. III, fig. 17.

Moskenstrømmen, 90 m.; Digermulen, 100—150 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Breisund, 100 m.

*Pseudoflustra solida*, STIMPSON.<sup>1)</sup>

Kvænangen II, 90 m.; The Porsanger Fiord, 70 m.

*Monoporella spinulifera*, HINCKS.<sup>2)</sup>

Pl. IV, figs. 14, 15.

*Porina ciliata*, forma *dura*, SMITT, Öfvers. af Kgl. Vet. Akad. Förh. 1867 (Bihang) pp. 6, 61, pl. 24, fig. 17.

*Discopora cruenta*, SMITT, Öfvers. af Kgl. Vet. Akad. Förh. 1871, p. 1127, pl. 21, figs. 20—23.

In my list of the Norwegian Bryozoa (Bergens Mus. Aarb. 1894—95). I have entered this species as *Macronella cruenta*, NORMAN, as I, with SMITT took NORMAN's *Lepralia cruenta* to be the same as *Discopora cruenta*, SMITT. I had, however, noticed at that time that there was a resemblance between *Discopora cruenta*, SMITT and *Macronella spinulifera*, HINCKS. The identity of these two forms has later been confirmed by HINCKS and NORMAN. It must, however, be observed that SMITT both mentions and illustrates a single row of marginal pores on the zoecia, while HINCKS<sup>3)</sup> does not even hint at their presence. In other respects the resemblance is striking, and the only possible explanation is that HINCKS has overlooked the marginal pores. On Pl. IV, fig. 15 the arrangement of the marginal pore-chambers will be seen.<sup>4)</sup>

The species is known from St. Lawrence, Greenland, Spitzbergen and King Charles' Land.<sup>5)</sup> I found it to be quite common on stones at Hammerfest in 1894.

*Escharella immersa*, FLEMING = *Macronella (Lepralia) peachi*, JOHNSTON.<sup>6)</sup>

Pl. IV, fig. 27.

Moskenstrømmen II, 150 m.; Malangen, 100—200 m. (var. *octodentata*).

*Escharella ventricosa*, HASSALL.

Pl. IV, fig. 28.

Moskenstrømmen II, 150 m.; Svolvær (1894), on coal; The Östnes Fiord, 50—70 m., on stone and shells, Hammerfest (1894) on stones.

*Escharella laqueata*, NORMAN.

Pl. IV, fig. 29.

Moskenstrømmen II, 150 m.; The Ostnes Fiord 50—70 m., on stone; Malangen, 100—200 m., on stone, Hammerfest (1894).

*Escharella abyssicola*, NORMAN.

Pl. IV, fig. 30.

The Tys Fiord I, 500 m., on *Lophohelia prolifera*; Kvænangen II, 90 m., on shells.

<sup>1)</sup> Refer to NORMAN (l. c. p. 124) for synonyms.

<sup>2)</sup> Cf. NORMAN (l. c. p. 115).

<sup>3)</sup> The Polyzoa of St. Lawrence. Ann. and Mag. Nat. Hist., ser. 6, vol. 3, p. 431, pl. 21, fig. 3.

<sup>4)</sup> Cfr. LEVINSEN, Studies on Bryozoa. Vid. Med. Nat. Hist. Foren. in Copenhagen, 1902, (Sep.), p. 10.

<sup>5)</sup> Cfr. BIDENKAP, „Die Bryozoen“. Fauna Arctica, B. I, Lief. 3, p. 521.

<sup>6)</sup> Cfr. NORMAN (l. c. p. 118).

*Escharella labiata*, BOECK.

Pl. IV, figs. 25, 26, 31.

The Beier Fiord, 50—150 m.: The Kirk Fiord III, 70—80 m.; Svolveer (1894), on coal; Malangen, 100—200 m., on *Retepora cellulosa*: The Jøkel Fiord II, 80 m.; Breisund, 100 m., on *Retepora cellulosa*: The Porsanger Fiord, 200 m.; Sværholt (1894); Mehavn (1894).

In this species the basis of the oecium is perforated (fig. 26). *Labiata* is different from *abyssicola* in that it has several rows of marginal pores (fig. 25).

The Norwegian species of this genus can fairly easily be distinguished by the help of the oral denticle, as this varies both in form and size in the species which I have had an opportunity of examining (figs. 27—31).

*Phylactella peristomata*, n. sp.

Pl. V, figs. 28—31.

The Jøkel Fiord II, 80 m., on *Waldheimia*.

The genus *Phylactella* was started by HINCKS, and it is characterized as follows in the Brit. Mar. Pol. (p. 356): — „Zooecia with the primary orifice more or less semicircular, the lower margin usually dentate; peristome much elevated, not produced or channelled in front. No avicularia. Zoarium (in British species) incrusting.“

As belonging to the British fauna, HINCKS mentions three species, *labrosa*, *collaris* and *eximia*. Of these, *labrosa* is stated to have a porous front wall and a „triplet“ of oral denticles. *Collaris* has neither pores nor denticles, *eximia* is provided with marginal pores.

On *Waldheimia* from the Jøkel Fiord, a form was found which, on account of its unusually elevated peristome, suggested *Phylactella*. On most of zooecia there was a single row of marginal pores, and it corresponded so far to *eximia* (fig. 28), but differed from it in having quite smooth oecia (fig. 29). Further, the peristome was elevated to the same height and thus was not provided with lateral, triangular lobes as is the case in *eximia*. The specimen from the Jøkel Fiord also had small avicularia with semicircular mandible (fig. 30). On young zooecia the avicularia are quite plainly seen (fig. 29), but they are not so easily seen on older individuals which have the large collar below the oral aperture.

According to the diagnosis of the genus made by HINCKS, there should be no avicularia, but as the resemblance between the species from the Jøkel Fiord and the hitherto described *Phylactella* species is striking in other respects, it is, I think, most practical to extend the limits of the genus to include also those species which have avicularia.

The oral denticle (fig. 31) is similar in shape to that of *Escharella labiata* (Pl. IV, fig. 31), but it is much narrower. Below the oral aperture, there is a swelling for the avicularian chamber, which is connected with the surface by help of a few pores (fig. 28).

*Escharoides<sup>1)</sup> jacksoni*, WATERS.

Pl. III, fig. 19.

*Mucronella coccinea*, BIDENKAP, Bryozoen von Ost-Spitzbergen. Zool. Jahrb. B. 10, p. 624, pl. 25, figs. 5, 6.

*Smittia jacksoni*, WATERS, Bryozoa from Franz Josef Land. Linn. Soc. Journ. Zoology, vol. 28, p. 87, pl. 12, fig. 18.

<sup>1)</sup> Cf. NORMAN, Notes on the Nat. Hist. of East Finmark. Ann. Mag. Nat. Hist., ser. 7, vol. 12, p. 117.

The Jøkel Fiord III, 100 m., on *Terebratulina*: Kvænangen II, 90 m., on stone and *Waldheimia*; Ingohavet, 300 m.

I consider that there are good grounds for distinguishing this form from *E. coccinea*, as WATERS has done in the work above mentioned. The descriptions which BIDENKAP and WATERS have given of the *jacksoni* species, answer perfectly for the specimens I have found. In *jacksoni* the zooecia are much larger, the mandible too is rather different in shape (figs. 18, 19). It is new to the fauna of Norway.

*Smittina<sup>1)</sup> reticulata*, MACGILLIVRAY.

Reine, 100 m.; Mortsund III, 100 m.; Henningsvær I, 150 m. Lofoten is the hitherto known northern limit for this species.

*Smittina trispinosa*, JOHNSTON.

(Pl. V, fig. 35).

Balstad (Lofoten).

*Smittina arctica*, NORMAN.

1869. *Escharella porifera*, forma *minuscula*, SMITT. Öfvers. Vet. Akad. Förh. 1867. Bihang, pp. 9, 73, pl. 24, figs. 33—35 (not forma *majuscula*).
1894. *Smittia arctica*, NORMAN (part.), A Month on the Trondhjem Fiord. Ann. Mag. Nat. Hist. ser. 6, vol. 13, p. 128.
1895. *Smittia arctica*, NORDGAARD, System. fort. over Norges marine Polyzoa. Bergens Mus. Aarb., 1894—95, nr. 2, p. 27, pl. 1, fig. 2.
1900. *Smittia landsborovii*, var., WATERS, Bryozoa from Franz Josef Land. Journ. Linn. Soc. Zool., vol. 28, pl. 12, fig. 7.
1903. *Smittia arctica*, NORDGAARD, Die Bryozoen des westlichen Norwegens. Die Meeresfauna von Bergen, (ed. by Dr. APPELLÖF) p. 90, pl. 1, figs. 16, 17.
1903. *Smittina arctica*, NORMAN, Notes on the Nat. Hist. of East Finmark. Ann. Mag. Nat. Hist., ser. 7, vol. 12, p. 121.

Moskenstrømmen, 90 m., on shells; The Ostnes Fiord, 50—70 m., on stone; Malangen, 100—200 m.; Kvænangen II, 90 m.; Hammerfest (1894); Breisund, 100 m.; Sværholt (1894); The Kjølle Fiord (1894); Nordkyn (1894).

In the work above quoted, NORMAN has entered SMITT's forms of *Escharella porifera* (f. *minuscula* and *majuscula*) under the name of *Smittia arctica*. During my excursion to Finmark in 1894, I found numerous specimens of f. *minuscula*, of which I also found some in the Lyse Fiord (59° 3' N.) in the winter of 1902. In the course of investigations made in 1899 in northern Norway, I found it at several places, and I also succeeded in one locality in obtaining forma *majuscula*, on a stone in the Porsanger Fiord, 200 m. A closer examination of the latter species has led to the conclusion that it must be considered to be a distinct one. It is doubtless most correct to retain NORMAN's designation, *arctica*, but this term will now have a different meaning to that originally given to it by NORMAN, as it will now only apply to forma *minuscula*, SMITT.

*Smittina majuscula*, n. sp.

Pl. IV, figs. 36—38.

1869. *Escharella porifera*, forma *majuscula*, SMITT. Öfvers. etc. 1867. Bihang, pp. 9, 74, pl. 24, figs. 36—38.
1888. *Smittia landsborovii*, forma *porifera*, HINCKS. Ann. Mag. Nat. Hist., ser. 6, vol. 1, p. 225, pl. 14, fig. 2.

<sup>1)</sup> Cfr. NORMAN, (l. c. p. 120).



The Porsanger Fiord, 200 m., on a stone.

SMITT (l. c., p. 75) calls attention to the fact that the ectocyst in zoecia and oecia are thinner than in the foregoing form.

In *arctica* there are in the oecia often transverse and longitudinal lines or sutures, these too are mentioned by SMITT (l. c., p. 74, pl. 24, fig. 33). SMITT also says that these lines sometimes occur in the oecia of *majuscula*, but I have not noticed them.

It is easy to distinguish between the two species. With regard to size, it may be mentioned that the zoecia in *arctica* are 0.8 mm. in length from the lower end to the tip of the oral denticle, and the corresponding measurement in *majuscula* gives 0.5—0.6 mm. Oecia in *arctica* are rather oval, in *majuscula* they are approximately ballshaped, in both species they are punctured like a thimble, but this is coarser in *majuscula* than in the other species.

The perforation in the frontal wall of the zoecia of *majuscula* is closer than in *arctica*, where it is, indeed, somewhat different. HINCKS (l. c., pl. 14, fig. 2) has illustrated the oral denticle as being pointed, and I found some of them of this shape in the colony which I had under examination.

Operculum in *arctica*, I have not yet succeeded in isolating, in *majuscula*, on the other hand, it has a characteristic form, which also differs from the usual one in the genus *Smittina* (fig. 37).

A very evident difference between the two species is that the zoecia in *majuscula* are plainly separated, while in *arctica* they more evenly merge into each other.

This species is most likely exclusively arctic. In addition to the Porsanger Fiord, in Finmark, the following findings places are mentioned, Spitzbergen. (SMITT), St. Lawrence (HINCKS).

*Smittina smitti*, KIRCHENPAUER,  
Pl. IV, fig. 24.

The Ogs Fiord I, 100 m.

In „Bryozoen des westlichen Norwegens“, I used a new name for this form, *Smittia lerenseni*, as KIRCHENPAUER's name for SMITT's *Escharella legitilii*, forma *prototypa* had quite slipped out of my memory, notwithstanding that I made a note of it several years ago. NORMAN<sup>1</sup>) here too made the necessary correction. I beg reference to NORMAN's list of synonyms, at the same time remarking that *Schizoporella Harmsworthi*, WATERS, ought to be excluded from it, in accordance with what I have previously pointed out, that this must be = *Schizoporella reliculato-punctata*, HINCKS.

Each zoecium has 6—8 lateral rosette-plates. As far as I could see, the two upper ones were bi-pored and the two next ones tri-pored.

This species has not previously been found in Norway.

*Smittina jeffreysi*, NORMAN.<sup>2</sup>)

The Porsanger Fiord, 70 m.

The species was not previously found in Norway.

*Rhamphostomella scabra*, (FABR.), SMITT,  
(Pl. V, figs. 8—11).

1867. *Cellepora scabra*, SMITT (part.). Krit. förteckn., p. 30, pl. 28, figs. 183—185.

1886. *Rhamphostomella scabra*, LORENZ, Bryozoen von Jan Mayen, p. 93.

Digermulen, on stone, 150 m.; The Jokel Fiord I, 100 m.; The Porsanger Fiord, 70 m.

LORENZ divided SMITT's *Cellepora scabra* into two species, and as far as I can judge this division is perfectly justifiable. The difference between them may be characterized as follows.

*R. costata* has an oral denticle (pl. V, fig. 22) but in *scabra* it is wanting. In *costata* the avicularian mandible is about half as long as it is wide, while in *scabra* the height is only very little more than the width.

The oecia in *costata* have usually more pores than those of *scabra* have (cfr. figs. 9, 21). The rostrum in the latter species is shorter and blunter than in the former one. It is generally the case too that the radial lines in *costata* are continued on the rostrum, but this is not often so in the case of *scabra*. Both species are punctured on the basal wall of the zoecium (fig. 10) but more closely in *scabra* than in *costata*.

BIDENKAP<sup>1</sup>) has found *Rh. scabra* in the Lyngen Fiord. So that the species is now known from the coast of Finmark to Lofoten.

*Rhamphostomella costata*, LORENZ,  
(Pl. V, figs. 21, 22).

1867. *Cellepora scabra*, SMITT (part), Krit. förteckn., pag. 30, pl. 28, figs. 186—188.

1886. *Rhamphostomella costata*, LORENZ, Bryozoen von Jan Mayen, p. 12 (94), pl. 7, fig. 11.

1892. *Rhamphostomella costata*, HINCKS, Polyzoa of St. Lawrence, Ann. and Mag. Nat. Hist., ser. 6, vol. 3, p. 426, pl. 21, figs. 6—8.

1900. *Rhamphostomella costata*, WATERS, Bryozoa from Franz Josef Land, p. 91, pl. 11, figs. 26, 27.

Tromsø, Mehamn (1894).

NORMAN has taken this form in the Varanger Fiord, and BIDENKAP in Lyngen. The hitherto known southern limit for this species is Tromsø.

*Rhamphostomella plicata*, SMITT,  
(Pl. V, figs. 14, 15).

1867. *Cellepora scabra*, forma *plicata*, SMITT, Krit. fört., p. 30, pl. 28, figs. 189, 191, 195.

1877. *Cellepora plicata*, HINCKS, Polyzoa from Iceland and Labrador, Ann. and Mag. Nat. Hist., ser. 4, vol. 19, p. 106, pl. 11, figs. 3, 4.

1886. *Rhamphostomella plicata*, LORENZ, Bryozoen von Jan Mayen, p. 12 (94).

1900. *Rhamphostomella plicata*, WATERS, Bryozoa from F. J. L., p. 92, pl. 11, figs. 28, 29.

Nordkyn (1894), on an annelid tube.

As is the case with *costata*, this species too has an oral denticle, which is, however, longer and narrower than in the species mentioned.

The oecium is as a rule provided with a few pores. I was not able to discover any punctures on the back side of the colony. It is therefore probable that SMITT's fig. 190 does not represent this species.

<sup>1</sup>) Finmark Polyzoa, p. 123.

<sup>2</sup>) Refer to synonyms in „Finmark Polyzoa“, p. 120.

<sup>1</sup>) Lyngenfjordens evertebrat fauna. Tromsø Mus. Aarb. 20, 1897, p. 92.

*Rhampostomella radiatula*, HINCKS.

Pl. V, fig. 16, 17.

1867. *Cellepora scabra* f. *plicata*, SMITT (part.), Krit. fört. pl. 28, fig. 193.
1877. *Lepralia radiatula*, HINCKS, Polyzoa from Iceland and Labrador. Ann. and Mag. Nat. Hist., ser. 4, vol. 19, p. 104, pl. 10, figs. 9—14.
1886. *Rhampostomella radiatula*, LORENZ, Bryozoen von Jan Mayen, p. 13 (95), pl. 7, fig. 9.

Hammerfest (1894); The Trold Fiord Sund, 40 m.; The North Cape (1894); The Kjolle Fiord (1894).

I found this species quite common on algae and hydroids which I took on the coast of Finmark in the autumn of 1894.

The zooecia are rather small, and the species is easily distinguished from the foregoing one, in that it wants the suboral rostrum and by the presence of the peculiar elevated peristome, about which HINCKS (l. c. p. 104) very appropriately remarks that it has „a very fantastic appearance“.

The species is now known from Labrador, Iceland, Spitzbergen, Jan Mayen and Finmark.

*Rhampostella contigua*, SMITT.

Pl. V, figs. 18—20.

1867. *Cellepora ramulosa*, forma *contigua*, SMITT, Krit. fört. p. 31, 189, pl. 28, figs. 198—201.

The Ostnes Fiord, 50—70 m., on stone; Hammerfest (1894), on stone; Breisund, 100 m., on a gastropod shell; Mehavn (1894), on *Balanus*.

The species of the genus *Cellepora* have characteristic opercula with a more or less distinct proximal lobe as in the *Schizoporella* species.

The shape of the operculum in the above mentioned species proves that it is quite impossible to look upon it as a variety of *C. ramulosa*, it can, indeed, not be considered to belong to the *Cellepora* genus. Neither is it a typical *Rhampostomella*, but I retain it for the present under that genus, as I do not now know any more suitable place for it.

The surface of the zooecia are quite even, occasionally there is a suggestion of radial stripes. The young zooecia have as a rule 4 spines on the distal side of the oral aperture. The operculum is more solid than in the other *Rhampostomella* species. The mandible of the avicularia is not of the same shape either as is characteristic of the other species which belong to the same genus.

*Cellepora tuberosa*, D'ORBIGNY.

1867. *Cellepora ramulosa*, f. *tuberosa*, SMITT., Krit. fört. pp. 31, 191.
1903. *Cellepora tuberosa*, NORDGAARD, Die Bryozoen des westlichen Norwegens, p. 69, pl. 2, figs. 28—34.

Moskenstrømmen; The Ostnes Fiord, 50—70 m.; The North Cape (1894).

Respecting this species, I beg to refer to what I have previously said in the paper written by me, which is quoted above.

*Cellepora nodulosa*, LORENZ.

Pl. III, figs. 21—24.

1867. *Cellepora ramulosa*, f. *avicularis*, SMITT (part.), Krit. förteckn., p. 32, 194, pl. 28, figs. 207—210.

1886. *Cellepora nodulosa*, LORENZ, Bryozoen von Jan Mayen p. 14 (96), pl. 7, fig. 14.

Kvænangen II, 90 m.; The Jøkel Fiord II, 80 m.; The Jøkel Fiord III, 100 m.; The North Cape (1894); The Porsanger Fiord; Sværholt (1894); The Kjolle Fiord (1894); Mehavn (1894).

The specimens from the places above mentioned answer, on the whole, well to LORENZ's illustrations and description of *C. nodulosa*.

The mandible of the avicularia (fig. 24) had a row of fine teeth in the distal margin, and in the operculum  $b$  was  $> h$  (fig. 23). On examining some old material of *Cellepora* specimens, I found that the forms which I entered as *C. pumicosa* from Finmark in my list of Norwegian Cheilostomata were really young colonies of *nodulosa*.

I am afraid that NORMAN and WATERS have been guilty of the same mistake, when they mention *pumicosa* respectively from Finmark and Franz Josef Land. I do not think that *pumicosa* occurs in Finmark. In addition to the places already mentioned, I have determined specimens of *C. nodulosa* from the North Ocean Expedition st. 223, 273, 363.

BIDENKAP has taken it in the inner part of the Lyngen Fiord.

*Cellepora ventricosa*, LORENZ.

Pl. III, figs. 26—29.

When I was working out the Bryozoa from the North Ocean Expedition, I treated *ventricosa* and *incrassata* as being the same, as I supposed that the difference between the forms lay within the limits of variation for the one species. After I had got more material, however, I found that they must be treated as two separate species, and this opinion is shared by WATERS in his treatment of the Bryozoa from Franz Josef Land.

I have a typical *C. ventricosa* (fig. 26) from Breisund in Finmark.

The zoarium probably never attains to such a decided branching as is the case in *C. incrassata*. The two species can be distinguished at once by the naked eye, as *incrassata* is comparatively smooth on the surface, the zooecia not reaching so far forward from the colony as in *ventricosa*.

There were no vicarious avicularia on the specimens of *C. ventricosa* which LORENZ and WATERS had at their disposal, but they were present (fig. 29) in my colony from Breisund. They are different from those in *C. incrassata*, the greatest width of the mandible of *ventricosa* is about double that at the hinging joint, while the corresponding mandible in *incrassata* is more evenly wide. (Cfr. WATERS, Bryozoa, from F. J. Land, pl. 12, fig. 13).

The mandible in the oral avicularium is semicircular also in *ventricosa* (fig. 28), but it is considerably larger than in *incrassata*.

*C. ventricosa* is new to Norwegian fauna.

*Cellepora incrassata*, SMITT.

Pl. III, fig. 25.

Hammerfest (1894).

WATERS has called attention to the fact that *Cellepora inerasata*, LAMARCK and *C. incrassata*, SMITT are not identical. The former is found in the Mediterranean and is supposed to be the same as *C. coronopus*, S. WOOD, while *C. incrassata*, SMITT has proved only to have arctic distribution. It occurred in the material which Mc ANDREW collected in Finmark in 1856 and the species



is entered by BUSK under the name *Cellepora verrucosus*.<sup>1)</sup> WATERS does not, however, adopt this name, because a large number of forms have been given the name *Cellepora verrucosus* and *Eschara verrucosus*.

I believe I have identified the following *Cellepora* species on the Norwegian coast:— *pumicosa*, *ramulosa*, *tuberosa*, *dichotoma*, *aricularis*, *nodulosa*, *costazi*, *ventricosa* and *incrassata*.

*Retepora beaniana*, KING.

Rost III, 100 m.; Moskenstrømmen I, 200 m.; The Kirk Fiord III, 70—80 m.; Balstad; Mortsund III, 100 m.; Ure I, 200—250 m.; The Ostnes Fiord, 130 m.; The Beier Fiord, 50—150 m.; Digermulen, 100—150 m.; Stønesbotn, 40—80 m.; Malangen, 100—200 m.; Hammerfest, Ingøhavet, 300 m.; Breisund, 100 m.; Mehavn (1894).

*Retepora cellulosa*, LIN.

Malangen, 100—200 m.; Hammerfest (1894); The North Cape (1894); The Porsanger Fiord, 200 m.; Sværholt (1894).

This species has not hitherto been found by me south of Malangen.

*Retepora wallichiana*, BUSK.

Pl. III, fig. 20.

The Beier Fiord, 50—150 m.; Balstad; Stønesbotn, 40—80 m.; Malangen, 100—200 m.; The North Cape (1894); Nordkyn (1894). I have also found this form in Radosund, a little north of Bergen. The species is arctic in its distribution.

*Cyclostomata*.

*Crisia eburnea*, LIN.

Moskenstrømmen I, 200 m.; The Kirk Fiord IV, 30—50 m.

*Crisia denticulata*, LAMARCK.

The Kirk Fiord, 100 m.; Malangen, 380 m.

*Tubulipora liliacea*, PALLAS.

Pl. III, fig. 30.

The Sag Fiord, 200 m.; on dead branches of *Isidella hippuris*; Malangen, 100—200 m.

*Tubulipora penicillata*?, FABR.

Pl. III, fig. 31.

The North Cape (1894); Mehavn (1894).

*Idmonca atlantica*, FORBES.

Pl. III, fig. 32.

The Sea N. W. of Rost, 700 m.; Moskenstrømmen I, 200 m.; The Kirk Fiord, 30—50 m.; The Beier Fiord, 50—150 m.; Reine, 100 m.; Balstad, 30—50 m.; Mortsund I, 200 m.; The Ostnes Fiord, 130 m.; The Jøkel Fiord I, 100 m.; Breisund 100 m.; The North Cape (1894); The Porsanger Fiord, 70 m.

*Diastopora patina*, LAMARCK.

Malangen, 100—200 m.

*Diastopora obelia*, JOHNSTON.

Moskenstrømmen, 90 m., on *Waldheimia*; The Kirk Fiord III, 70—80 m.; Digermulen, on stone, 150 m.; The Tys Fiord I, on *Lophohelia*, 500 m.; Malangen, 100—200 m.; Ingøhavet, on sponges, 300 m.

*Reticulipora intricaria*, SMITT.

Sværholt (1894).

*Hornera lichenoides*, (PONTOP.), LIN.

Pl. III, fig. 33.

Rost II, 150 m.; Moskenstrømmen, 90 m.; Reine, 100 m.; Mortsund II, 100 m.; Stønesbotn, 40—80 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Mehavn (1894).

*Hornera violacea*, M. SARS.

Malangen, 100—200 m.; Malangen, 380 m.

*Lichenopora hispida*, FLEMING.

The Kirk Fiord, 100 m.; The Tys Fiord I, on *Lophohelia*, 500 m.; Malangen, 100—200 m.; The Porsanger Fiord, 200 m.

*Lichenopora verrucaria*, FABRICIUS.

Groto, on algae, 6—24 m.

*Domopora stellata*, GOLDFUSS.

Pl. III, fig. 34.

Reine (Lofoten), 100 m.; Malangen, 100—200 m., Malangen indicates the northern limit of the species.

*Defrancia lucernaria*, M. SARS.

The Kirk Fiord, 50—80 m., both living and dead colonies; The Ogs Fiord I, 100 m. (dead colony); Kvænangen II, 90 m.; The Jøkel Fiord I, 100 m.; The Jøkel Fiord II, 80 m.; The Porsanger Fiord, 70 m.

*Ctenostomata*.

*Alcyonidium gelatinosum*, LIN.<sup>1)</sup>

Malangen, 100—200 m.

*Alcyonidium disciforme*, SMITT.

Pl. III, fig. 35.

Lynghen III, 320 m.

This peculiar species had not previously been found on the Norwegian coast.

*Flustrella hispida*, FABRICIUS.

The North Cape (1894), on *Fucus serratus*; Nordkyn (1894), on *Fucus serratus*. NORMAN has found this species at Svølvær, Lofoten.

*Flustrella corniculata*, SMITT.

Pl. III, fig. 37, 38.

1871. *Alcyonidium corniculatum*, SMITT, Krit. förteckn. ets. Öfvers. Kgl. Vet. Akad. Forh. 1871, p. 1123, pl. 20, figs. 10—16.

<sup>1)</sup> *Alcyonidium hirsutum*, FLEM. has been found by NORMAN on *Fucus* at Svølvær, Lofoten.

<sup>1)</sup> Ann. and Mag. Nat. Hist., ser. 2, vol. 18, p. 32, pl. 1, fig. 1.



1886. *Flustrella corniculata*. LORENZ. Bryozoen von Jan Mayen. p. 99.
1897. *Flustrella corniculata*. BIDENKAP. Bryozoen von Ost-Spitzbergen. Zool. Jahrb. B. 10. 1897. p. 634.
1900. *Flustrella corniculata*. BIDENKAP. Die Bryozoen von Spitzbergen und König Karls Land. Fauna arctica. Bd. I. p. 531.
1900. *Acyonidium cervicornis*. ALICE ROBERTSON. Paper from the Harriman Alaska Expedition. Bryozoa. Proc. Wash. Acad. Science. vol. 2. p. 330. pl. 21, figs. 14—17.
1903. *Flustrella corniculata*. NORMAN. Notes on the Nat. Hist. of East Finnmark. Ann. and Mag. Nat. Hist., ser. 7, vol. 11. p. 576.

Svolvær. Lofoten (1894). on algae.

NORMAN was the first to find this species on the Norwegian coast. He found it living between tidemarks at Vadso. It is interesting that this form which had previously only been found in the arctic regions can exist as far down as Lofoten. SMITT has described the species from Spitzbergen, where it has later been taken by KÜKENTHAL and WALTER, as well as by RÖMER and SCHAUDINN. (Cf. BIDENKAP. l. c.).

MISS ROBERTSON has described a species from material from Alaska, under the name *Acyonidium cervicornis*, which is probably the same as SMITT's species. The only thing which might suggest a difference, is that the aperture of the zooecium in *cervicornis* is mentioned as being circular, while in *corniculata* (as in *hispidus*) it is a fissure which is provided with two lobes. In preserved material, however, these facts may easily be wrongly interpreted. The characteristic, branched spines (Pl. III, figs. 37, 38), which are situated one at each corner between the zooecia, from which they are separated by an intermediate wall, seem to be alike in the two forms. They appear really to be identical. Both in *hispidus* and *corniculata*, there are two semicircular shaped thickened places near at the oral aperture, these probably serve the same purpose as the operculum in *Cheilostomata*.

*Bowerbankia imbricata*, ADAMS.

Pl. III, fig. 36.

Nordkyn (1894). on *Laminaria*.

I have a specimen from the North Ocean Expedition, st. 343, in which several colonies have grown together, forming comparatively thick branches (Pl. III, fig. 36).

The foregoing list of Bryozoa from the northern part of the Norwegian coast is not complete, but it is my opinion that it is fairly representative. The number has been increased by the addition of several species.

Of those forms described by SMITT from the numerous Swedish arctic expeditions, there are now only exceedingly few which have not been observed by me on our northern coast. The Bryozoa fauna from Lofoten to the Varanger Fiord proves to contain more arctic elements than was previously supposed.

### *Brachiopoda.*

HERMAN FRIELE and J. SPARRE SCHNEIDER determ.

Remarks by the author.

*Crania anomala*, MÜLL.

The Kirk Fiord II, 70—80 m.; Mortsund (Vest Fiord), 200 m.; Digermulen, 100—150 m.; Hammerfest (1894).

G. O. SARS<sup>1)</sup> mentions The Komag Fiord in Vest Finnmarken as the northern limit for this species. Hammerfest is a little further north.

*Rhynchonella psittacca*, CHEMN.

Malangen, 100—200 m.; Kvænangen II, 90 m.; The Jokel Fiord III, 100 m.; Breisund, 100 m.; The Porsanger Fiord, 200 m. The southern limit for this species is The Malangen Fiord.

*Terebratulina caput-serpentis*, LIN.<sup>2)</sup>

The Beier Fiord, 50—150 m.; The Tys Fiord, 500 m.; The Kirk Fiord II, 70—80 m.; Mortsund II (Vest Fiord), 200 m.; The Ogs Fiord I, 100 m.; Malangen, 100—200 m.; Stonnesbotn, 40—80 m.; Kvænangen II, 90 m.; The Jokel Fiord III, 100 m.; Hammerfest (1894); Ingohavet, 300 m.; The Porsanger Fiord, 200 m.; The Kjølle Fiord (1894).

*Terebratulina septentrionalis*, COUTH.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord III, 230 m.; The Salten Fiord II, 320—380 m.; Balstad (Vest Fiord), 150 m.

*Waldheimia cranium*, MÜLL.

The Skjerstad Fiord III, 230 m.; The Tys Fiord, 500 m.; Rost II, 150 m.; Moskenstrømmen, 90 m.; Reine (Vest Fiord), 100 m.; The Kirk Fiord IV, 30—50 m.; Balstad (Vest Fiord), Mortsund II, 200 m.; Stene (Vest Fiord), 100 m.; The Ostnes Fiord; Digermulen, 100—150 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Hammerfest (1894); Ingohavet, 300 m.; The Kjølle Fiord (1894).

### *Pelecypoda.*

HERMAN FRIELE and J. SPARRE SCHNEIDER determ.

Remarks by the author.

*Anomia ephippium*, LIN.

Balstad, 80 m.; Digermulen, 100—150 m.; Malangen, 100—200 m.; Kvænangen, 90 m.; The North Cape (1894); The Porsanger Fiord, 70 m.

*Anomia aculeata*, MÜLLER.

The Skjerstad Fiord III, 230 m.; The Sag Fiord, 200 m.; The Kirk Fiord, 70 m.; Stonnesbotn, 40—80 m.; Malangen, 100—200 m.; The Jokel Fiord, 100 m.

*Pecten islandicus*, MÜLLER.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord X (Misvær Fiord), 10—30 m.; Moskenstrømmen, 90 m.; The Ostnes Fiord; The Kanstad Fiord, 30—90 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Breisund, 100 m.; The Porsanger Fiord, 50 m.

The largest specimen from The Skjerstad Fiord X was 86 mm. in height and 84 mm. in length.

*Pecten aratus*, GMELIN.

Moskenstrømmen, 90 m.; Balstad (Vest Fiord), 150 m.

<sup>1)</sup> Mollusca Regionis Arcticæ Norvegiæ, p. 8.

<sup>2)</sup> Some of the places here mentioned doubtless have reference to *T. septentrionalis*. SCHNEIDER having considered it to be a variety of *caput-serpentis* but FRIELE has treated it as a separate species.

The specimen from Moskenstrømmen was 15 mm. in height and 14 mm. in length.

The northern limit for this species is Lofoten.

*Pecten septemradiatus*, MÜLLER.

The Beier Fiord, 50—150 m.; (1 spec., 11 mm.); The Sag Fiord, 200 m. (s)<sup>1</sup>; Malangen, 100—200 m. (s); Gaukværo, 250 m. The largest specimen from Gaukværo was 32 mm.

At Tromsø, SCHNEIDER only found shells, but both M. and G. O. SARS collected the species in the Varanger Fiord.

*Pecten tigrinus*, MÜLLER.

The Ostnes Fiord.

This species was previously known right up to The North Cape. NORMAN in 1890 took it in The Lang Fiord (South Varanger)<sup>2</sup>.

*Pecten striatus*, MÜLLER.

Stønnesbotn, 40—80 m.

Havøsund (Finmark) is the northern limit for this species.

*Pecten incomparabilis*, RISSO.

The Ostnes Fiord, 30 m.

Lofoten is the northern limit for the species.

*Pecten imbrifer*, LOVÉN.

Malangen, 380 m.; Kvæuangen II, 90 m.

*Pecten vitreus*, CHEMNITZ.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord III, 230 m.; The Tys Fiord, 500 m. (in quantities on *Lophohelia prolifera*); The Ogs Fiord I, 100 m.; The Kanstad Fiord, 30—90 m.

*Pecten abyssorum*, LOVÉN.

The Skjerstad Fiord IV, 330 m.; Brettesnes—Skroven, 350—400 m.; Malangen, 380 m.

*Pecten similis*, LASKEY.

Moskenstrømmen I, 200 m.; Balstad (Lofoten), 150 m.

*Pecten groenlandicus*, SOWERBY.

Lyngen II, 250 m.; Lyngen III, 300 m.; Kvæuangen, 300—343 m.

The southern limit for the species is Tromsø.

At St. Lyngen II several specimens were taken, the largest measured 22 mm., thus being very nearly as large as the specimens from Spitzbergen which are given as being 24 mm.

*Lima excavata*, FABR.

Arno, 300—400 m.; Tys Fiord I, 500 m.

The largest specimen measured 135 mm.

G. O. SARS has caught this species at Skroven (Lofoten). According to SARS<sup>3</sup> the species is mentioned from Finmark by Mr. ANDREW, but is has, however, not been taken there later.

FRIELE and GRIEG<sup>4</sup> give the distribution of this species to the depths between The Hebrides and The Faroe Isles, Portugal, The Azores and Senegambia. 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 Finmark 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.

*Lima loscombi*, SOWERBY.

Moskenstrømmen, 90 m.

G. O. SARS has found shells of this species at Skroven. My catches in Moskenstrømmen prove that the species still exists at Lofoten, which must therefore be considered to be its northern limit on our coast.

*Limatula crassa*, FORBES.

Moskenstrømmen I, 200 m.

*Mytilus edulis*, LIN.

Nordkyn (1894). Common other places too.

*Modiola modiolus*, LIN.

The Skjerstad Fiord X, 10—50 m.; Hammerfest (1894); Troldfiordsund, 40 m.; Nordkyn (1894).

*Modiola phaseolina*, PHILLIPPI.

Moskenstrømmen, 200 m.; Reine I, 150 m.; Balstad, Stene, 120—200 m.; Hemingsvær-Strømmen, 20—40 m.; The Sag Fiord, 200 m.; Malangen, 100—200 m.; Troldfiordsund, 40 m.; Breisund, 100 m.

*Dacrydium vitreum*, MOLLER.

Ure I (Vest Fiord), 200—250 m.; mouth of Raftsund, 250—300 m.; The Ogs Fiord I, 100 m.; Malangen, 380 m.; Lyngen II, 250 m.

*Crenella decussata*, MONT.

The Skjerstad Fiord II, 100—185 m.; Gaukværo II, 25 m.; Hammerfest (s).

*Modiolaria lavigata*, GRAY.

The Beier Fiord, 50—150 m.; The Ostnes Fiord, 20 m.; Breisund, 100 m.; The North Cape (1894).

The Beier Fiord is the southern limit for this species. I collected a small specimen here.

*Modiolaria nigra*, GRAY.

The Beier Fiord, 50—150 m.; The Kirk Fiord II, 50 m.; Mortsund III, 100 m.; Gaukværo, 250 m.; Stønnesbotn, 40—80 m.; The Jøkel Fiord I, 100 m.; Troldfiordsund, 40 m.

*Nucula tumidula*, MALM.

The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 490 m.; The Salten Fiord II, 320—380 m.; Brettesnes—Skroven, 350—400 m.; Tranødybet, 607—640 m.

*Nucula tenuis*, MONT.

The Skjerstad Fiord VII, 490 m.; The Ogs Fiord I, 100 m. (s); The Jøkel Fiord, 100 m.

<sup>1</sup>) (s) means that only empty shells were found.

<sup>2</sup>) Notes on the Natural History of East Finmark. Ann. Mag. Nat. Hist. ser. 7, vol. X, p. 357.

<sup>3</sup>) Mollusca Regionis arcticæ Norvegiæ, p. 24.

<sup>4</sup>) Mollusca III, p. 6. The Norw. North Atl. Exp.



*Leda pernula*, MÜLLER.

The Skjerstad Fiord III, 230 m.; The Kirk Fiord II, 50 m.; Svølvær, 150 m.; The Ostnes Fiord, 30—40 m.; mouth of Raftsund, 250—300 m.; The Ogs Fiord I, 100 m.; The Kanstad Fiord, 30—90 m.; Gaukværo II, 250 m.; Malangen, 380 m.; Stønnesbotn, 40—80 m.; Kvænangen II, 90 m.; The Porsanger Fiord, 200 m.

*Leda minuta*, O. F. MÜLLER.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord III, 230 m.; Kvænangen II, 90 m.; Digermulen, 100—150 m.

*Portlandia lucida*, LOVÉN.

The Skjerstad Fiord II, 100—185 m.; The Skjerstad Fiord VII, 490 m.; Oxsund, 600 m.; The Kirk Fiord II, 50 m.; Mortsund I, 200 m.; Ure I (Vest Fiord), 200—250 m.; Risværflaket, 150—180 m.; mouth of Raftsund, 250—300 m.; Malangen, 380 m.

*Portlandia intermedia*, M. SARS.

The Porsanger Fiord, 200 m.

This species was first caught by M. SARS in The Varanger Fiord. The Norw. North Atl. Exp. caught it at St. 260 (The Porsanger Fiord), 261, (The Tana Fiord) and 262 (off The Varanger Fiord). Hitherto it has not been taken further westwards and southwards on the Norwegian coast than The Porsanger Fiord.

*Portlandia tenuis*, PHILLIPPI.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord VI, 125 m.; The Skjerstad Fiord VII, 490 m.

*Portlandia lenticula*, MÖLLER.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord, 100—185 m.; The Skjerstad Fiord VI, 125 m.; The Kirk Fiord IV, 70—80 m.; Mortsund I, 200 m.; The Ogs Fiord I, 100 m.; The Kanstad Fiord, 30—90 m.; Malangen, 380 m.; Stønnesbotn, 40—80 m.; The Jøkel Fiord II, 80 m.

*Portlandia frigida*, TORELL.

Risværflaket, 150—180 m.

*Yoldia limatula*, SAY.

The Kirk Fiord, 70—80 m.; Svølvær, 150 m.; The Ostnes Fiord, 30—40 m. (several specimens, the largest being 36 mm.); Stønnesbotn, 40—80 m.; The Kjølle Fiord (1894).

The southern limit for the species is Lofoten.

*Malletia obtusa*, M. SARS.

Moskenstrømmen I, 200 m.; Brettesnes—Skroven, 300—400 m.; Tranodybet, 640 m.

The northern limit for this species is Lofoten.

*Area pectunculoides*, SCACCHI.

The Beier Fiord, 50—150 m.; (var. *septentrionalis*); The Skjerstad Fiord III, 230 m.; (var. *septentrionalis*); The Skjerstad Fiord VI, 125 m. (var. *septentrionalis*, the largest specimen 9.5 mm.); The Oxsund, 600 m.; The Sag Fiord, 200 m.; Moskenstrømmen, 200 m.; Ure I, 200—250 m.; Mortsund I, 200 m.; Brettesnes—Skroven, 300—400 m.; The Ogs Fiord I, 100 m.; mouth of Raftsund, 250—300 m.; Tranodybet, 640 m.; Gaukværo II, 250 m.; Malangen, 100—200 m. (var. *septentrionalis*); Malangen, 380 m.; The Jøkel Fiord III, 100 m.; (var. *septentrionalis*); Kvænangen, 300—343 m. (var. *septentrionalis*).

The typical form extends to Malangen, or, at any rate, to Lofoten; var. *septentrionalis* is limited southwards in the Beier Fiord.

*Arca glacialis*, GRAY.

The Porsanger Fiord, 200 m.

According to G. O. SARS, this species has been caught at Magerø by VERKRÜZEN. Further westwards and southwards this species has not hitherto been noticed on our coast.

*Limopsis minuta*, PHIL.

The Salten Fiord II, 320—380 m.; The Folden Fiord, 530 m.; Landego, 200—450 m.; Oxsund, 600 m.; The Sag Fiord, 200 m.; Moskenstrømmen, 200 m.; Balstad, 150 m.; Stene (Vest Fiord), 120—200 m.; Ure I, 200—250 m.; Skroven, 200—400 m.; The Kanstad Fiord, 30—90 m.

FRIELE and GRIEG mentioned that this species was taken by The Norw. North Atl. Exp. at St. 290, which is situated about half way between Norway and Beeren Eiland, which is the most northern place where it is known.

*Cardium nodosum*, TURK.

The Kanstad Fiord, 30—90 m.

*Cardium echinatum*, LIN.

The Salten Fiord I, 15—20 m.

*Cardium fasciatum*, MONT.

The Beier Fiord, 50—150 m. (s); The Skjerstad Fiord IX, 80 m.; The Salten Fiord I, 15—20 m.; The Kirk Fiord II, 50 m.; Napstrømmen, 40 m.; Henningsværstrømmen, 40 m.; The Ostnes Fiord: The Kanstad Fiord, 30—90 m.; Malangen, 100—200 m.; Stønnesbotn, 40—80 m.; Troldfiordsund, 40 m.

*Cardium minimum*, PHIL.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 80 m.; The Salten Fiord II, 320—380 m.; Moskenstrømmen, 200 m.; Ure I, 200—250 m.; Mortsund, 200 m.; The Kanstad Fiord, 30—90 m.; Gaukværo II, 250 m.; Malangen, 380 m.; Lyngen III, 300 m.

*Cyprina islandica*, LIN.

The Salten Fiord I, 15—20 m.; Napstrømmen, 40 m.; Stene (Vest Fiord), 120—200 m.; The Ostnes Fiord, 40 m.; The Ogs Fiord I, 100 m.; The Kanstad Fiord, 30—90 m.; Troldfiordsund, 40 m.; The Kjølle Fiord (1894).

*Astarte borealis*, CHEMN.

Troldfiordsund, 40 m.

*Astarte banksi*, LEACH.

(*A. compressa*, MONT.).

The Beier Fiord, 50—150 m.; The Salten Fiord I, 15—20 m.; The Skjerstad Fiord I, 30—50 m.; The Ostnes Fiord, 30 m.; Stønnesbotn, 40—80 m.; Hammerfest.

*Astarte sulcata*, DA COSTA.

The Beier Fiord, 50—150 m.; The Salten Fiord II, 320—380 m.; Rost II, 150 m.; Reine I, 150 m.; Balstad, 150 m.; Mortsund III, 100 m.; Ure I, 200—250 m.; Svølvær, 150 m.; Digermulen, 150 m.; Malangen, 100—200 m.; The Kjølle Fiord (1894).

*Astarte compressa*, LIX.*(A. elleptica*, BROWN).

The Beier Fiord, 50 m.; The Ostnes Fiord, 30 m.

*Astarte crenata*, GRAY.*(A. crebricostata*, FORBES).

The Skjerstad Fiord II, 185 m.; The Skjerstad Fiord III, 230 m.; The Skjerstad Fiord VI, 125 m.; Røst II, 150 m.; The Kirk Fiord, 70—100 m.; Mortsund I, 200 m.; Stene (Vest Fiord), 120—200 m.; Risværflaket, 180 m.; The Ogs Fiord I, 100 m., Malangen, 100—200 m.; Lyngen II, 250 m.; Kvænangen, 300—343 m.; Kvænangen, 90 m.; The Jokel Fiord II, 60 m.; The Porsanger Fiord, 200 m.; The Kjølle Fiord (1894).

The specimens from The Kirk Fiord showed no signs of deformity. The largest were 34 mm. in length and 80 mm. in height. This species has not been observed on our coast further south than The Skjerstad Fiord.

*Venus gallina*, LIX.

The Salten Fiord I, 15—20 m.; The Salten Fiord II, 320—380 m.

Several shells were found on the beach at Væro on  $12\frac{1}{3}$  1896.*Venus orata*, PENNANT.

Røst II, 150 m.; Mortsund III, 100 m.; Svolvær; Malangen, 100—200 m.; Sværholt (1894).

*Lucina borealis*, LIX.

Napstrommen, 30—40 m. (s); Svolvær (1894).

Shells belonging to this species were found on the beach at Væro the  $12\frac{1}{3}$  1896.*Arimus flexuosus*, MONT.

The Skjerstad Fiord II, 185 m.; Landego, 200—450 m.; The Kirk Fiord, 40—100 m.; Risvær, 150 m.; Malangen, 380 m.

*Arimus sarsi*, PHIL.

Risværflaket, 150—180 m. (s).

*Arimus croulinensis*, JEFF.

The Skjerstad Fiord IV, 330 m. (s); The Skjerstad Fiord VII, 490 m.

*Kelliella miliaris*, PHIL.

Mouth of Raftsund, 280—300 m.

This form has not been caught alive on the Norwegian coast north of Raftsund. According to SCHNEIDER<sup>1)</sup> shells have been found at Tromsø by Dr. KRAUSE.

*Montacuta substriata*, MONT.

GRIEG<sup>2)</sup> mentions that this species has been found on several specimens of *Spatangus purpureus*.

*Mactra elliptica*, BROWN.

Røst I, 120 m.; Stene (Vest Fiord), 120—200 m.; Henningsværstrommen, 20—40 m.; Troldfiordsund, 40 m.; The North Cape (1894).

*Synalosmya alba*, WOOD.

The Salten Fiord I, 15—20 m.

*Synalosmya longicallis*, SCACCHI.

The Salten Fiord II, 320—380 m. (s); The Folden Fiord, 530 m.; Landego, 200—450 m.; Mortsund I, 200 m.; Skroven, 200—400 m.

*Synalosmya nitida*, MÜLLER.

Mortsund I, 200 m.; Tranødybet, 640 m.; Gaukværo II, 250 m.; Malangen, 380 m.

*Tellina (Macoma) calcaria*, CHEMN.

Kvænangen II, 90 m. (s).

*Solen pellucidus*, PENN.

The Salten Fiord I, 15—20 m.

The northern limit for this species is Lofoten.

*Neora arctica*, M. SARS.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 80 m. FRIELE and GRIEG<sup>1)</sup> mention that this species was only known from one place on the Norwegian coast, viz. Vadso (Varanger Fiord).

*Neora obesa*, LOV.

The Beier Fiord, 50—150 m.; The Salten Fiord II, 320—380 m.; The Folden Fiord, 530 m.; Oxsund, 600 m.; The Kirk Fiord IV, 30—50 m.; Mortsund I, 200 m.; Brettesnes—Skroven, 350—400 m.; Risværflaket, 150—180 m.; The Kanstad Fiord, 30—90 m.; Tranødybet, 640 m.; Gaukværo II, 250 m.; Malangen, 380 m.; Lyngen III, 300 m.

*Neora obesa* var. *glacialis*, G. O. SARS.

The Beier Fiord, 50—150 m.

In my collection there were most likely several forms of this variety which have been classified under the chief form. (*N. obesa*, LOV.).

*Neora subtorta*, G. O. SARS.

The Skjerstad Fiord VI, 125 m.; The Jokel Fiord, 100 m.

The Skjerstad Fiord is the southern limit for this species, as far as is now known.

*Neora rostrata*, SPENGLER.

The Salten Fiord II, 320—380 m.; The Folden Fiord, 530 m.; Landego, 200—400 m.; Brettesnes—Skroven, 350—400 m.

This is one of the southern forms, which G. O. Sars has found at Hasvik on Sorø.

*Neora cuspidata*, OLIVI.

The Skjerstad Fiord VI, 125 m.

*Poromya granulata*, NYST.

Malangen, 100—200 m.

*Corbula gibba*, OLIVI.

The Ostnes Fiord, 20 m.

<sup>1)</sup> Tromsøundets Molluskfauna. Tromsø Mus. Aarsh. VIII, p. 85.<sup>2)</sup> Oversigt over det nordlige Norges echinodermer, p. 33. Berg. Mus. Aarb. 1902. No. 1.<sup>1)</sup> Mollusca III, p. 39.

*Saxicava arctica*, LIN.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord III, 230 m.; The Skjerstad Fiord IV, 330 m.; The Sag Fiord, 200 m.; Balstad, 150 m.; Ure I, 200—250 m.; Svølvær (1894); Digermulen, 100—150 m.; The Ogs Fiord I, 100 m.; Malangen, 100—200 m.; The North Cape (1894); The Kjølle Fiord (1894).

*Zirphæa crispata*, LIN.

On the farm Sund in The Beier Fiord, on the beach. This is one of the mussels which are used as bait.

**Scaphopoda.**

HERMAN FRIELE and I. SPARRE SCHNEIDER determ.

Remarks by the author.

*Dentalium entale*, LIN.

The Skjerstad Fiord IX, 80 m.; Røst II, 150 m.; Svølvær (1894); Digermulen, 100—150 m.; Sværholt (1894).

*Dentalium occidentale*, STIMPSON.

The Kirk Fiord II, 70—80 m.; Brettesnes—Skroven, 350—400 m.; Malangen, 100—200 m.; Lyngen III, 300 m.

*Dentalium agile*, M. SARS.

Landego, 200—400 m.; The Folden Fiord, 530 m. Lofoten is the northern limit for this species.

*Siphonodentalium vitreum*, M. SARS.

The Skjerstad Fiord II, 185 m.; The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 490 m.; Malangen, 380 m.; Lyngen II, 250 m.; Lyngen III, 300 m.; Kvænangen II, 90 m.; Kvænangen, 300—343 m.; The Jøkel Fiord I, 100 m.; The Jøkel Fiord II, 60 m.; The Porsanger Fiord, 200 m.

This arctic form has not hitherto been noticed south of The Skjerstad Fiord.

*Siphonodentalium quinquangulare*, FORBES.

The Sag Fiord, 200 m.; Oxsund, 600 m.; Mortsund I, (Vest Fiord), 200 m.; Brettesnes—Skroven, 350—400 m.

**Placophora.**

HERMAN FRIELE and I. SPARRE SCHNEIDER determ.

Remarks by the author.

*Hanleyia hanleyi*, BEAN.

The Kirk Fiord II, 50 m.; Malangen, 100—200 m.

*Leptochiton cancellatus*, SOWERBY.

The Sag Fiord, 200 m.; Kvænangen II, 90 m.

*Leptochiton cinereus*, LIN.

Henningsværstrømmen, 20—40 m.; The Ostnes Fiord, 30 m., Digermulen, 100—150 m.

*Trachydermon eraratus*, G. O. SARS.

The Salten Fiord II, 320—380 m.

*Trachydermon albus*, LIN.

„Glea“ (Røst); Digermulen, 100—150 m.

*Trachydermon ruber*, LOWE.

Troldfiordsund, 40 m.

*Tonicella marmorea*, FABR.

The Kirk Fiord IV, 30—50 m.; Henningsværstrømmen, 30—40 m.; The Ostnes Fiord I, 30 m.

**Gastropoda.**

HERMAN FRIELE and I. SPARRE SCHNEIDER determ.

Remarks by the author.

*Patella vulgata*, LIN.

Several large shells belonging to this species were found on the beach at Væro (<sup>12</sup>/<sub>3</sub> 1896).

This species is found as far north as Raftsund (Lofoten) on the inner coast, according to G. O. SARS. Along the outer coast, SCHNEIDER<sup>1)</sup> mentions that it is found up to the 70th degree of latitude (Vando, NW of Tromsø).

*Patina pellucida*, LIN.

Svølvær harbour; Sværholt (1894).

SCHNEIDER mentions that the species may be found right up to Vardo.

*Acmæa testudinalis*, MÜLL.

„Glea“ (Røst); The Kjølle Fiord (1894); Sværholt (1894).

*Tectura rubella*, FABR.

In a bottom sample from Hammerfest (s). The southern limit for the species is Tromsø.

*Tectura virginea*, MÜLL.

Henningsværstrømmen, 20—40 m.; The Skjerstad Fiord II, 30—50 m.

*Tectura fulva*, O. F. MÜLL.

Skroven, 200—400 m.

*Lepeta coeca*, O. F. MÜLL.

The Skjerstad Fiord IX, 30—50 m.; The Ogs Fiord I, 100 m.; The Jøkel Fiord I, 100 m.; The Porsanger Fiord.

*Puncturella noachina*, LIN.

The Skjerstad Fiord IX, 80 m.; The Folden Fiord, 530 m.; Røst II, 100 m.; Mortsund III, 100 m.; in a sample of bottom from Hammerfest (s).

*Emarginula fissura*, LIN.

The Ostnes Fiord, 20 m.

G. O. SARS mentions Hammerfest as the northern limit for the species.

*Scissurella crispata*, FLEM.

Mortsund I, 200 m.

*Margarita helicina*, FABR.

„Glea“ (Røst), Oxsund, 600 m.; Kvænangen, 300—343 m.; Troldfiordsund, 40 m.; Repvaag (Porsanger Fiord), 10 m.

<sup>1)</sup> Tromsøundets Molluskfauna, p. 101.



*Margarita groenlandica*, CHEMN.

The Beier Fiord, 50—150 m.; The Salten Fiord I, 15—20 m.; Balstad; Hemningsværstrømmen, 20—40 m.; Svolvær, Risværflaket, 150—180 m.; The Ostnes Fiord; Stønnesbotn, 40—80 m.; The Jøkel Fiord, 100 m.; Hammerfest; Troldfiordsund, 40 m.; The Kjolle Fiord (1894).

*Margarita cinerea*, COUTH.

The Kirk Fiord IV, 30—50 m. (s); The Jøkel Fiord III, 100 m.; Hammerfest (1894) (s).

*Macharoplastax obscura*, COUTH.

The Beier Fiord, 50—150 m. (s); Stønnesbotn, 40—80 m.; Kvænangen II, 90 m. (s); Troldfiordsund, 40 m.; Hammerfest (1894) (s).

*Gibbula cineraria*, LIN.

The Salten Fiord I, 15—20 m.; The Salten Fiord II, 320—380 m.; The Kirk Fiord III, 70—80 m.; Balstad, 10—35 m.; Svolvær (1894); Risværflaket, 150—180 m.; The Kanstad Fiord, 30—90 m.; Lyngen III, 300 m.

*Gibbula tumida*, MONT.

The Salten Fiord I, 15—20 m.; Hemningsværstrømmen, 20—40 m.; The Kanstad Fiord, 30—90 m.; Kvænangen II, 90 m.

*Trochus occidentalis*, MIGH.

The Beier Fiord, 50—150 m.; Reine, 100 m.; Balstad, 10—35 m.; Malangen, 100—200 m.; The Jøkel Fiord I, 100 m.; Hammerfest (1894) (s); Breisund, 100 m.; Ingøhavet, 300 m.

*Conulus millegranus*, PHIL.

Digermulen, 100—150 m.

The northern limit for this species is Digermulen.

*Capulus hungaricus*, LIN.

Røst II, 150 m.

I collected two dwarf-like specimens at Røst, which is the most northerly place where the species has been observed alive. The Norw. North Atl. Exp. only found shells at stations 192 and 195.

*Velutina lorigata*, PENN.

Svolvær (1894); Breisund, 100 m.

*Velutina flexilis*, MONT.

Breisund, 100 m.

*Lamellaria latens*, O. F. MÜLL.

Arno, 300—400 m.

A gigant specimen, about 50 mm.

*Marsenia prolata*, O. F. MÜLL.

Mortsund III, 100 m.; Sværholt (1894).

*Onchidiopsis glaucialis*, M. SARS.

Tys Fiord, 500 m.

*Amauropsis islandica*, GMELIN.

The Beier Fiord, 50—150 m. (s); Malangen, 100—200 m. (s); Hammerfest (s); Troldfiordsund; Breisund.

*Natica (Lunatia) moulayi*, FABR.

The Kirk Fiord III, 70—80 m.; Balstad, 10—35 m.; Mortsund I, 100 m.; The Ostnes Fiord; Digermulen, 100—150 m.; The Kanstad Fiord, 30—90 m.; Malangen, 100—200 m.; Stønnesbotn, 40—80 m.; Troldfiordsund, 40 m.

*Natica (Lunatia) intermedia*, PHIL.

The Salten Fiord I, 15—20 m.

Lofoten is the northern limit for this species.

*Natica (Lunatia) groenlandica*, BECK.

The Salten Fiord I, 15—20 m.; The Kirk Fiord II, 50 m.; The Kirk Fiord III, 70—80 m.; The Kirk Fiord IV, 30—50 m.; Mortsund III, 100 m.; Digermulen, 100—150 m. (s); The Ogs Fiord I, 100 m.; Stønnesbotn, 40—80 m.; Lyngen II, 250 m. (s); The Porsanger Fiord, 200 m. (s).

*Natica (Lunatia) affinis*, GMEL.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord I, 30—50 m.; The Salten Fiord, 320—380 m.; Oxsund, 600 m.; Ure I, 200—250 m.; Ostnes Fiord (s); Gaukværo, 250 m.; Malangen, 100—200 m. (s); Kvænangen II, 90 m. (s); The Jøkel Fiord I, 100 m.; The Jøkel Fiord III, 100 m.; Breisund, 100 m.; The Porsanger Fiord, 200 m.

*Trichotropis borealis*, BROD. & SOW.

Moskenstrømmen I, 200 m.; Balstad, 10—35 m.; Malangen, 100—200 m.; The Jøkel Fiord I, 100 m.; The Jøkel Fiord II, 80 m.; Hammerfest (s); Troldfiordsund, 40 m.; The Porsanger Fiord, 200 m.

*Trichotropis conica*, MOLL.

The Jøkel Fiord.

Tromsø is the southern limit for this species.

*Littorina littorea*, LIN.

„Glea“ (Røst), several large specimens.

*Littorina radis*, METOX.

The Skjerstad Fiord IX, 80 m.; Risværflaket, 150—180 m. (s).

Var. *groenlandica*, MOLL. collected at Vardø was given me by my friend OLAF VAADE.

*Littorina palliata*, SAY.

From OLAF VAADE, factory-manager, I got specimens of this species, which were collected at Vardø.

*Littorina obtusata*, LIN.

„Glea“ (Røst); Risværflaket, 150—180 m. (s).

*Lacuna dicaricata*, FABR.

The Salten Fiord I, 15—20 m.; Balstad, 10—35 m.; Hemningsværstrømmen, 20—40 m.; Svolvær (1894); Risværflaket, 150—180 m.; The Kanstad Fiord, 30—90 m.; Kvænangen II, 90 m.; Troldfiordsund, 40 m.; The North Cape (1894); Sværholt (1894).

*Rissoa (Alvania) jeffreysi*, WALLER.

The Skjerstad Fiord VI, 125 m.; Hammerfest (s).

*Rissoa (Onoba) aculeus*, GOULD.

Hammerfest (s).

*Lorenella metula*, LOV.

The Kirk Fiord II, 50 m.; Brettesnes—Skroven, 300—400 m.

*Cerithiopsis costulata*, MOLL.

Hammerfest (s).

*Levocoehlis granosa*, WOOD.

Reine I, 150 m.

*Aporhais pes-pelicani*, LIN.

The Salten Fiord I, 15—20 m. Several rather large specimens. G. O. SARS has occasionally caught this species in Lofoten, and M. SARS<sup>1)</sup> mentions that he found a specimens in the Ox Fiord. On the inner coast, from Lofoten to the Ox Fiord, the species has not been noticed; but on the outer coast it is mentioned by SCHNEIDER as being collected at Lyngø and Vandø.

*Scalaria groenlandica*, CHEMN.

The Skjerstad Fiord III, 230 m. (s); Lyngen III, 300 m.; Hammerfest (s); Troldfiordsund, 40 m.; The Porsanger Fiord, 200 m. At Hammerfest and at the station Lyngen III empty shells of var. *loreni* were found.

*Scalaria obtusocostata*, WOOD.

Lyngen III, 300 m. (s).

*Hemiaclis ventrosa*, JEFFREYS.

The Sag Fiord, 200 m.

*Eulimella scilloe*, SCACCHI.

The Folden Fiord, 530 m.

*Eulina intermedia*, CANTR.

The mouth of Raftsund, 280—300 m.; Oxsund, 600 m.

*Eulina stenostoma*, JEFFR.

Landegø, 200—400 m.; Mortsund I (Vest Fiord), 200 m.; the mouth of Raftsund, 250—300 m.; The Sag Fiord, 200 m.

According to SCHNEIDER the former northern limit for this species was Tromsø; but The Norw. North Atl. Exp. collected specimens not only in The Skjerstad Fiord, but also in The Vest Fiord, The Alten Fiord, The Porsanger Fiord and The Tana Fiord.

*Admete viridula*, FABR.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord I, 30—50 m.; The Skjerstad Fiord IX (s); Moskenstrømmen, 200 m.; Balstad, 150 m.; Mortsund II, 200 m. (s); Stene (Vest Fiord), 100—200 m.; Gaukværo II, 250 m.; Lyngen II, 250 m.; The Jøkel Fiord, 100 m.; The Porsanger Fiord, 200 m.

*Mangilia (Raphitoma) anceps*, EICHW.

Moskenstrømmen I, 200 m.

This is one of the southern forms which has been caught by G. O. SARS at Hasvik on Sørø.

*Taranis cirrata*, BRUGNONE.

Lyngen II, 250 m.

*Bela pyramidalis*, STRØM.

Kvænangen II, 90 m.

*Bela sarsi*, VERRILL.

The Kirk Fiord IV, 30—50 m.; The Porsanger Fiord, 70 m.

*Bela declivis*, LOV.

The Beier Fiord, 50—150 m. (s); The Jøkel Fiord, 100 m. (s).

*Bela nobilis*, MÖLLER.

The Jøkel Fiord I, 100 m.

*Bela scalaris*, MÖLLER.

Gaukværo II, 250 m. (s); Malangen, 100—200 m. (s); Lyngen III, 300 m. (s).

*Bela rugulata*, MÖLLER.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord II, 185 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.

*Bela erarata*, MÖLLER.

Lyngen II, 250 m.; Kvænangen, 300—343 m. (s).

*Bela harpularia*, COUTH.

The Salten Fiord I, 15—20 m.; Stonnesbotn, 40—80 m. (var. *rosea*).

*Bela tverelyana*, TURK.

The Skjerstad Fiord VI, 125 m.

*Bela tenuicostata*, M. SARS.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 80 m.; Mortsund I, 200 m.; Gaukværo II, 250 m.

*Typhlomangilia nivalis*, LOV.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 80 m.; The Sag Fiord, 200 m.; Mortsund II, 200 m.; Ure I, 200—250 m.; Digermulen, 100—150 m.; Gaukværo II, 250 m.; Malangen, 100—200 m.; Lyngen III, 300 m.

*Spirotropis carinata*, PHIL.

Moskenstrømmen, 200 m.; Balstad, 150 m.; Digermulen, 100—150 m. (s); The Sag Fiord, 200 m.; Gaukværo II, 250 m.; Malangen, 380 m.

*Metzgeria alba*, JEFFREYS.

Moskenstrømmen, 200 m.; Ure I, 200—250 m. (s); Malangen, 100—200 m.

*Trophon truncatus*, STRØM.

Henningsværstrømmen, 20—40 m.; Hammerfest (s).

*Trophon clathratus*, LIN.

The Beier Fiord, 50—150 m. (var. *gunneri*); Moskenstrømmen, 200 m.; The Kirk Fiord II, 70—80 m. (s); The Kirk Fiord III; Svolvær (1894) (var. *gunneri*); Breisund, 100 m. (the typical form and var. *gunneri*); The Porsanger Fiord, 200 m.

*Trophon barvicensis*, JOHNST.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 80 m.; Moskenstrømmen, 200 m. (s); Malangen, 380 m. (s).

*Purpura lapillus*, LIN.

The Salten Fiord I, 15—20 m.; „Glea“ (Rost), on the beach; The North Cape (1894); Nordkyn (1894).

<sup>1)</sup> Beretning om en zoologisk Reise Sommeren 1849. Sep. p. 64.

*Astyris rosacea*, GOULD.

„Glea“ (Rost), on the beach; Hammerfest (s); Breisund, 100 m. (s).

*Nassa incrassata*, STROM.

Svolvær (1894).

*Buccinum undatum*, LIN.

The Beier Fiord, 50—150 m.; The Salten Fiord I, 15—20 m.; The Skjerstad Fiord I, 30—50 m.; The Skjerstad Fiord IX, 50 m. „Glea“ (Rost); The Ostnes Fiord, 40 m.; Malangen, 100—200 m.; Stønnesbotn, 40—80 m.

*Buccinum groenlandicum*, CHEMN.

The Jøkel Fiord II, 60 m.

Tromsø is its southern limit.

*Buccinum finmarchianum*, VERKR.

Kvænangen II, 90 m. (s); Breisund, 100 m.; The Porsanger Fiord, 200 m.; Sværholt (1894).

There is no certain proof that this species has been seen alive south of the Bals Fiord, where, according to SCHNEIDER, it has been caught on a fishing line.

*Ukko turtoni*, BEAN.

The Porsanger Fiord, 200 m.

*Volutopsis norvegica*, CHEMN.

Reine (Vest Fiord), 100 m.; Balstad II, 80 m.; The Ostnes Fiord; The Kanstad Fiord (s).

The southern limit, as known at present, for this species is The Vest Fiord.

*Neptunea despecta*, LIN.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 80 m.; The Kanstad Fiord, 30—90 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Breisund, 100 m.

*Sipho islandicus*, CHEMN.

Rost I, 100 m.

*Sipho gracilis*, var. *glaber*, VERKRÜZEX.

Reine, 100 m.; Balstad; The Ostnes Fiord; Malangen, 100—200 m.; Sværholt (1894); Mehavn (1894).

*Sipho territus*, M. SARS.

Reine, 100 m.; Balstad, 150 m. (s); Mortsund, 200 m. (s); Svolvær (1894).

*Sipho obur*, MORCH.

The Skjerstad Fiord II, 185 m. (s); The Folden Fiord, 530 m.; Arnø, 300—400 m. (s); Malangen, 100—200 m.

*Sipho latericeus*, MOLLER.

The Jøkel Fiord III, 100 m. (s); Breisund, 100 m.; The Porsanger Fiord, 200 m. (s).

The southern limit is Tromsø.

*Cylichna alba*, BROWN.

The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 490 m.; Mortsund I, 200 m.; The Ostnes Fiord; The Porsanger Fiord, 200 m.

*Amphisphyrta expansa*, JEFFER.

The Folden Fiord, 530 m.

*Amphisphyrta hiemalis*, COUTH.

The Beier Fiord, 50—150 m.; Risvær, 150—180 m.

*Scaphander puncto-striatus*, MIGH.

The Salten Fiord II, 320—380 m.; The Folden Fiord, 530 m.; The Sag Fiord, 200 m.; The Kirk Fiord III, 70—80 m.; Svolvær (1894); The Kanstad Fiord, 30—90 m.; Malangen, 380 m.; The Jøkel Fiord III, 100 m.

*Scaphander lignarius*, LIN.

Balstad, 150 m.; Mortsund III, 100 m.

The northern limit is Lofoten. In the neighbourhood of Bergen (Herlø Fiord) the species reaches a length of 40 mm., the largest specimen from Mortsund measured 19 mm.

*Philine quadrata*, WOOD.

The Skjerstad Fiord VII, 490 m.; Reine I, 150 m.

*Philine finmarchica*, M. SARS.

The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 490 m.

The Skjerstad Fiord is the southern limit for this species, as far as is now known.

*Pleurobranchus plumula*, MONT.

The Tys Fiord, 500 m.; Breisund, 100 m.

GRIEG<sup>1</sup>) mentions it from the Vaags Fiord (Nord Fiord) and STORM<sup>2</sup>) from Rødberg in the Trondhjem Fiord.

The northern limit must now be changed to the Breisund.

***Nudibranchiata*.<sup>3</sup>)**

Remarks by HERMAN FRIELE, who has also determ.

*Calidna obvelata*, O. G. MÜLLER.*C. repanda*, A. & H. (?).

Kvænangen, 90 m.

A small specimen. The teeth correspond to *C. obvelata*, but in external appearance, there seems to be some difference; I do not, however, venture to name a new species after my examination of a specimen which was possibly only imperfectly developed, and was also greatly contracted.

*Dendronotus arborescens*, MÜLLER.

Rost II, 150 m.; The Porsanger Fiord, 200 m.

*Dendronotus robustus*, VERRILL.

The Skjerstad Fiord II, 100—185 m.; The Skjerstad Fiord IV, 330 m.; Stønnesbotn, 40—80 m.; The Jøkel Fiord, 80 m.

*Campespe major*, BERGH.

The Skjerstad Fiord III, 230 m.

<sup>1</sup>) Skrabninger i Vaagsfjorden og Ulvesund, Ytre Nordfjord. Berg. Mus. Aarb. 1897, no. XVI, pag. 23.

<sup>2</sup>) Oversigt over Trondhjemsfjordens fauna, p. 13. Meddelelser fra stationsanlæggets arbeidskomite for Trondhjems biologiske station, Trondhjem 1901.

<sup>3</sup>) Descriptions by Mr. FRIELE of the new species here mentioned will soon be published.



Only one specimen of this species, which is described by RUD. BERGH in „Nudibranchien“ from the Wilhelm Barents Expedition, has previously been found, and that was at Vardo.

*Coryphella rufibranchialis*, JOHNST.

The Skjerstad Fiord, 130 m.; Grøtø, 6—24 m.; Repvaag, 10 m.

*Coryphella robusta*, n. sp., M. S.

<sup>25</sup>/<sub>4</sub> 1899, Breisund, 100 m. Two specimens.

*Coryphella nordguardi*, n. sp., M. S.

The Skjerstad Fiord II, 100—185 m. Four specimens.

*Coryphella* sp.?

The Skjerstad Fiord IV, 330 m. One specimen.

Judging from the structure of the teeth and the edges of the jaws, it would seem that this specimen belongs to an unknown species; but it was in such a mutilated condition that its external appearance cannot be described.

*Aeolida pusilla*, n. sp. M. S.

Kvænangen, 90 m.

### Cephalopoda.

*Ommatostrephes lodurus*, RAF.

Jaws of this species were found in the stomachs of cods and coal fish (*Gadus virens*) at Sundero (in Vesterdaalen) in February 1897.

*Rossia glaucopsis*, LOV.

Mortsund I, 200 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Sværholt (1894).

### Crustacea.

#### Copepoda.

The author determ.

*Euryte longicauda*, PHILIPPI.

(*Thorellia brunnea*, BOECK).<sup>1)</sup>

Repvaag (Porsanger Fiord), 10 m.

The species was very common at this place, the females generally had ovisacks.

*Dactylopus strömi*, BAIRD.

Repvaag (Porsanger Fiord), 10 m.

*Thalestris (Dactylopus) gibba*, KRØYER. (G. O. Sars determ.).

Repvaag (Porsanger Fiord), 10 m.

*Harpacticus chelifer*, MÜLLER.

Repvaag (The Porsanger Fiord), 10 m.

*Ilyia furcata*, BAIRD.

Repvaag (The Porsanger Fiord), 10 m.

Important contributions to the knowledge of the Copepoda of northern Norway have recently been made by Prof. G. O. Sars,<sup>1)</sup> Dr. THOMAS SCOTT<sup>2)</sup> and the Rev. Canon A. M. NORMAN. Dr. SCOTT has described several new species from Finmark.

### Branchiopoda.

*Nebalia bipes*, FABR.

Repvaag (Porsanger Fiord), 10 m.

A detailed description of *Nebalia* is given by G. O. Sars in *Fauna Norvegiae*, Vol. 1. (*Phyllocarida* and *Phyllopoda*).

### Ostracoda.

G. O. Sars determ.

*Paralorostoma ruriabile*, BAIRD.

Repvaag (Porsanger Fiord), 10 m.

*Cypridina norvegica*, BAIRD.

Oxsund, 600 m.; The Sag Fiord, 200 m.; Moskenstrømmen, 180 m.; Reine (Vest Fiord), from the stomach of cod; Høla (Vest Fiord) 250 m.; Gaukværo II, 250 m.

I also found this species in the stomach of cod (*Gadus calurarius*) caught at Christiansund <sup>20</sup>/<sub>2</sub> 1896 and at Sartoro <sup>23</sup>/<sub>2</sub> 1898.

Contributions to a knowledge of the *Ostracoda* of Northern Norway have especially been made by A. M. NORMAN<sup>3)</sup> and G. O. Sars.<sup>4)</sup>

### Cirripedia.

The author determ.

*Lepas anatifera*, LIN.

Moskenesø (Lofoten), on a glass ball.

*Conchoderma auritum*, LIN.

Mehavn (Finmark) on *Megaptera boops* fastened to *Coronula diadema*.

*Scalpellum strömi*, M. Sars.<sup>5)</sup>

Tranødybet, 607—640 m.; The Porsanger Fiord, 200 m.

*Balanus balanoides*, LIN.

Common on the rocks along the beach.

*Balanus crenatus*, BRUG.

The North Cape (1894). Is found in tolerably deep water.

*Balanus porcatus*, da COSTA.

Kvænangen II, 90 m.; The North Cape (1894).

<sup>1)</sup> Crustacea of Norway, Vol. IV.

<sup>2)</sup> Notes on some Copepoda from Arctic Seas collected in 1890 by the Rev. Canon A. M. NORMAN, F. R. S. By THOMAS SCOTT, F. L. S. Ann. Mag. Nat. Hist. Ser. 7. Vol. XI.

<sup>3)</sup> Notes on the Marine Crustacea Ostracoda of Norway. Ann. Mag. Nat. Hist. Ser. 6, Vol. VII, 1891, p. 108.

<sup>4)</sup> Oversigt af Norges marine Ostracoder. Kristiania. Vid. Selsk. Forh. 1865.

<sup>5)</sup> G. O. Sars determ.

<sup>1)</sup> Cf. GIESBRECHT, Mittheilungen über Copepoden. Mittheilungen aus der zool. Station zu Neapel. 14 Vol. Nr. 1, 1900, p. 57.



*Balanus hameri*, ASCANIUS.

Rost I, 120 m.

The specimen was about 50 mm. in length. G. O. Sars has collected some specimens in the Sorøund near Hammerfest, which were 90 mm. in length and 50 mm. in height.

Several (possibly all) of the specimens collected at Rost contained a very large number of nauplius larvæ (<sup>24</sup>/<sub>3</sub> 1899).

*Verruca stroemia*, MÜLL.

Common in all fiords.

*Coronula diadema*, LIN.

Mehavn (Fimmark) on the skin of *Megoptera boops*. According to WELTENER,<sup>1</sup> this species is a thorough cosmopolitan.

**Amphipoda.**

J. SPARRE-SCHNEIDER determ.

Remarks by the author.

*Socarnes rulli*, KRØYER.

Troldfiordsund, 40 m.; Breisund, 100 m.

*Ambasia danielsseni*, BOECK.

The Skjerstad Fiord III, 230 m.; Ure I (Vest Fiord), 200—250 m.

*Aristias tumidus*, KRØYER.

Reine (Vest Fiord), 150 m., juniors.

*Calisoma hopei*, A. COSTA.<sup>2</sup>

*Calisoma crenata*, G. O. Sars, *Amphipoda*, p. 53, Pl. XIX.

Fig. 1.

The Skjerstad Fiord IX, 80 m.

*Hippomedon denticulatus*, BATE.

The Salten Fiord I, 15—20 m.; Napstrømmen (Lofoten) 30—40 m.

*Hippomedon propinquus*, G. O. Sars.

Kvænangen II, 90 m.

*Orchomene serratus*, BOECK.

Henningsvær I (Vest Fiord), 150 m.; The Tys Fiord I, 500 m.

*Orchomene amblyops*, G. O. Sars.

Mortsund I (Vest Fiord), 200 m.

*Orchomenella minuta*, KRØYER.

Troldfiordsund, 40 m.; Repvaag (Porsanger Fiord), 10 m.

*Orchomenella pinguis*, BOECK.

Repvaag (Porsanger Fiord), 10 m.

*Tryphosella*<sup>3</sup> *høvringi*, BOECK.

The Skjerstad Fiord II, 100—185 m.; The Folden Fiord, 530 m.; The Sag Fiord, 200 m.; Mortsund (Vest Fiord), 200 m.; Ure I (Vest Fiord), 200—250 m.; Malangen, 380 m.

<sup>1</sup> Die Cirripeden der Arktis. Fauna arctica von RÖMER und SCHAUDINN. Vol. I, p. 302.

<sup>2</sup> Cf. NORMAN, British Amphipoda. Ann. Mag. Nat. Hist. Ser. 7, Vol. V, p. 200.

<sup>3</sup> Cf. NORMAN. On British Amphipoda, p. 205.

SCHNEIDER has used the names of Sars in „*Amphipoda*“. I have made some alterations in this respect, as I have acted upon NORMAN's remarks in his revision of British Amphipoda.

*Uristes umbonatus*, G. O. Sars.*Pseudotryphosa umbonata*, G. O. Sars.

Reine (Vest Fiord) from the stomach of cod.

*Anonyx mugax*, PHIPPS.

The Salten Fiord I, 15—20 m.; The Kirk Fiord II; The Kanstad Fiord, 30—90 m.; The Jokel Fiord, from the stomach of cod; Repvaag (Porsanger Fiord), 10 m.

*Haplonyx cicada*, FABR.

Reine (Vest Fiord), from the stomach of cod; Svolveær (Vest Fiord), from the stomach of cod; The Jokel Fiord II.

*Chironesimus debrayni*, HOEK.

Kvænangen II, 90 m.

This species is previously known from The Barents Sea (HOEK); Lofoten, The Trondhjem Fiord, Christiansund (G. O. Sars).

*Lepidopereum ambo*, GOES.

The Beier Fiord, 50—150 m.; Hola (Vest Fiord), 150 m.; Stommesbotn, 40—80 m.; The Jokel Fiord II, 80 m.

*Leptophorus falcatus*, G. O. Sars.

Malangen, 380 m.

This species was previously known from Bohuslen and up to the coast of Nordland. The northern limit must now be taken to be Malangen.

*Paraphoxus oculatus*, G. O. Sars.

The Skjerstad Fiord VII, 490 m.

*Ampelisca macrocephala*, LILLJEBORG.

Kvænangen II, 90 m.

*Ampelisca eschrichti*, KRØYER.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 80 m.; The Kirk Fiord, 50 m.; The Ogs Fiord, 100 m.; The Kanstad Fiord, 30—90 m.

*Ampelisca aequicornis*, BRUZELIUS.

Malangen, 100—200 m.; Kvænangen II, 90 m. The previously known northern limit was Lofoten; this must now be changed to Kvænangen.

*Ampelisca amblyops*, G. O. Sars.

Malangen, 380 m.

This species was previously known from Bohuslen, and Sars has collected it in the Kristiania Fiord and the Trondhjem Fiord. Its northern limit must now be taken to be Malangen.

*Haploys tubicola*, LILLJEBORG.

The Kirk Fiord II, 50 m.; Malangen, 380 m.

*Stegocephalus inflatus*, KRØYER.

Rost, from the stomach of cod; Malangen, 380 m.; Ingøhavet, 300 m.; The Porsanger Fiord, 200 m.

*Stegocephalus similis*, G. O. SARS.

The Skjerstad Fiord VII. 490 m.; Henningsvær (Vest Fiord), from the stomach of cod; Malangen. 380 m.

The most northerly place at which Sars has collected this species is Tjøto. Its northern limit must now be changed to Malangen.

*Andania abyssii*, BOECK.

Malangen, 380 m.

The northern limit must now be moved from Lofoten to Malangen.

*Amphilocheus tenuimanus*, BOECK.

Malangen, 380 m.

Sars has caught this species at different places on the west coast right up to Selsovik, which is a little north of the arctic circle. Its northern limit will now be Malangen.

*Metopa alderi*, BATE.

The Skjerstad Fiord XVI; The Tys Fiord. 500 m.

*Leucothoe spinicarpa*, ABILDGAARD.

Henningsvær I. 150 m.; Tranødybet, 530 m.; Malangen. 380 m.

Sars has found this form at different places on the south and west coasts of Norway as far up as the Trondhjem Fiord. Its northern limit will now be Malangen.

*Oediceros saginatus*, KROYER.

Troldfjordsund. 40 m. Occurred in very large numbers and with young.

*Paroediceros lynceus*, M. SARS.

The Kanstad Fiord. 30—90 m.; Stonnesbotn, 40—80 m. The southern limit for the species on our coast is, according to Sars, Appelvær.

*Paroediceros propinquus*, GOES.

The Beier Fiord. 50—150 m.; Lyngen II. 250 m.

*Monoculodes subnudus*, NORMAN.

(*Monoculodes falcatus*, G. O. SARS).

The Kirk Fiord III, 70—80 m.; Ure I (Vest Fiord).

*Halimedon mülleri*, BOECK.

Mortsund I (Vest Fiord), 200 m.; Gaukværo II. 250 m.

*Halimedon acutifrons*, G. O. SARS.

Mortsund I, (Vest Fiord). 200 m.; Gaukværo II, 250 m.

*Halimedon megalops*, G. O. SARS.

Repvaag (Porsanger Fiord). 10 m.

*Halimedon brevicar*, GOES.

Malangen, 380 m.

*Bathymedon longimanus*, BOECK.

(Vest Fiord), 150—180 m.

*Aceros phyllonyx*, M. SARS.

The Beier Fiord. 50—150 m.; The Skjerstad Fiord I. 30—50 m.; The Salten Fiord. 200 m.; The Folden Fiord, 530 m.; Landego,

200—450 m.; The Kirk Fiord IV. 50 m.; Mortsund I. 200 m.; The Ogs Fiord I. 100 m.; The Kanstad Fiord. 30—90 m.; Gaukværo II. 250 m.; Stonnesbotn, 40—80 m.; The Jøkel Fiord I. 100 m.

*Pleustes panoplus*, KROYER.

Rosthavet, 700 m.; Repvaag (Porsanger Fiord), 10 m.

*Paramphitoe pulchella*, KROYER.

The Skjerstad Fiord XVI. on Hydroida.

*Paramphitoe bicuspis*, KROYER.

Troldfjordsund. 40 m.

*Paramphitoe assimilis*, G. O. SARS.

Malangen. 380 m.

*Parapleustes latipes*, M. SARS.

The Beier Fiord. 50—150 m.; The Skjerstad Fiord III. 230 m.; The Kanstad Fiord. 30—90 m.

*Epimeria cornigera*, FABR.

The Sag Fiord. 200 m.

The northern limit is thus changed from the Trondhjem Fiord to the Sag Fiord.

*Epimeria parasitica*, M. SARS.

Balstad (Vest Fiord). 150 m.

As far as I know, this form has not previously been observed so far north as in Lofoten.

*Epimeria tuberculata*, G. O. SARS.

Malangen. 380 m.

This species was not previously found north of the Trondhjem Fiord.

*Epimeria loricata*, G. O. SARS.

Malangen. 100—200 m.; Lyngen II. 250 m.; Sars has collected this form at Hasvig, West Finmark. Malangen is the southern limit for the species.

*Acanthozoe cuspidata*, LEPECHIN.

The Ogs Fiord, 100 m.

The southern limit for this arctic form is the Trondhjem Fiord.

*Acanthozoa serratum*, FABR.

The Beier Fiord. 50—150 m.; Groto. 0—24 m.; The Kanstad Fiord. 30—90 m.; Stonnesbotn. 40—80 m.; Kvænangen, 340 m.; Troldfjordsund. 40 m.

*Iphimedia obesa*, RATHKE.

Balstad (Vest Fiord).

*Syrhoe crenulata*, GOES.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord II, 100—185 m.; The Skjerstad Fiord III, 330 m.

*Pardaliscus cuspidata*, KROYER.

The Jøkel Fiord. in the stomach of cod.

*Pardaliscia abyssi*, BOECK.

Ingøhavet, 300 m.

*Eusirus minutus*, G. O. SARS.

Malangen, 380 m.

This species had previously only been found by Sars at Rødberg in the Trondhjem Fiord.

*Rhacotropis aculeata*, LEPECHIN.

Ingøhavet, 300 m.: The Porsanger Fiord, 70 m.

*Rhacotropis helleri*, BOECK.

The Skjerstad Fiord II, 100—185 m.: The Skjerstad Fiord IV, 330 m.: The Skjerstad Fiord VII, 490 m.: The Folden Fiord, 530 m.: Malangen, 380 m.: Lyngen II, 250 m.: Kvænangen, 300—343 m.

*Rhacotropis mucropus*, G. O. SARS.

The Salten Fiord II, about 200 m.: The Skjerstad Fiord IV, 330 m.: Oxsund, 600 m.: Mortsund (Vest Fiord), 200 m.: Tranødybet, 607—640 m.

*Haliragoides inermis*, G. O. SARS.

Mortsund I (Vest Fiord), 200 m.: The Sag Fiord, 200 m.

*Halirages fulvocinctus*, M. Sars.

The Skjerstad Fiord IV, 330 m.: Brettesnes—Skroven, 350—400 m.: Risværflaket, 150—180 m.: The Sag Fiord, 200 m.: Kvænangen, 300—343 m.

*Apherusa tridentata*, BRUZELIUS.

Troldfiordsund, 40 m.

*Calliopius leviusculus*, KRØYER.

Repvaag (Porsanger Fiord), 10 m.

*Paratylus swammerdami*, H. MILNE-EDWARDS.

Troldfiordsund, 40 m.

*Melphidippa borealis*, BOECK.

Malangen, 380 m.

*Amathilla homari*, FABR.

Balstad (1897); The North Cape (1894); Sværholt (1894).

*Gammarus locusta*, LIN.

Røst II, 150 m.: Balstad, 30—40 m.; Reine, from the stomach of cod.

*Melita dentata*, KRØYER.

The Skjerstad Fiord IV, 330 m.: Troldfiordsund, 40 m.: The Jøkel Fiord II, 80 m.

*Lilljeborgia pallida*, BATE.

Ure I (Vest Fiord); Malangen, 380 m.

*Lilljeborgia fissicornis*, M. Sars.

The Sag Fiord, 200 m.; Malangen, 380 m.; Lyngen III, 300 m.

*Idanella aquaticornis*, G. O. Sars.

Kvænangen, 300—343 m.

This species has on the coast of Norway previously only been collected in the Varanger Fiord (NORMAN, G. O. Sars). The occurrence in Kvænangen is thus very interesting.

*Gammaropsis erythrophthalma*, LILLJEBORG.

Røsthavet, 700 m.

This form had not previously been collected so far north as the Trondhjem Fiord. It was therefore remarkable to find it on the 68th degree of latitude.

*Amphithoe rubricata*, MONT.

Balstad (1897); Henningsværstrømmen (Vest Fiord), 20—40 m.: Grøto, 0—24 m.

*Ischyrocerus angripes*, KRØYER.

Røsthavet, 700 m.: Ingøhavet, 300 m.: Repvaag (Porsanger Fiord), 10 m.

*Ischyrocerus minutus*, LILLJEBORG.

The Skjerstad Fiord XVI.

*Erichtonius abditus*, TEMPLETON.

Ingøhavet, 300 m.

This species is, according to Sars „not unfrequently off the south and west coast of Norway“. Its northern limit will now be the sea off Ingo.

*Unciola leucopis*, KRØYER.

Røsthavet, 700 m.

On the coast of Norway, this form had, hitherto, only been observed in the Varanger Fiord.

*Aeginella spinosa*, BOECK.

The Skjerstad Fiord XVI; Malangen, 380 m.: Ingøhavet, 300 m.: Breisund, 100 m.; The Porsanger Fiord, 70 m.

*Caprella septentrionalis*, KRØYER.

Breisund, 100 m.; The North Cape (1894).

*Caprella monocera*, G. O. Sars.

The North Cape (1894).

*Paraecyamus boops*, LÜTKEN.

On *Megaptera boops* at Mehavn.

Literature concerning the *Amphipoda* of Northern Norway:

A. M. NORMAN, Notes on the Natural History of East Finmark. Ann. Mag. Nat. Hist., ser. 7. Vol. X, p. 479—483.

J. SPARRE-SCHNEIDER, Undersøgelser af dyrlivet i de arktiske fjorde. Tromsø mus. aarsh. 14.

G. O. Sars, Crustacea of Norway. Vol. I.

It is worth noticing that the majority of the *Amphipoda* mentioned in the foregoing list were caught in the winter. In the list



only the localities and depths are given, but the dates of catch may be found in the list of dredging stations.

### Isopoda.

J. STABRE SCHNEIDER determ.

*Apscaules spinosus*, M. SARS.

(Gaukværo; Ure I (Vest Fiord), 200—250 m.

*Egy psora*, LIN.

Balstad, 150 m.; Mortsund (Vest Fiord); Skroven (Vest Fiord), 200—400 m.

*Egy ventrosa*, M. SARS.

Ingøhavet, 300 m.; two specimens, one of them with ova.

*Idothea baltica*, PALLAS.

Hola (Vest Fiord), from the stomach of cod; Stonnesbotn, 40—80 m.; Kvænangen, 300—343 m.

*Idothea emarginata*, FABR.

Stene in Bø, several specimens from the stomachs of cods; Troldfiordsund, 40 m.

*Astacilla longicornis*, SOWB.

Røsthavet, 700 m.

*Janira maculosa*, LEACH.

The Tys Fiord I, 500 m.; Malangen, 380 m.

*Manna fabricii*, KROYER.<sup>1)</sup>

Repvaag (Porsanger Fiord), 10 m.

*Munnopsis typica*, M. SARS.

Several places in the Skjerstad Fiord; The Folden Fiord, 530 m.; Landegø, 200—450 m.; Malangen, 380 m.; Lyngen II, 250 m.; Lyngen III, 300 m.; Kvænangen, 300—343 m.

*Eurycope cornuta*, G. O. SARS.

The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 490 m.; The Folden Fiord, 530 m.; The Sag Fiord, 200 m.; Tranødybet, 607—640 m.; Malangen, 380 m.; Lyngen II, 250 m.; Kvænangen, 300—343 m.

Concerning the Isopoda of northern Norway, reference should be made to NORMAN<sup>2)</sup> and G. O. SARS.<sup>3)</sup>

### Cumacea.

G. O. SARS determ.

*Lamprops fasciata*, G. O. SARS.

Repvaag (Porsanger Fiord), 10 m.

*Leucon nasicus*, KROYER.

Malangen, 380 m.

<sup>1)</sup> G. O. SARS determ.

<sup>2)</sup> Notes on the Natural History of East Finmark. Ann. Mag. Nat. Hist. ser. 7, vol. X, p. 478.

<sup>3)</sup> Crustacea of Norway, vol. II.

*Eudorella emarginata*, KROYER.

The Jøkel Fiord, 80 m.

*Diastylis rathekei*, KROYER.

Several places in the Skjerstad Fiord: Moskenstrømmen, 200 m.; The Kirk Fiord (several places); Ure I, 200—250 m.; Mortsund I, 200 m.; Malangen, 100—200 m.; The Porsanger Fiord, 200 m.

*Diastylis goodsiri*, BELL.

Malangen, 100—200 m.; Lyngen II, 250 m.; The Jøkel Fiord I, 100 m.

It has never previously been noticed so far south as Malangen. It was, however, known from Kvænangen (*Aurivillius*, SCHNEIDER), the Porsanger Fiord (G. O. SARS) and from the Varanger Fiord (M. SARS).

*Campylaspis rubicunda*, LILLJEBORG.

Mortsund I (Vest Fiord), 200 m.

Literature:—G. O. SARS, Crustacea of Norway, Vol. III.

A. M. NORMAN, Notes on the Nat. Hist. of East Finmark. Ann. Mag. Nat. Hist. Ser. 7, Vol. X, p. 478.

CARL ZIMMER, Die arktischen Cumaceen. Fauna arctica, Bd. I.

### Schizopoda.

The author determ.

*Boreomysis tridens*, G. O. SARS.<sup>1)</sup>

The Skjerstad Fiord VII, 490 m.; The Folden Fiord, 530 m.; Oxsund, 600 m.; Tranødybet, 640 m.; Malangen, 380 m.

NORMAN<sup>2)</sup> has caught this form in the Trondhjem Fiord, and G. O. SARS<sup>3)</sup> in the Vest Fiord.

Malangen is thus the most northerly place at which this species is found.

*Erythrope goësi*, G. O. SARS.

The Skjerstad Fiord IV, 330 m.; The Jøkel Fiord I, 100 m.

*Erythrope serrata*, G. O. SARS.

Mortsund I (Vest Fiord), 200 m.; Ure I (Vest Fiord), 200—250 m.

*Erythrope abyssorum*, G. O. SARS.

The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 490 m.; Mortsund I, 200 m.

*Pseudomma roseum*, G. O. SARS.

Malangen, 380 m.

*Pseudomma truncatum*, E. J. SMITH.

Lyngen II, 250 m.

G. O. SARS has caught it in the Bugø Fiord, a branch of the Varanger Fiord.

The southern limit for the species will now be the Lyngen Fiord.

<sup>1)</sup> *Boreomysis arctica* and *Hemimysis abyssicola* are included among the plankton forms.

<sup>2)</sup> A Month on the Trondhjem Fiord. Ann. Mag. Nat. Hist. Ser. 6, Vol. XIII, p. 274.

<sup>3)</sup> Monographie over Norges Mysider, h. III, p. 17.

*Parerythrops obesa*, G. O. SARS.

The Sag Fiord, 200 m.; Mortsund I, 200 m.

*Amblyops abbreviata*, G. O. SARS.

The Skjerstad Fiord VII, 490 m.

*Mysidopsis didelphys*, NORMAN.

Reine I (Vest Fiord), 150 m.

*Mysideis insignis*, G. O. SARS.

The Skjerstad Fiord, 330 m.; Ure I, 200—250 m.; the mouth of Raftsund, 250—300 m.; Malangen, 380 m.

*Mysis mixta*, LILLJEBORG.

The Beier Fiord, 50—150 m.; The Jøkel Fiord II, 80 m.; Stønnesbotn, 40—80 m.

*Macromysis inermis*, RATHKE.

Balstad (Vest Fiord).

**Decapoda.**

The author determ.<sup>1)</sup>

*Pasiphaea tarda*, KRØYER.<sup>2)</sup>

Landego, 200—450 m.; Oxssund, 600 m.; Malangen, 380 m.

A female from Malangen (<sup>14</sup>/<sub>4</sub> 1899) was carrying eggs without ocular spots.

*Pandalus annulicornis*, LEACH.

The Beier Fiord, 50—150 m.; The Salten Fiord I, 15—20 m.; The Skjerstad Fiord I, 30—50 m.; Røst II, 150 m.; Moskenstrømmen, 200 m.; Balstad, 30 m.; Henningsværstrømmen, 20—40 m.; the mouth of the Raftsund, 250—300 m.; The Kanstad Fiord, 30—90 m.; Malangen, 100—200 m.; Stønnesbotn, 40—80 m.; Kvænanen, 300—343 m.; Breisund, 100 m.; Mehavn (1894).

Females bearing eggs with ocular spots were observed on

<sup>14</sup>/<sub>4</sub> 1899, Malangen.

<sup>15</sup>/<sub>4</sub> —, Stønnesbotn.

<sup>21</sup>/<sub>3</sub> 1900, the Beier Fiord.

*Pandalus borealis*, KRØYER.

The Beier Fiord, 50—150 m.; Landego, 200—450 m.; The Salten Fiord II, 200 m.; The Skjerstad Fiord II, 100—185 m.; Balstad, 150 m.; The Ostnes Fiord, 100 m.; the mouth of the Raftsund, 250—300 m.; The Kanstad Fiord, 30—90 m.; Lyngen III, 300 m.; The Porsanger Fiord, 200 m.

Females bearing eggs with ocular spots were observed on

<sup>5</sup>/<sub>4</sub> 1900, Salten Fiord II, 200 m.

*Pandalus propinqus*, G. O. SARS.

Balstad, 150 m.; Arno, 300—400 m.; The Salten Fiord II, 320—380 m.; The Tys Fiord I, 500 m.; Malangen, 100—200 m.

Females bearing eggs with ocular spots occurred on

<sup>14</sup>/<sub>4</sub> 1899, Malangen, 100—200 m.

This species has not previously been noticed north of Lofoten. Malangen must now be looked upon as its northern limit.

*Pandalus platyceros*, BRANDT.

(= *F. leptorhynchus*, KINAHAN).

The Salten Fiord II, 320—380 m.

<sup>1)</sup> In doubtful cases Prof. G. O. SARS has identified.

<sup>2)</sup> This species is also included in the plankton forms, vide present work, p. 37.

*Pandalus brevirostris*, RATHKE.

The Beier Fiord, 50—150 m.; The Salten Fiord II, 320—380 m.; The Folden Fiord, 530 m.; The Sag Fiord, 200 m.; Tranødybet, 607—640 m.; Balstad, 150 m.; Mortsund I, 100 m.; Ure I, 200—250 m.; Henningsvær I, 150 m.; Skroven, 200—400 m.; The Ostnes Fiord, 100 m.; the mouth of the Raftsund, 250—300 m.; Gaukværø II, 250 m.; Malangen, 380 m.

Females bearing eggs, without ocular spots, occurred on

<sup>23</sup>/<sub>3</sub> 1900, The Ostnes Fiord, 100 m.;

<sup>26</sup>/<sub>3</sub> 1900, Balstad, 150 m.;

<sup>31</sup>/<sub>3</sub> 1900, The Beier Fiord, 50—100 m.;

<sup>5</sup>/<sub>1</sub> 1900, The Salten Fiord II, 320—380 m.

The species is new in Malangen, which must now be considered as its northern limit on our coast.

*Caridion gordonii*, BATE.

Stene (Vest Fiord), 120—200 m.; Henningsvær, 150 m.

G. O. SARS<sup>1)</sup> says that the species is found right up to the Varanger Fiord.

*Sclerocrangon boreus*, PHIPPS.

The Skjerstad Fiord XVI; The Skjerstad Fiord IX, 30—40 m.; Grøtø, 6—24 m.; The Kanstad Fiord, 30—40 m.; Troldfiordsund, 40 m.; Breisund, 100 m.

Females bearing eggs with ocular spots occurred on <sup>3</sup>/<sub>4</sub> 1900, the Skjerstad Fiord IX, 30—40 m. The Skjerstad Fiord is, as far as is known at present, the southern limit for this species, but it is probable that its distribution extends further south.

*Crangon crangon*, LIN.

Females bearing eggs, without ocular spots, occurred on

<sup>7</sup>/<sub>4</sub> 1900, Grøtø, 6—24 m.

*Crangon abnani*, KINAHAN.

The Beier Fiord, 50—150 m.; Røst II, 150 m.; Svølvær, (1894); The Ostnes Fiord; The Kanstad Fiord, 30—90 m.; Stønnesbotn, 40—80 m.; Mehavn (1894).

Females bearing eggs, without ocular spots, occurred on

<sup>21</sup>/<sub>3</sub> 1900, the Beier Fiord, 50—150 m.

*Pontophilus echinulatus*, M. SARS.

Mortsund, 100 m. (2 specimens, about 12 mm. in length); Balstad, 150 m. (1 female bearing eggs without ocular spots).

*Pontophilus norvegicus*, M. SARS.

The Beier Fiord, 50—150 m.; Arno, 300—400 m.; Landego, 200—450 m.; The Salten Fiord II, 320—380 m.; The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord VII, 490 m.; The Folden Fiord, 530 m.; Oxssund, 600 m.; The Sag Fiord, 200 m.; Moskenstrømmen, 200 m.; Balstad, 150 m.; Mortsund I, 200 m.; Brettesnes-Skroven, 350—400 m.; the mouth of the Raftsund, 250—300 m.; Tranødybet, 607—640 m.; Gaukværø II, 250 m.; Malangen, 380 m.; Lyngen III, 300 m.

Females bearing eggs occurred, without ocular spots, on

<sup>22</sup>/<sub>2</sub> 1899, Mortsund I, 200 m.;

<sup>5</sup>/<sub>4</sub> 1900, The Salten Fiord, 320—380 m.;

<sup>17</sup>/<sub>2</sub> 1899, The Sag Fiord, 200 m.

with ocular spots, on

<sup>16</sup>/<sub>3</sub> 1900, Balstad, 150 m.;

<sup>5</sup>/<sub>4</sub> 1900, The Salten Fiord, 320—380 m.

<sup>1)</sup> Crustacea II, p. 11. The Norw. North. Atl. Exp.

*Sabinea septemarmata*, SABINE.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord I, 30—50 m.; The Skjerstad Fiord II, 100—185 m.; The Kirk Fiord II, 50 m.; The Ostnes Fiord, 130 m.; Stonesbotn, 40—80 m.; Lyngen II, 250 m.; The Jøkel Fiord I, 100 m.; The Jøkel Fiord III, 100 m.; The Porsanger Fiord, 200 m.; The Kjølle Fiord (1894); Mehavn (1894).

Females bearing eggs with ocular spots occurred on

$^{21}/_4$  1899, The Jøkel Fiord, 100 m.;

$^{27}/_4$  1899, The Porsanger Fiord, 200 m.;

$^{2}/_4$  1900, The Skjerstad Fiord, 30—50 m.

var. *sarsi*, SMITH.

The Beier Fiord, 50—150 m.; Balstad, 150 m.; Stene (Vest Fiord), 120—200 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Breisund, 100 m.

Females bearing eggs with ocular spots occurred on

$^{14}/_4$  1899, Malangen, 100—200 m.

*Hippolyte gaimardi*, M. EDW.

The Beier Fiord, 50—150 m.; The Salten Fiord I, 15—20 m.; The Skjerstad Fiord IX, 30—50 m.; Grøto, 6—24 m.; Napstrømmen (1896), 30—40 m.; The Ostnes Fiord I, 30 m.; Risværflaket, 150—180 m.; The Kanstad Fiord, 30—90 m.; The Jøkel Fiord I, 100 m.; Troldfjordsund, 40 m.; The Porsanger Fiord, 200 m.

Females bearing eggs with ocular spots occurred on

$^{10}/_3$  1899, Risværflaket, 150—180 m.;

$^{17}/_3$  —, Kanstad Fiord, 30—90 m.;

$^{20}/_4$  —, Jøkel Fiord I, 100 m.;

$^{25}/_4$  —, Troldfjordsund, 40 m.;

$^{22}/_3$  1900, The Ostnes Fiord I, 30 m.;

$^{3}/_4$  —, The Skjerstad Fiord IX, 30—50 m.;

$^{5}/_4$  —, The Salten Fiord I, 15—20 m.;

$^{7}/_4$  —, Grøto, 6—24 m.

*Hippolyte pusiola*, KRØYER.

The Salten Fiord I, 15—20 m.; Balstad (1896), 30 m.; Troldfjordsund, 40 m.; Breisund, 100 m.

Females bearing eggs, without ocular spots, occurred on

$^{25}/_4$  1899, the Breisund, 100 m.

*Hippolyte turgida*, KRØYER.

The Ostnes Fiord, 30 m.

*Hippolyte spinus*, SOW.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 30—40 m.; The Skjerstad Fiord XVI; Reine I, 150 m.; Balstad, 150 m.; Hemningsværstrømmen, 20—40 m.; The Kanstad Fiord, 30—90 m.; Gaukværø II, 250 m.; Malangen, 380 m.; Stonesbotn, 40—80 m.; Lyngen II, 250 m.; Kvænangen II, 90 m.; The Jøkel Fiord, III, 100 m.; Troldfjordsund, 40 m.; Breisund, 100 m.

Females bearing eggs with ocular spots occurred on

$^{21}/_4$  1899, The Jøkel Fiord, 100 m.;

$^{25}/_4$  1899, The Troldfjordsund, 40 m.;

$^{3}/_4$  1900, The Skjerstad Fiord, 30—40 m.

*Hippolyte liljeborgi*, DANIELSSEN.

(= *H. securifrons*, NORMAN).

The Beier Fiord, 50—150 m.; The Skjerstad Fiord III, 230 m.; The Skjerstad Fiord IV, 330 m.; The Skjerstad Fiord X,

10—30 m.; The Skjerstad Fiord XIII, 110 m.; The Oxsund, 600 m.; The Sag Fiord, 200 m.; Landego, 200—450 m.; The Kirk Fiord III, 70—80 m.; Mortsund, 200 m.; The Ostnes Fiord, 130 m.; Malangen, 380 m.; The Porsanger Fiord, 70 m.

Females bearing eggs with ocular spots occurred on

$^{20}/_3$  1900, Landego, 200—450 m.;

$^{2}/_4$  —, The Skjerstad Fiord III, 230 m.;

$^{3}/_4$  —, The Skjerstad Fiord X, 10—30 m.

*Hippolyte polaris*, SABINE.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord III, 230 m.; The Skjerstad Fiord X, 10—30 m.; The Skjerstad Fiord XVI; The Tys Fiord I, 500 m.; Røsthavet, 300—500 m.; Moskenstrømmen, 200 m.; The Kirk Fiord III, 30—50 m.; The Ogs Fiord I, 100 m.; The Kanstad Fiord, 30—90 m.; Tranødybet, 450—530 m.; Stonesbotn, 40—80 m.; Malangen, 100—200 m.; The Jøkel Fiord III, 100 m.; Ingøhavet, 300 m.; Breisund, 100 m.; The Porsanger Fiord, 200 m.

Females bearing eggs with ocular spots occurred on

$^{28}/_3$  1899, The Tys Fiord I, 500 m.;

$^{14}/_4$  —, Malangen, 100—200 m.;

$^{27}/_4$  —, The Porsanger Fiord, 200 m.;

$^{2}/_4$  1900, The Skjerstad Fiord II, 230 m.;

$^{1}/_4$  —, The Skjerstad Fiord XVI.

At several of the foregoing stations, males were found, these have been described as a separate species (*H. borealis*). In all of them the rostrum was without teeth or a slight indication of such could be seen. The lowest corner of the fore edge of Cephalothorax was rounded.

*Bythocaris simplicirostris*, G. O. SARS.

Tranødybet, 607—640 m.; Malangen, 100—200 m.

*Cryptocheles pygmaea*, G. O. SARS.

The Folden Fiord, 530 m.; Tranødybet, 607—640 m.

At the former place females bearing eggs, without ocular spots, occurred on  $^{6}/_4$  1900.

*Eupagurus bernhardus*, LIN.

The Salten Fiord I, 15—20 m.; Grøto, 6—24 m.; Napstrømmen, 30—40 m.; Svølvær, 15—20 m.; Troldfjordsund, 40 m. (2 small specimens).

Females bearing eggs with ocular spots occurred on

$^{5}/_4$  1900, The Salten Fiord I, 15—20 m.

*Eupagurus pubescens*, KRØYER.

The Beier Fiord, 50—150 m.; The Skjerstad Fiord IX, 30—50 m.; The Skjerstad Fiord XVI, 10—100 m.; Røst I, 120 m.; Moskenstrømmen, 200 m.; Reine, 150 m.; Balstad, 150 m.; Stene (Vest Fiord), 120—200 m.; The Ostnes Fiord, 20 m.; Digermulen, 100—150 m.; Grøto, 6—24 m.; The Kanstad Fiord, 30—90 m.; Gaukværø II, 250 m.; Malangen, 100—200 m.; Kvænangen II, 90 m.; Troldfjordsund, 40 m.; Ingøhavet, 300 m.; Breisund, 100 m.; The Porsanger Fiord, 200 m.; Sværholt (1894).

Females bearing eggs with ocular spots occurred on

$^{14}/_4$  1899, Malangen, 100—200 m.;

$^{24}/_4$  —, Ingøhavet, 300 m.;

$^{35}/_4$  —, Breisund, 100 m.

*Lithodes maia*, LIN.

Malangen, 100—200 m.; The Kjølle Fiord (1894).



*Galathea nera*, EMBLETON.

Balstad, 20 m.; Henningsværstrømmen, 20—40 m.

*Galathea dispersa*, BATE.

The Beier Fiord, 50—150 m.

As far as I know, this species has not previously been found north of the arctic circle. The Beier Fiord must now be considered to be its limit to the north.

*Galathea intermedia*, LILLJEBORG.

Henningsværstrømmen, 20—40 m.; Svolveier (1894).

*Galathodes tridentatus*, ESMARK.

The Tys Fiord I, 500 m.; Tranodybet, 450—530 m.

At both places, the species was found on *Lophohelia* bottom. Tranodybet is the northern limit, as far as is known at present.

*Munida rugosa*, FABR.

The Beier Fiord, 50—150 m.; Arno, 300—400 m.; Landego, 200—450 m.; The Salten Fiord II, 320—380 m.; The Folden Fiord, 530 m.; The Sag Fiord, 200 m.; The Tys Fiord I, 500 m.; Moskenstrømmen, 200 m.; Reine, 150 m.; Balstad, 150 m.; Mortsund I, 200 m.; Ure I, 200—250 m.; Svolveier (1894); Brettesnes—Skroven, 350—400 m.; Digermulen, 100—150 m.; Gaukvarø II, 250 m.; Malangen, 100—200 m.; Lyngen III, 300 m.

Females bearing eggs without ocular spots occurred on

<sup>16</sup>/<sub>2</sub> 1899, Brettesnes—Skroven, 350—400 m.;

<sup>24</sup>/<sub>4</sub> —, Ingøhavet, 300 m.

<sup>26</sup>/<sub>3</sub> —, Balstad, 150 m.

*Munida tenuimana*, G. O. SARS.

The Folden Fiord, 530 m.; Oxsund, 600 m.; The Tys Fiord, 500 m.; Brettesnes—Skroven, 350—400 m.; Tranodybet, 607—640 m.

*Hyas araneus*, LIX.

The Misvær Fiord (arm of the Skjerstad Fiord), 10—50 m. (1 female carrying eggs).

*Hyas coarctatus*, LIX.

The Misvær Fiord, 10—50 m.; The Salten Fiord I, 15—20 m.; Rost II, 150 m.; Moskenstrømmen, 90 m.; The Kirk Fiord III, 70—80 m.; Balstad, 15—30 m.; Stone in Bø, from the stomach of cod; Malangen, 100—200 m.; Stonesbotn, 40—80 m.; The Jøkel Fiord, 100 m.; The Porsanger Fiord, 200 m.

*Portunus depurator*, LIX.

The Salten Fiord I, 15—20 m.; Troldfiordsund, 40 m.

As far as I know, this species has not previously been found so far north.

*Portunus holsatus*, FABR.

Stone in Bø (Vesteraalen), from the stomach of *Fleuronectes platessa*.

It is not likely that this species has been previously noted from Lofoten. Its northern limit must now be taken to be Vesteraalen.

*Portunus pusillus*, LEACH.

Mortsund II, 200 m.

This is also a new species for Lofoten.

**Pantopoda.**<sup>1)</sup>

Dr. APPELLOF, Bergen, determ.

*Pycnogonum litorale*, STROM.

Skjerstadfiord III, 230 m.; Kvenangen, 300—343 m.; Jøkel-fiord II, 60 m.

*Pseudopallene circularis*, GOODSIR.

Skjerstadfiord X, 10—30 m.; Balstad, 30 m.; Napstrømmen, 30—40 m.

*Pseudopallene spinipes*, FABR.

Napstrømmen, 30—40 m.; Stonesbotn, 40—80 m.; Hammerfest (1894); Troldfiordsund, 40 m.; Nordkap (1894).

*Nymphon glaciale*, LILLJEBORG.

Mehavn (1894). New for the Norwegian fauna.

*Nymphon grossipes*, FABR.

Ogsfiord, 100 m.; Troldfiordsund, 40 m.; Nordkap (1894); Sværholt (1894).

*Nymphon mixtum*, KROYER.

Kirkfiord II, ca. 50 m.

*Nymphon leptocheles*, G. O. SARS.

Morsdalfiord, 50 m.; Malangen, 380 m.

*Nymphon strømi*, KROYER.

Morsdalfiord, 50—150 m.; Balstad (Lofoten): Risværflaket, 150—180 m.; Kanstadfiord, 30—90 m.; Arno, 300—400 m.; Ostnesfiord, 50—70 m.; Jøkel-fiord III, 100 m.

*Nymphon macrum*, WILSON.

Foldenfiord, 530 m.; Ogsfiord I, 100 m.; Malangen, 100—200 m.

*Chaetonymphon hirtipes*, BELL.

Balstad (Lofoten), 10—35 m.; Malangen, 100—200 m.; Jøkel-fiord III, 100 m.; Kvenangen II, 90 m.; Breisund, 100 m.; Nordkap (1894); Porsangerfiord, 200 m.

*Chaetonymphon spinosum*, GOODSIR.

Arno, 300—400 m.; Saltenfiord II, 320—380 m.; Morsdalfiord, 50—150 m.; Reine I (Lofoten), 150 m.; Malangen, 100—200 m.

**Tunicata.****Synascidiae.**

H. HUITFELDT-KAAS, Kristiania, determ.

*Aphidiopsis sarsi*, HUITF.-KAAS.

Hammerfest (1894).

According to HUITFELDT-KAAS<sup>2)</sup> this species has previously been collected by M. SARS at Kristiansund and Beian.

*Amaroucium mutabile*, M. SARS.

Hammerfest (1894); Troldfiordsund, 40 m.

SARS collected his specimens too at Hammerfest.

<sup>1)</sup> Cf. G. O. SARS, Pycnogonidea. The Norw. North Atl. Exp. 1876—78.

<sup>2)</sup> The Norw. North Atl. Exp. Synascidia, p. 15.

*Ascidiae simplices.*

Dr. R. HARTMEYER, Berlin, and Dr. JOHAN KLÆR, Kristiania, determ.

*Ciona intestinalis*, LIN.

Moskenstrømmen, 90 m.; The Tys Fiord I, 500 m.; Sunderø (1897) in the stomach of cod.

According to KLÆR,<sup>1)</sup> the species occurs all along the coast of Norway. It has however, probably never before been collected at a depth of 500 m. At several places in Lofoten, 1897 in March and in April, I found *Ciona* in the stomach of cod.

*Ascidia gelatinosa*, KLÆR.

Mortsund I, 200 m.; Tranodybet, 607—640 m.; Oxsund, 600 m.; The Sag Fiord, 200 m.

HARTMEYER<sup>2)</sup> mentions this species as being found at Tromsø, which is, I believe, its most northerly locality.

*Ascidia prunum*, O. F. MÜLL.

The North Cape (1894).

*Ascidia conchilega*, O. F. MÜLL.

Mortsund I (The Vest Fiord), 200 m.

*Styela rustica*, LIN.

Svolvær (1894).

*Dendrodia aggregata*, RATHKE.

Henningsvær (from stomach of cod); Trolldfiordsund, 40 m.; Breisund, 100 m.; Nordkyn (1894). In the Breisund this species was so abundant that it almost filled the dredging-net after a short draw.

*Polycarpa libera*, KLÆR.

The Skjerstad Fiord IV, 330 m.

KLÆR<sup>3)</sup> writes: „Found only in Komag Fiord, Ox Fiord and at Vadsø.“ This species must be considered as an arctic one. The Skjerstad Fiord is its southern limit, as far as is now known.

*Cynthia echinata*, LIN.

Nordkyn (1894).

*Pisces.*

Prof. COLLETT and the author determ.

*Sebastes marinus*, LIN.

<sup>12</sup>/<sub>2</sub> 1897. Sunderø in Vesteraalen, from the stomach of cod.

*Centridermichthys uncinatus*, REINH.

<sup>31</sup>/<sub>3</sub> 1900, The Beier Fiord, 50 m. (several specimens); <sup>7</sup>/<sub>4</sub> 1899, Reine, 100 m. (1 specimen); <sup>14</sup>/<sub>4</sub> 1899, Malangen, 100—200 m. (1); <sup>15</sup>/<sub>4</sub> 1899, Stonesbotn, 40—80 m. (1); <sup>25</sup>/<sub>4</sub> 1899, Breisund, 100 m. (1).

*Centridermichthys hamatus*, KRØYER.

<sup>6</sup>/<sub>3</sub> 1899. Henningsvær, 150 m. (1); <sup>20</sup>/<sub>4</sub> 1899, The Jøkel Fiord II, 80 m. (1); <sup>24</sup>/<sub>4</sub> 1899, Ingohavet, 300 m. (1); <sup>25</sup>/<sub>4</sub> 1899, Breisund, 100 m. (4).

*Triglops pingeli*, REINH.

<sup>25</sup>/<sub>4</sub> 1899. Breisund, 100 m. (1).

*Cottus scorpius*, LIN.

Sværholt (1894); <sup>20</sup>/<sub>4</sub> 1896. Napstrømmen. 40 m.

*Cottunculus microps*, COLLETT.

<sup>3</sup>/<sub>5</sub> 1899, The Lyngen Fiord II, 250 m. (1).

*Agonus cataphractus*, LIN.

<sup>25</sup>/<sub>4</sub> 1898, Breisund, 100 m. (1).

*Chirolophis galerita*, LIN.

<sup>3</sup>/<sub>4</sub> 1900, The Skjerstad Fiord X, 10—30 m. (several specimens).

At the mouth of the Misvær Fiord, we got the dredging bag full of *Lithothamnium*, in whose openings a multitude of animals were hidden, there were ophiurides, asterides, worms, molluscs, crabs etc.

Among these stone algae which are generally called „ruggel“ by the Norwegian fishermen, many specimens of *Chirolophis galerita* were found. Some lumps of „ruggel“ were left lying on the deck during the night. The next morning, I broke up one of the lumps, and a living specimen of *Chirolophis* came into view, it had — so to say — spent a night on „dry land“. When at rest, this fish bends the back part of its body sideways.

*Lumpenus lampretiformis*, WAHLB.

<sup>31</sup>/<sub>3</sub> 1900. The Beier Fiord, 50 m. (1).

*Anarrhichus lupus*, LIN.

<sup>23</sup>/<sub>4</sub> 1896. Balstad.

Contents of stomach: — *Ophiuroidea*, *Onuphis conchylega*, *Buccinum undatum*, *Eupagurus pubescens*.

*Crystallogobius linearis*, DÜB. & KÖR.

<sup>10</sup>/<sub>3</sub> 1899. The Trolld Fiord in Lofoten, several specimens from the stomach of *Gadus callarias*. The cod was 40 cm. in length.

*Pleuronectes cynoglossus*, LIN.

<sup>15</sup>/<sub>4</sub> 1899. Stonesbotn, 50—80 m. (3).

*Pleuronectes platessa*, LIN.

<sup>10</sup>/<sub>4</sub> 1899. Stene in Bø (Vesteraalen), several large specimens, with stomach and intestines full of shells (*Pecten*) and *Echinodermata*. There were also *Polychaeta*, *Eupagurus pubescens*, *Portunus holsatus* etc.

*Platysomatichthys hippoglossoides*, WALB.

<sup>20</sup>/<sub>4</sub> 1896. Balstad, from the stomach of cod.

*Drepanopsetta platessoides*, O. FABR.

<sup>31</sup>/<sub>3</sub> 1900. The Beier Fiord, 50—150 m. (several specimens).

*Gadus aeglefinus*, LIN.

<sup>29</sup>/<sub>4</sub> 1897. Reine, one specimen (28 cm.) from the stomach of cod.

I have written something about the food of the haddock in my paper: — „Contribution to the Study of Hydrography and Biology on the Coast of Norway“. p. 17.

*Gadus callarias*, LIN.

At several places we caught cod and examined the contents of their stomachs, we also bought some for the same purpose. On

<sup>1)</sup> The Norw. Atl. Exp. A List of Ascidiae simplices, p. 3.

<sup>2)</sup> Holosome Asciden, p. 36. Meeresfauna von Bergen.

<sup>3)</sup> The Norw. North Atl. Exp. A List of Norwegian Ascidiae simplices, p. 12.

<sup>10</sup>/<sub>4</sub> 1899, we examined some cod which had been caught at Stene in Bø. Some were of a reddish colour, others were paler and resembled ocean-cod („skrei“).

The roe was not fully developed.

In the stomachs were found *Polydora*, *Hyas coarctatus* etc.

A single specimen had *Lernæa branchialis* on one of its gills.

On <sup>20</sup>/<sub>4</sub> 1899 we bought in the Jøkel Fiord 10 cod which had been fished by line in the fiord. Shape and colour were those of the ocean-cod („skrei“), in a few of the larger females the roe was very loose. Schizopods and Amphipods were found in the stomachs.

I have also referred to the food of the cod in the paper quoted above, p. 14.

*Gadus virens*. LIN.

In the beginning of February, 1897, I took part in a fishing expedition with nets for „skrei“. In the course of this, we also caught a number of „sei“ (*Gadus virens*). Cf. my paper referred to above, p. 17.

*Molva molva*. LIN.

Towards the end of April 1897, I went with a fisherman to fish with nets near Røst. Among the rest, we also caught large specimens of *Molva*. As a rule the stomach hang like a balloon out of its mouth, but in one instance, bones of *Gadus aeglefinus* could be identified.

*Brosmius brosme*. ASC.

In the stomach of *Brosmius*, which was caught near Røst in April 1897. *Lithodes maja* was often found.

*Lycodes sarsi*. COLLETT.

<sup>6</sup>/<sub>4</sub> 1900. The Folden Fiord, 530 m. (1).

*Mallotus villosus*. O. F. MÜLL.

On <sup>25</sup>/<sub>4</sub> 1899, dead specimens were found drifting in the Troidfiordsund (between Rølfso and Ingo). Both males and females were found, and on examination it was seen that they had spawned. It is said that it is quite usual to find dead capelan floating in Finmark in the spring, and many theories have been started to offer an explanation for this. Some think that the death of the capelan is to be accounted for by the coldness of the water; others suppose that it must be attributed to unsuitable food etc.

But none of the theories advanced seem very satisfactory.

*Clupea harengus*. LIN.

<sup>18</sup>/<sub>3</sub> 1896. Henningsvær, from the stomach of cod.

Herring catches are made in many of the fiords in Nordland in the winter, so as to provide bait for the codfishery in Lofoten.

The supply of the so-called baiting herring („agnsild“) is conveyed by small steamers. On <sup>16</sup>/<sub>3</sub> 1897 I went on board one of

these steamers (S/S „Svolvær“) from Svolvær in Lofoten to the Ler Fiord in Helgeland, where a quantity of herrings had been caught. On <sup>17</sup>/<sub>3</sub> I examined the plankton at the bottom of the fiord at the place where the catch had been made. It was not very rich. On the surface, I got a few specimens of *Oithona similis*, as well as nauplii of *Copepoda*. In a sample from 0—25 m. were found the following: —

*Cal. finmarchicus* r  
*Pseudocal. elongatus* r  
*Acartia longiremis* rr  
*Microsetella atlantica* c  
*Melridia longa* rr  
 Nauplii of *Copepoda* +

Temperature and salinity were found to be distributed as follows: —

<sup>17</sup> / <sub>3</sub> 1897, The Ler Fiord.			
	t.		s.
0 m.	3 <sup>o</sup> .5 C.		33.94 <sup>0</sup> / <sub>100</sub>
10 „	3.8 -		33.73 „
Bottom 25 „	3.8 -		33.73 „

The herrings were rather meagre. I made some measurements, and found that the smallest were 15 cm. in length, the largest 20 cm., the usual length was 16, 17, 18 cm. (The measurement was made from the tip of the snout to the commencement of the division of the tail fin). Indications of roe and milt were present in the largest specimens. The stomachs were empty, but most of them had a white mass in the intestine.

One of the fiords which almost always in winter supplies Lofoten with „agnsild“ is the Kvænangen Fiord. My observations in this fiord (<sup>24</sup>/<sub>1</sub> and <sup>19</sup>/<sub>4</sub> 1899), testify great uniformity in temperature and salinity during the winter.

This probably has much to do with the fact that plankton Copepods may be found right up to the surface of the water. At any rate, I observed quantities of *Calanus finmarchicus* in a sample from 0—5 m. on <sup>24</sup>/<sub>1</sub> 1899.

As the food of the herring can thus rise so far up, it is explicable that the herring itself follows it, and comes so far up in the water that it can be reached by the tackle employed.

*Anguilla vulgaris*. TURR.

<sup>5</sup>/<sub>4</sub> 1900. The Salten Fiord I, 15—20 m. (*juniores*).

*Myxine glutinosa*. LIN.

During the cod fishery at Sunderø in Vesteraalen, in the beginning of February 1897, I noticed that large numbers of fish were destroyed by this destructive animal. In some cases the robbers had not had a chance of escape, but were found under the skin of the sucked out cod.



## B. Bottom Samples.

### a. Foraminifera.

Mr. HANS KLÆR, Tromsø, determ.

At some places, we took bottom samples, and when the tow-net reached the bottom, we also obtained a combination of bottom mud and plankton.

These samples were sent to Mr. ED. THUM, Leipzig, and he sorted out the *Foraminifera* and the *Diatomacea* and made excellent preparations. Mr. HANS KLÆR and Mr. E. JØRGENSEN have classified the species thus prepared.

In the following pages, I give the list of the *Foraminifera* from Mr. KLÆR'S Manuscript.

With regard to the synonyms, I beg reference to the works of the author himself.<sup>1)</sup>

<sup>11</sup>/<sub>1</sub> 1899, Moskenstrømmen. 0—150 m.  
Bottom sample and plankton.

*Hyperammia ramosa*, *Hyperammia subnudosa*, *Crithionina abyssorum*, *Halophragmium bulloides*, *Valulina conica*, *Ammodiscus tennisi*, *Reophax scorpionus*, *Trochammina robertsoni*, *Trochammina nitens*, *Webbina clavata*, *Verniculina polystropha*, *Textularia agglutinans*, *Bulimina pyrula*, *Bulimina marginata*, *Virgulina schreibersiana*, *Uvigerina angulosa*, *Cassidulina laevigata*, *Nodosaria laevigata*, *Globigerina bulloides*, *Truncatulina lobatula*, *Truncatulina refulgens*, *Anomalina coronata*, *Operculina ammonoides*, *Nonionina umbilicatula*, *Nonionina turgida*.

<sup>17</sup>/<sub>1</sub> 1899, Stamsund.  
Bottom sample.

*Haplophragmium canariense*, *Haplophragmium glomeratum*, *Valulina conica*, *Bulimina pyrula*, *Bulimina elipsoides*, *Bulimina marginata*, *Bolivina punctata*, *Cassidulina bradyi*, *Chilostomella ovoidea*, *Uvigerina pygmaea*, *Uvigerina angulosa*, *Pullenia sphaeroides*, *Pullenia quinqueloba*, *Truncatulina lobatula*, *Anomalina coronata*, *Nonionina umbilicatula*, *Operculina ammonoides*, *Cornuspira carinata*, *Quinqueloculina seminulum*, *Biloculina simplex*.

<sup>17</sup>/<sub>1</sub> 1899, Stamsund. 0—150 m.  
Bottom sample and plankton.

*Trochammina inflata*, *Bigenenerina sarsi* A., *Bulimina marginata*, *Bulimina concoluta*, *Bulimina pyrula*, *Bolivina punctata*, *Uvigerina angulosa*, *Sagrina dimorpha*, *Patellina corrugata*, *Cassidulina laevigata*, *Polymorphina compressa*, *Cornuspira foliacea*, *Nodosaria calomorpha*, *Lagena marginata*, *Lagena hexagona*, *Lagena apiculata*, *Cristellaria rotulata*, *Globigerina bulloides*, *Pullenia sphaeroides*, *Truncatulina lobatula*, *Nonionina scapha*, *Operculina ammonoides*, *Quinqueloculina seminulum*, *Biloculina elongata*.

<sup>31</sup>/<sub>1</sub> 1899, Hola (Svolvær). 0—150 m.  
Bottom sample and plankton.

*Halophragmium truncatum*, *Trochammina robertsoni*, *Bolivina dilatata*, *Bolivina punctata*, *Virgulina schreibersiana*, *Bulima subteres*, *Bulima marginata*, *Cassidulina laevigata*, *Cassidulina crassa*, *Polymorphina compressa*, *Patellina corrugata*, *Lagena marginata*, *Lagena laevis*, *Lagena striata*, *Truncatulina lobatula*, *Discorbina globularis*, *Nonionina scapha*, *Operculina ammonoides*, *Quinqueloculina seminulum*, *Biloculina elongata*, *Biloculina oblonga*, *Globigerina bulloides*.

<sup>31</sup>/<sub>1</sub> 1899, Hola (Svolvær). 0—150 m.  
Bottom sample and plankton.

*Reophax scorpionus*, *Halophragmium glomeratum*, *Trochammina robertsoni*, *Valulina conica*, *Valulina fusca*, *Trochammina nitida*, *Bulima elipsoides*, *Bulima pyrula*, *Bulima marginata*, *Bolivina punctata*, *Bolivina dilatata*, *Virgulina squamosa*, *Uvigerina angulosa*, *Sagrina dimorpha*, *Cassidulina crassa*, *Cassidulina laevigata*, *Lagena striata*, *Lagena clavata*, *Lagena distoma*, *Lagena hexagona*, *Lagena marginata*, *Globigerina bulloides*, *Pullenia sphaeroides*, *Truncatulina lobatula*, *Discorbina obtusa*, *Operculina ammonoides*, *Nonionina stelligera*, *Nonionina turgida*, *Triloculina tricarinata*, *Quinqueloculina seminulum*.

<sup>31</sup>/<sub>1</sub> 1899, Lilands Bay (Ostnesfjord). 0—35 m.  
Bottom sample and plankton.

*Trochammina* sp., *Spiroplecta bififormis*, *Uvigerina angulosa*, *Cassidulina crassa*, *Cassidulina laevigata*, *Virgulina schreibersiana*, *Bulimina marginata*, *Bolivina dilatata*, *Nodulina gracilis*, *Polymorphina compressa*, *Nodosaria communis*, *Nodosaria calomorpha*, *Patellina corrugata*, *Lagena squamosa*, *Lagena williamsoni*, *Lagena gracilis*, *Lagena striata*, *Lagena marginata*, *Truncatulina lobatula*, *Nonionina scapha*, *Operculina ammonoides*, *Quinqueloculina seminulum*.

<sup>3</sup>/<sub>2</sub> 1899, Raftsund, 250—300 m.

*Hyperammia* sp., *Trochammina robertsoni*, *Valulina fusca*, *Valulina conica*, *Textularia agglutinans*, *Textularia williamsoni*, *Bigenenerina sarsi*, *Bigenenerina digitata*, *Bolivina punctata*, *Bolivina dilatata*, *Bulimina marginata*, *Bulimina pyrula*, *Bulimina elipsoides*, *Uvigerina angulosa*, *Sagrina dimorpha*, *Cassidulina laevigata*, *Cassidulina crassa*, *Globigerina bulloides*, *Pullenia sphaeroides*, *Pullenia quinqueloba*, *Orbulina universa*, *Nodosaria scalaris*, *Nodosaria communis*, *Lagena squamosa*, *Lagena marginata*, *Truncatulina lobatula*, *Rotalia soldani*, *Discorbina araucana*, *Discorbina obtusa*, *Nonionina umbilicatula*, *Operculina ammonoides*, *Cornuspira carinata*, *Quinqueloculina seminulum*, *Biloculina simplex*, *Biloculina elongata*.

<sup>1)</sup> *Thalamophora*. The Norw. North. Atl. Exp.

Synopsis of the Norwegian Marine Thalamophora. Rep. on Norwegian Fishery and Marine Investigations, edited by Dr. HJØRT, Vol. I, nr. 7, 1900.

Besides these, there were also found at the same place:

*Saccammina sphaerica*, *Rhabdammina abyssorum*.

<sup>3</sup>/<sub>2</sub> 1899, Raftsund, 0—270 m.

Bottom sample and plankton.

*Trochammina robertsoni*, *Textularia sagittula*, *Bigeneria sarsi*, *Balimmina elipsoides*, *Balimmina pyrula*, *Balimmina marginata*, *Balimmina convoluta*, *Balimmina subteres*, *Bolirina punctata*, *Virgulina schreibersiana*, *Cassidulina crassa*, *Cassidulina laerigata*, *Polymorphina compressa*, *Sagrina dimorpha*, *Globigerina bulloides*, *Pullenia sphaeroides*, *Nodosaria calomorpha*, *Lagena semistriata*, *Lagena marginata*, *Lagena gracillima*, *Lagena striata*, *Truncatulina lobatula*, *Discorbina araucana*, *Discorbina berthelotiana*, *Nonionina umbilicatula*, *Operculina ammonoides*, *Cornuspira foliacea*, *Triloculina tricarinata*.

<sup>7</sup>/<sub>2</sub> 1899, Ofoten I, 360 m.

*Bigeneria sarsi* (A + B), *Balimmina normanni*, *Virgulina schreibersiana*, *Bolirina punctata*, *Bolirina dilatata*, *Balimmina elipsoides*, *Balimmina marginata*, *Urigerina angulosa*, *Sagrina dimorpha*, *Cassidulina laerigata*, *Cristellaria rotulata*, *Nodosaria laerigata*, *Nodosaria scalaris*, *Nodosaria soluta*, *Nodosaria inflata*, *Lagena marginata*, *Lagena striata*, *Lagena distoma*, *Lagena semistriata*, *Lagena hexagona*, *Globigerina bulloides*, *Pullenia sphaeroides*, *Pullenia quinqueloculina*, *Sphaeroidina bulloides*, *Truncatulina lobatula*, *Rotalia soldani*, *Discorbina berthelotiana*, *Anomatina coronata*, *Patellina corrugata*, *Nonionina stelligera*, *Nonionina umbilicatula*, *Operculina ammonoides*, *Cornuspira carinata*, *Quinqueloculina seminulum*, *Quinqueloculina arenacea*.

<sup>16</sup>/<sub>2</sub> 1899, Brettesnes—Skroven, 350—400 m.

#### I.

*Hyperammina ramosa*, *Reophax scorpiurus*, *Halophragmium luidorsatum*, *Valvulina fusca*, *Webbia clarata*, *Balimmina marginata*, *Urigerina pygmaea*, *Nodosaria laerigata*, *Anomalina coronata*, *Rotalia soldani*, *Nonionina umbilicatula*, *Quinqueloculina arenacea*.

At the same place were also found: —

*Saccammina sphaerica*, *Bathysipton filiformis*.

<sup>16</sup>/<sub>2</sub> 1899, Brettesnes—Skroven, 350—400 m.

#### II.

*Trochammina* sp., *Balimmina pyrula*, *Balimmina marginata*, *Balimmina subteres*, *Bolirina punctata*, *Bolirina dilatata*, *Virgulina schreibersiana*, *Cassidulina laerigata*, *Cassidulina crassa*, *Polymorphina compressa*, *Urigerina angulosa*, *Cornuspira* sp., *Lagena orbignyana*, *Lagena distoma*, *Lagena marginata*, *Lagena striata*, *Globigerina bulloides*, *Pullenia sphaeroides*, *Patellina corrugata*, *Discorbina araucana*, *Nonionina umbilicatula*, *Nonionina scapha*, *Operculina ammonoides*, *Quinqueloculina subrotunda*.

<sup>3</sup>/<sub>3</sub> 1899, The Kirk Fiord I, 100 m.

#### I.

*Ammoliscus incertus*, *Virgulina squamosa*, *Balimmina marginata*, *Cassidulina laerigata*, *Cassidulina bradyi*, *Polymorphina compressa*, *Bolirina punctata*, *Bolirina dilatata*, *Urigerina angulosa*, *Cristellaria rotulata*, *Nodosaria communis*, *Lagena lagenoides*, *Lagena marginata*, *Globigerina bulloides*, *Truncatulina lobatula*, *Discorbina araucana*,

*Discorbina berthelotiana*, *Nonionina scapha*, *Operculina ammonoides*, *Quinqueloculina agglutinans*.

<sup>3</sup>/<sub>3</sub> 1899, The Kirk Fiord I, 100 m.

#### II.

*Halophragmium luidorsatum*, *Halophragmium canariense*, *Textularia agglutinans*, *Textularia sagittula*, *Balimmina pyrula*, *Balimmina marginata*, *Bolirina dilatata*, *Virgulina schreibersiana*, *Urigerina angulosa*, *Cassidulina laerigata*, *Cassidulina crassa*, *Truncatulina lobatula*, *Discorbina globularis*, *Globigerina bulloides*, *Nonionina scapha*, *Polystomella striatopunctata*, *Patellina corrugata*, *Operculina ammonoides*, *Quinqueloculina seminulum*.

<sup>4</sup>/<sub>4</sub> 1899, The Ostnes Fiord, 10—20 m.

*Reophax scorpiurus*, *Halophragmium canariense*, *Halophragmium glomeratum*, *Gordiammina* sp., *Verrucilina polystropha*, *Spiroplecta biformis*, *Balimmina marginata*, *Cassidulina crassa*, *Cassidulina laerigata*, *Urigerina angulosa*, *Polymorphina compressa*, *Lagena laevis*, *Lagena distoma*, *Lagena marginata*, *Truncatulina lobatula*, *Discorbina globularis*, *Rotalia beccari*, *Operculina ammonoides*, *Nonionina scapha*, *Polystomella striato-punctata*, *Quinqueloculina seminulum*, *Globigerina bulloides*.

<sup>4</sup>/<sub>4</sub> 1899, Moldoren, near Svolvær, 10 m.

*Bolirina dilatata*, *Virgulina schreibersiana*, *Lagena squamosa*, *Lagena laevis*, *Globigerina bulloides*, *Patellina corrugata*, *Truncatulina lobatula*, *Truncatulina ungeriana*, *Discorbina cilardeboana*, *Nonionina stelligera*, *Polystomella striato-punctata*, *Quinqueloculina seminulum*.

1899, Svolvær harbour, 10—15 m.

*Bigeneria sarsi*, *Bolirina dilatata*, *Bolirina punctata*, *Balimmina marginata*, *Cassidulina laerigata*, *Urigerina angulosa*, *Lagena hexagona*, *Lagena squamosa*, *Lagena striata*, *Lagena gracillima*, *Lagena lagenoides*, *Globigerina bulloides*, *Pullenia sphaeroides*, *Truncatulina lobatula*, *Discorbina globularis*, *Rotalia beccari*, *Polystomella striatopunctata*, *Nonionina stelligera*, *Operculina ammonoides*, *Quinqueloculina seminulum*, *Quinqueloculina subrotunda*.

<sup>18</sup>/<sub>1</sub> 1899, Gaukvaero (Vesteraalen), 0—180 m.

Plankton and bottom sample.

*Textularia williamsoni*, *Cassidulina laerigata*, *Cassidulina crassa*, *Urigerina angulata*, *Lagena hexagona*, *Cristellaria rotulata*, *Globigerina bulloides*, *Truncatulina lobatula*, *Truncatulina refulgens*, *Discorbina globularis*, *Nonionina stelligera*, *Quinqueloculina seminulum*, *Biloculina simplex*.

<sup>10</sup>/<sub>4</sub> 1899, Stene in Bø (Vesteraalen), 10 m.

*Urigerina angulosa*, *Cassidulina laerigata*, *Truncatulina lobatula*, *Discorbina araucana*, *Nonionina stelligera*, *Polystomella striatopunctata*, *Spiroloculina planulata*, *Triloculina tricarinata*, *Quinqueloculina seminulum*.

KLER has also classified several species which were not prepared.

<sup>23</sup>/<sub>3</sub> 1900, The Ostnes Fiord.

*Truncatulina lobatula*, *Truncatulina ungeriana*, *Truncatulina refulgens*, *Anomalina coronata*, *Planorbulina mediterraneensis*.



<sup>22</sup>/<sub>2</sub> 1899, Mortsund I. 200 m.

*Nothosuria solata*, *Cristellaria rotulata*, *Cristellaria crepidula*.

<sup>28</sup>/<sub>3</sub> 1899. The Tys Fjord. 500 m.

*Pulvinulina punctulata* on *Lophohelia prolifera*.

<sup>18</sup>/<sub>2</sub> 1899. The Sag Fjord. 200 m.

*Saccamina sphaerica*.

<sup>22</sup>/<sub>3</sub> 1899, The Sea NW of Rost. 700 m.

*Rupertia stabilis*.

<sup>14</sup>/<sub>4</sub> 1899. Malangen. 380 m.

*Astrorhiza arenacea*, *Discorbina globularis*.

<sup>3</sup>/<sub>5</sub> 1899, Lyngen III, 300 m.

*Astrorhiza arenacea*.

Hammerfest (1894).

*Truncatulina lobatula*, *Truncatulina refulgens*, *Truncatulina ungeriana*, *Discorbina globularis*.

Sværholt (1894).

*Discorbina globularis*, *Truncatulina lobatula*.

<sup>27</sup>/<sub>4</sub> 1899, The Porsanger Fjord. 200 m.

*Rhabdammina abyssorum*.

With regard to the distribution of the *Thalamophora*, Mr. KLÆR writes<sup>1)</sup> „In taking a survey of the occurrence of Thalamophora in all the ocean-depths investigated by the North Atlantic Expedition we find, in all, three different centres of distribution, viz: —

- A. The southern gray clay, which includes the fiords and banks along the Norwegian coast, about as far as to 19° E. Long; and the gray clay near Iceland.
- B. The northern gray clay, to which the fiords and banks along

the Norwegian coast east of 19° Long., near Beeren Island and Spitzbergen belong, and the *Rhabdammina* clay.

C. The brown clay, which is divided into the *Biloculina* clay proper and the transition clay.“

KLÆR (l. c. p. 11) gives the following as being the forms which are of most frequent occurrence in the southern gray clay along the coast of Norway: —

*Urigerina pygmaea*, *U. angulosa*, *Truncatulina lobatula*, *T. refulgens*, *Nonionina umbilicatula*, *N. scapha*, *Lagena marginata*, *Pullenia sphaeroides*, *Quinqueloculina seminulum*, *Globigerina bulloides*, *Bolivina dilatata*, *Balimina elipsoides*, *B. marginata* and *Cassidulina luevigata*.

As characteristic of the northern gray clay, KLÆR (l. c. p. 12) gives the following forms: —

*Astrorhiza crassatina*, *Lagena apiculata*, *Pulvinulina karsteni*, *Globigerina pachyderma*.

These are considered to be arctic forms. „On the other hand, there are some southern species which are either absent from the field of the northern centre or at any rate are very scarce, and do not attain to their full size, e. g. *Balimina marginata*, *Urigerina pygmaea* and *angulosa*, *Operculina ammonoides*.“<sup>2)</sup>

The samples I have collected almost exclusively represent the southern gray clay, of which Thalamophor-fauna they certainly give a very complete illustration.

It is of considerable interest to see that the limit between the northern and southern gray clay on the Norwegian coast is fixed at 19° Long., which lies near Tromsø. Without thinking of this fact, I have, for hydrographical and zoological reasons (cf. Part IV) fixed Malangen as the boundary fiord or rather the transition fiord between the preponderant boreal and the preponderant arctic fauna.

This division is thus confirmed by a study of the deposits.

<sup>1)</sup> *Thalamophora*, p. 10. The Norw. North Atl. Exp. 1876—78.

<sup>2)</sup> With respect to the chemical condition of the deposits, reference should be made to SCHMELCK'S treatise „On Oceanic Deposits“. The Norw. North Atl. Exp. Chemistry. A plate is adjoined giving the distribution of the deposits.



## b. Diatoms in Bottom Samples from Lofoten and Vesteraalen.

By  
E. JORGENSEN.

In the following pages an account is given of the diatoms contained in some bottom samples from the following localities in Lofoten and Vesteraalen:

Moskenstrømmen, 0—180 m. (together with plankton).

Stamsund, 0—150 m. (together with plankton).

Svolvær harbour, 10—15 m.

The Ostnes Fiord, 10—20 m.,

Brettesnes—Skroven, 350—400 m.,

Mouth of the Raftsund, 250—300 m.,

Stene in Bø, 10 m.,

Gaukværø, 0—180 m. (together with plankton).

Two of these, the samples from Brettesnes—Skroven and from Raftsund, were poor and consisted perhaps only of dead specimens, a good many of which naturally originate from the plankton. The samples from Moskenstrømmen, Stamsund and Gaukværø were taken together with plankton.

The working through of bottom samples is a very troublesome and lengthy task, when it is done as it should be. As there was, however, not time enough to investigate the samples in the manner I consider the right one, and as — on the other hand — it was of some importance, to be able rightly to interpret the plankton, to gain a preliminary knowledge of the bottom flora, I have contented myself with the method usually adopted, and have studied the species from the valves in slides. For this purpose the material — together with a richer one from the west coast of Norway — has been prepared as slides by Mr. THUM of Leipzig, in his well-known perfect way.

For this reason, it has not been possible to discern between living (recent) and fossil species.

The species occurring in the plankton are in detail dealt with in another chapter of this work (pp. 90—108). Nevertheless, to avoid arbitrariness, I have not omitted the plankton species, but have in such cases mentioned them as originating from the plankton.

## List of the species observed.

I. *Centricæ* SCHÜTT.1. *Coscinodiscæ*.*Coscinodiscus* EHRB.*C. nitidus* GREG.

Cf. above p. 95.

Somewhat rare: Moskenstrømmen r, Stamsund r, Raftsund r, Stene r, Gaukværø r.

*Distribution*: Western Europe; Balearic Islands, Greenland and Finmark (CLEVE). Warmer coasts of America, Asia and Australia.

*C. appollinis* EHRB. (1844).

EHRB. Mikogeologie pl. 35 A, XXII, f. 4.

*var. compacta* RATTR. Rev. of Coscinod. p. 579.

*C. scintillans* (GREV.) A. SCHMIDT Nords. Diat. p. 94, pl. 3, f. 33.

Differs from the main species (= *C. scintillans* GREV.) in having the puncta distinctly smaller towards the margin, more numerous radial rows, the shortened ones being longer than usual. Probably is a separate species.

Rare: Moskenstrømmen +, Stamsund r, Svolvær r, Stene r.

*Cosc. nitidus* A. SCHM. Nords. Diat. pl. III, f. 32 does not show the irregular distribution of the puncta that is characteristic of the preceding species. This form occurs in my material together with the one figured l. c. f. 33 and has a similar radiate structure, only much coarser.

*Distribution*: The variety is only known from Solsvik (west of Bergen, Norway). The main species, which has not been found by us, occurs in the antarctic regions.

*C. concavus* EHRB.? GREG.

GREG. Diat. of Clyde 1857, p. 500, pl. X, f. 47. EHRB. Mikogeol., pl. 21, f. 4? non pl. 18, f. 38.

Hardly belongs to the genus *Coscinodiscus*. RATTRAY l. c. p. 170 remarks that the girdle aspect of this species answers to *Endietya oceanica* EHRB. (cf. Mikogeologie pl. 35 A, XXVIII figs. 6, 7; A. SCHMIDT Atlas pl. 65, figs. 10—15).

Very rare: Gaukværø r. Diameter 86  $\mu$ ; 2 areoles on 10  $\mu$ ; border sharply defined, nearly 3  $\mu$  broad.

*Distribution*: Western Europe; Balearic Islands, Black Sea, Sea of Kara (CLEVE). Warmer coasts of America and Asia.

*C. leptopus* GRUN.

VAN HEUREN Synops. pl. 131, figs. 5—6.

Rare: Raftsund r. Diameter 55  $\mu$ ; 5 areoles on 10  $\mu$ . Remarkable for the minute areoles on the border, like those in the genuine *C. lineatus* EHRB. It differs on the whole from the latter species only in possessing the pseudonodule.

*Coscinosira polychora* GRUN and the variety of *Coscinodiscus lineatus* mentioned below have a much finer structure and less regularly straight rows of areoles.

*Distribution*: Mediterranean. Southern Atlantic, Pacific Ocean, Indian Ocean.

*C. lineatus* EHRB., *var.*

Cf. above p. 92.

Rare: Stamsund. r. Finer structure than in the genuine *C. lineatus*. Small; 7<sup>1,2</sup>—8 areoles on 10  $\mu$ . Border narrow, striate, 15 striae on 10  $\mu$ . Areoles near the border somewhat smaller. Secondary rows somewhat flexuose.

In the sample from Svolvær a very similar specimen was found, only with a little finer structure and marginal spines. This

specimen agrees completely with *Coscinosira polychora* GRUN., but wants the peculiar transverse processus of the latter species.

Such forms, which are perhaps solitary cells of *Coscinosira*, may easily be mistaken for *C. lineatus*.

*Distribution*: The main species is cosmopolitan. CLEVE and OSTRUP mention *C. lineatus* from several arctic localities: Finnmark, Baren Eiland, Greenland, Spitzbergen, Kara. I should, however, think that the species has been confounded with *Coscinosira polychora*, at any rate to some extent.

*C. excentricus* EHRB.

Cf. above p. 92.

Frequent: Moskenstrømmen r. Stamsund +. Gaukværo r +. Derived undoubtedly from the plankton.

*Distribution*: Cosmopolitan.

*C. Kützingii* A. SCHM.

A. SCHM. Atlas, pl. 57, f. 17. *C. marginatus* A. SCHM. Nords. Diat. pl. 3, f. 35.

As GRUNOW remarks, this species is intermediate between *C. excentricus* and the difficult group of *C. subtilis*.

Very rare: Raftsund r, Stamsund r.

*Distribution*: North Sea. Arctic and antarctic regions (GRUN.). Not mentioned by CLEVE as arctic. Very nearly related forms are found near Greenland (*C. adumbratus* OSTR.) and Jan Mayen (1898, E. JØRGENSEN).

*C. Rothii* (EHRB.?) GRUN.

GRUN. Diat. Franz Jos. Land, p. 29, pl. III (C), figs. 20 a, b, 22. *C. symmetricus* A. SCHM. Atlas pl. 57, figs. 25—27, non GREV. *Heterostephania Rothii* EHRB.  $\alpha$  *octonaria* Mikrogeologie 35 A. XII B, fig. 4 a.

Belongs to the difficult group of *C. subtilis* EHRB., as well as the following species and a good many more, which probably will not bear a more thorough examination.

Structure plainly fasciculate, with numerous fascioli separated by radial lines made conspicuous by the marked inner ends of the beginnings of new rows. Small marginal apiculi in the middle of the fascioli, one in each. Valve almost flat (occasionally undulated according to GRUNOW).

Very rare: Stamsund r, Raftsund r, Brettesnes—Skroven r. Probably a plankton form.

*Distribution*: Belgium, Scotland; Caspian Sea. Warmer regions of America and Asia. Southern Seas.

*C. Normanni* GREG.

GREG. Quart. Journ. Micr. Sc. 1859, p. 80, pl. 6, fig. 3. *C. „normanicus“* VAN HEERCK Synops. pl. 131, l. *C. fasciculatus* A. SCHM. Nords. Diat. pl. III, figs. 41, 42; Atlas pl. 57, figs. 9, 10.

Very closely related to the preceding species. Differs in having a distinctly convex valve, finer structure (though variable in this respect), more numerous and narrow fascioli and less distinct marginal apiculi.

It is perhaps not quite certain that this species is identical with *C. Normanni* GREG.; the name *C. fasciculatus* A. SCHM. (1874) must however be abolished on account of *C. fasciculatus* O'MEARA (1867).

This species seems to me to answer tolerably well to *C. punctulatus* GREG. In specimens with fine structure the fascioli are only seen with difficulty, while the clear, scattered dots mentioned

by GREGORY l. e. are conspicuous. If this should prove correct, the *C. Normanni* GREG. is perhaps the same as *C. Rothii* GRUN.

Rather frequent: Stamsund r +, Svolvear r +. Brettesnes—Skroven r, Ostnesfjord r +, Stene r. Probably a plankton species (living or fossil).

*Distribution*: Western Europe. America. Arafura Sea.

*C. curvatulus* GRUN.

Cf. above p. 92.

Derived undoubtedly from the plankton.

Very rare: Stene rr.

*Distribution*: Arctic regions; Northern European coasts: Balearic Islands. America and Africa.

*C. stellaris* ROR.

Cf. above p. 92.

Derived undoubtedly from the plankton.

Very rare: Gaukværo r. When the conspicuous star is wanting, the species is difficult to determine.

var. *symbolophorus* (GRUN.).

*C. symbolophorus* GRUN. Diat. Franz Jos. Land, p. 82, pl. IV (D), figs. 3—6.

Differs from the main species in having much coarser structure.

Very rare: Moskenstrømmen r, Raftsund r. Like the main species planktonic.

*Distribution*: The main species occurs in Western Europe, the Mediterranean and the antarctic regions, the variety in the arctic and antarctic regions.

*C. concinnus* W. SM.

Cf. above p. 93.

Derived undoubtedly from the plankton.

Very rare: Gaukværo. rr: Stene, r.

*Distribution*: Cosmopolitan.

*C. centralis* EHRB., RATTE.

Cf. above p. 93.

Derived probably from the plankton.

Not unfrequent: Moskenstrømmen r, Stamsund r, Raftsund r, Stene r.

*Distribution*: Cosmopolitan.

*C. subbulliens* JØRG.

*C. oculus iridis auct. scand.*, p. p.

Cf. above p. 94.

Probably derived from the plankton.

Rare: Moskenstrømmen r, Raftsund r, Gaukværo r +.

*Distribution*: Arctic regions.

*C. borealis* BAIL.

BAIL. Americ. Journ. Sc. 1856, p. 3. A. SCHM. Atlas, pl. 63, f. 11.

Very rare: Raftsund, rr. Diameter 135  $\mu$ . Coarse structure; areoles increasing towards the border, at the centre  $3\frac{1}{2}$ , near the border 2 on 10  $\mu$ : the largest ones only little larger than those at the very margin. Large and very conspicuous „papillæ“ (poroides).

Border sharply defined, dark, striate. The disc somewhat convex towards the border.

The specimen found only differs from SCHMIDT's figure in wanting the „central space“. Instead of this space, which is, however, not mentioned by RATTRAY l. c., a large areole was present.

*Distribution*: Pacific Ocean, especially in the northern region (Kamtschatka Sea, BAILEY). Cape Wankarema (CLEVE).

*C. decrescens* GRUN.

GRUN. Diat. Franz. Jos. Land, p. 28. A. SCHMIDT Atlas, pl. 61, figs. 7-9. RATTRAY l. c. p. 77.

Perhaps a plankton form, occurring with us like *C. subballiens*. Coarse structure, conspicuous „papillæ“. Recognizable through the rapid decreasing of the areoles outside of  $\frac{1}{2}$  radius.

Rare: Moskenstrømmen r+, Stamsund r. Diameter 92  $\mu$  or less; largest areoles somewhat outside of  $\frac{1}{2}$  radius, 2 on 10  $\mu$ , at the centre smaller, on the border much smaller. Border broad, sharply defined, striate, with 5-6 striæ on 10  $\mu$ . Central space generally absent (answering to *var. repleta* GRUN. l. c.), sometimes present.

*Distribution*: Faroe Channel, Franz. Josef's Land, Japan, Macassar Straits, Florida.

*C. radiatus* EHRB.

Cf. above p. 92.

Probably derived from the plankton.

Rather frequent: Moskenstrømmen c, Stamsund r+, Svølvær r. Ostnesfiord r, Gaukværo +, Stene r.

*Distribution*: Cosmopolitan.

*var. minor* A. SCHM.

A. SCHM. Nords. Diat. p. 94, pl. 3, f. 4. *C. devius* A. SCHM. Atlas, pl. 60 figs. 1-4.

Stamsund r, Svølvær r, Gaukværo r, Stene r.

*var. oculus iridis* (EHRB., RATTR.).

Flat. A conspicuous central rosette and often a small „central space“. Areoles largest at or beyond  $\frac{1}{2}$  radius, hexagonal, with large „papilla“, towards the border rapidly decreasing, at the very margin small. Largest areoles 3 on 10  $\mu$ .

This form, which answers very well to *Coscinodiscus oculus iridis* EHRB. Mikrogeologie pl. 19, fig. 2, is certainly not specifically distinct from *C. radiatus*, intermediate forms being rather frequent.

Moskenstrømmen r, Gaukværo r. Occurred also in other samples.

*C. nodulifer* JAN.

JANISCH. in A. SCHMIDT Atlas, pl. 59, f. 21.

Flat. A small, but conspicuous nodule near the centre. Areoles hexagonal, increasing from the centre to  $\frac{3}{4}$  radius, here 3 on 10  $\mu$ ; towards the margin rapidly decreasing, at the border 5-6 on 10  $\mu$ . Border sharply defined, striate, with 6-6 $\frac{1}{2}$  striæ on 10  $\mu$ .

Answers very well to the figure referred to.

Rare: Raftsund +. Brettesnes-Skroven r.

*Distribution*: This southern species is found near the Balearic

Islands and in the warmer regions of the Atlantic, Pacific and Indian Oceans.

It is very remarkable that this species occurs so far north. It is probably a plankton form, most likely a fossil one.

*Actinocyclus* EHRB.

*A. alienus* GRUN.

GRUN. in VAN HEURCK Synopsis, pl. 125, f. 12 (*var. arcticus*).

Very rare: Brettesnes-Skroven r; Stene r. In structure *Coscinodiscus*-like, as GRUNOW states intermediate between *C. curvatus* and *C. radiatus*. Central space circular, conspicuous, only with a few irregularly scattered puncta. Numerous fasciculi (over 20) with interfascicular radii, which are more or less plainly ziezæ bent, especially towards the centre. Towards the margin, the fasciculi are not separated from each other, but form an even radiately structured marginal part. Very small and inconspicuous marginal apiculi. Border narrow, indistinctly striate.

Diameter 61-66  $\mu$ ; rows of areoles 15 on 10  $\mu$ , at the margin closer. Ocellus marginal, evident.

*Distribution*: Cape Wankarema. Also mentioned from a few places of the North Atlantic and Arctic Seas.

*A. Ehrenbergi* RALFS.

Cf. above p. 95.

Probably derived from the plankton.

Not unfrequent: Stamsund r, Svølvær r, Gaukværo r, Stene +.

*Distribution*: Cosmopolitan.

*A. Ralfsii* (W. SM.) RALFS.

Cf. above p. 95.

More frequent in the bottom samples than in the plankton (from which however must not be concluded that it is a bottom form): Stamsund r, Svølvær r+, Ostnesfiord r, Gaukværo r+, Stene r.

*Distribution*: Western Europe, Greenland (OSTRUP). Warmer Seas.

*A. sparsus* (GREG.) RATTR.

RATTR. Revis. Actinoc. 1890, p. 370. *Eupodiscus sparsus* GREG. Trans. Micr. Soc. 1857, p. 81, pl., fig. 47.

The description by RATTRAY does not answer well to the figure referred to. According to this figure, it seems chiefly to differ from *A. Ehrenbergi* in being more sparsely granulated towards the centre, so that only the interfascicular radii reach the central space. It is, however, doubtful whether it can really be kept distinct from the preceding species. Also *A. moniliformis* RALFS seems to be a species very closely related to *A. Ehrenbergi*.

Specimens which seem to belong here were found in the sample from Gaukværo, r.

*A. crassus* V. H.

VAN HEURCK Synopsis p. 215, pl. 124, figs. 6, 8.

VAN HEURCK's figure shows interfasciculate radii, though not so evident as those of *A. Ehrenbergi*. Smaller and coarser forms of the latter species is puzzlingly similar to *A. crassus*. It is on



the whole doubtful, whether these two species always can be distinguished from each other.

A more essential difference than in the structure of the valve is found in the form of the cell (frustule). *A. crassus* has high cells, usually higher than broad, with thick walls, also in the connecting zone; here there is also a conspicuous difference in width between the two valves. *A. Ehrenbergii*, however, forms low cells, broader — often much so — than high, and the two valves have nearly the same diameter.

The valve of *A. crassus* is flat from the centre to some distance from the border, where there is a high and steep marginal zone.

Somewhat rare: Stamsund r, Raftsund r, Gaukværo r, Stene r. Occurs also in the plankton samples.

*Distribution*: Western Europe. After all, it is most probably identical with *Eupodiscus crassus* W. SM. (Cf. VAN HEURCK l. c. and *Traité d. Diat.* p. 524).

**Note.** In the sample from Stene, several broken valves with a rather large disc occurred, somewhat similar to *Xanthiopyxis? umbonata* GREV., cf. VAN HEURCK *Traité d. Diat.* p. 512, fig. 263, which cannot, however, be referred to the genus *Xanthiopyxis* EHRB., a doubtful genus including what are probably resting spores of *Chaetoceros* (cf. SCHÜTT. in ENGLER and PRANTL., *Natürl. Pflanzenfamil.*, Theil I, Abth. 1 b. p. 148). Structure rather fine, similar to that of *Coscinodiscus*; valve rather convex, with numerous large, slender, conical spines, as in the figure referred to. Undoubtedly a fossil species.

## 2. *Melosireæ*.

### *Coscinosira polychorda* (GRUN) GRUN.

Cf. above p. 97.

Derived from the plankton.

Very rare: Stamsund r, Gaukværo r.

*Distribution*: Cf. above p. 97. As stated before (p. 196) this species seems also to occur singly, and is then easily mistaken for *Coscinodiscus lineatus*. At any rate, forms occur in which the peculiar transverse processus at the semiradius are wanting.

### *Thalassiosira* CL.

#### *T. gravida* CL.

Cf. above p. 96.

In bottom samples the strong resting spores (endocysts) of this species occur, though seldom (much more so than would probably be the case, if this species generally „oversummers“ on the bottom).

Rare: Stamsund r +, Svølvær r.

*Distribution*: Cf. above p. 96.

#### *T. decipiens* (GRUN) JØRG.

Cf. above p. 96.

Undoubtedly derived from the plankton.

Rare: Stamsund r, Svølvær r, Gaukværo r +.

*Distribution* (of *Coscinodiscus decipiens* GRUN.): Caspian Sea, Great Britain and Ireland. West coast of Norway.

### *Melosira* AG.

#### *M. granulata* (EHRB.) RALFS.

VAN HEURCK *Synopsis* p. 200, pl. 87, figs. 10—12.

Fresh water species.

Very rare: Gaukværo. rr.

*Distribution*: Frequent in fresh water, especially in Western Europe. Franz Josef's Land.

#### *M. Roeseana* RABENH.

VAN HEURCK *Synopsis* p. 199, pl. 89, figs. 1—6.

Fresh water species.

Very rare: Ostnesfjord, rr.

*Distribution*: Common fresh water species. Greenland (Ostrup).

#### *M. Borreri* GREV.

GREV. in HOOK. *Brit. Fl.* II, p. 401. VAN HEURCK *Synops.* p. 198, pl. 85, figs. 5—8.

Very rare: Svølvær, rr (*var. ad hispid.* CASTR.).

*Distribution*: Frequent on the coasts of Europe. Greenland (CL.).

### *Paralia sulcata* (EHRB.) CL.

CLEVE *Diat. Arct. Sea* 1873. p. 7. *Gallionella sulcata* EHRB., *Mikrogeologie* pl. 18. 1.

Common: Moskenstrømmen +, Stamsund c, Svølvær c, Raftsund r +, Brettesnes—Skroven r, Ostnesfjord c, Gaukværo cc, Stene c.

*Distribution*: Frequent on the coasts of Europe and America. Arctic regions.

#### *forma coronata* (EHRB.) GRUN.

VAN HEURCK *Synopsis* pl. 91, f. 18. *Gallionella coronata* EHRB., *Mikrogeologie* pl. 38, XXII, fig. 5.

Rare: Svølvær r, Stene r.

### *Cyclotella* KÜTZ.

#### *C. striata* (KÜTZ.) GRUN.

GRUN. in CLEVE et GRUNOW *Arct. Diat.* 1880, p. 119. VAN HEURCK *Synopsis* p. 213, pl. 92, figs. 6—10. *Coscinodiscus striatus* KÜTZ.

Rare: Stamsund r, Raftsund r, Stene r.

*Distribution*: Frequent in brackish water. Western Europe. Baltic Sea. Warmer parts of Asia and Africa.

#### *C. comta* (EHRB.) KÜTZ.

KÜTZ. *Spec. Algar.* p. 21. VAN HEURCK *Synops.* p. 214, pl. 92, figs. 16—22.

Fresh water species.

Very rare: Gaukværo. rr.

*Distribution*: Western Europe.

### *Hyalodiscus* EHRB.

#### *H. scoticus* (KÜTZ.) GRUN.

GRUN. in *Journ. Royal Micr. Soc.* 1879, p. 690, pl. 21, f. 5. VAN HEURCK *Synops.* pl. 84, figs. 15—18. *Cyclotella s.* KÜTZ. *Bacill.* p. 50, pl. 1, figs. II, III.

Frequent: Stamsund r, Svølvær +, Gaukværo + c, Stene r +.

*Distribution*: Western Europe. Bosphorus. Arctic regions.

**H. subtilis** BAIL.

BAIL. New Spec. p. 10, f. 12.

Perhaps only a form of the preceding species.

Very rare: Stamsund r. Stene r.

*Distribution*: Belgium. Scotland. Finmark (Cl.). America. Asia.**H. stelliger** BAIL.

New Spec. p. 10. VAN HEURCK Synops. p. 213, pl. 84, figs. 1—2.

Frequent: Moskenstrømmen +, Stamsund r +, Svolvær r, Raftsund r, Brettesnes—Skroven r, Gaukværø r, Stene r.

*Distribution*: Western Europe. Virgin Isles. Spitsbergen (uncertain. Cl.).**Podosira hormoides** (MONT.) KÜTZ.

KÜTZ. Bacill. p. 52, pl. 29, f. 84. A. SCHMIDT Nord. Diat. pl. 3, f. 40.

*Melosira h.* MONT. Fl. Boliv. 1839, p. 2.

Rare: Stamsund r, Svolvær r, Raftsund r.

*Distribution*: Coasts of the North Sea. Greenland. West coast of South America. Adriatic Sea.**3. Eupodisceæ.****Roperia tessellata** (ROP.) GRUN.

Cf. above p. 98.

Undoubtedly derived from the plankton.

Rare: Stamsund r +. Stene r r.

*Distribution*: Western coasts of Europe and Africa.**Auliscus sculptus** (W. SM.) RALFS.RALFS in PRITCH. Inf. p. 845, pl. 6, f. 3. *Eupodiscus s.* W. SM. Brit. Diat. I, p. 25, pl. 4, f. 39.

Common: Moskenstrømmen +, Svolvær c, Raftsund r, Brettesnes—Skroven r, Ostnesfjord r, Gaukværø c, Stene c.

Specimens occur which are very similar to *A. calatus* BAIL. (A. SCHM. Atlas pl. 32, figs. 14—15), but connected with *A. sculptus* by intermediate forms: Gaukværø +, Stene r.*Distribution*: Coasts of the North Sea. Western Europe. Mediterranean. America. *A. calatus*: Warmer coasts of the Atlantic, Pacific and Indian Oceans.**Eupodiscus argus** W. SM.

W. SM. Brit. Diat., p. 24. A. SCHMIDT Atlas, pl. 92, figs. 7—11; pl. 97, figs. 7—11. VAN HEURCK Synops. p. 209, pl. 117.

Very rare: Moskenstrømmen, r r, only one broken valve.

*Distribution*: Frequent on the coasts of the North Sea and Western Europe. America.**Aulacodiscus** EHRB.**A. Kittonii** ARNOTT.

ARNOTT in PRITCH. Inf. p. 844, pl. 8, f. 24. A. SCHMIDT Atlas pl. 36, figs. 5—7.

Rare: Moskenstrømmen +, Raftsund r, Brettesnes—Skroven r, Gaukværø r.

All specimens observed have 4 processus and no. or a very small or inconspicuous, „central space“.

It is very remarkable that this tropical species occurs in

Lofoten. Very likely fossil. At present I have no opportunity of ascertaining whether the cells have really all been empty.

*Distribution*: Warmer coasts of the Pacific Ocean, especially frequent on the coasts of California.**A. Johnsonii** ARNOTT.

ARNOTT in PRITCH. Inf. p. 844. A. SCHMIDT Atlas pl. 36, figs. 1, 2.

*A. Kittonii* var. J. RATTR. Rev. of Aulacodisc. p. 376.

Very rare: Raftsund r, Brettesnes—Skroven r.

Differs from the preceding especially in having a conspicuous central space and processus of a different shape. *A. Kittonii* is, however, said to vary considerably.*Distribution*: Tropical coasts of the Indian and Atlantic Oceans.**4. Asterolampreæ.****Actiuptychus** EHRB.**A. undulatus** (BAIL.?) RALFS.

Cf. above p. 98.

Frequent: Moskenstrømmen r +, Stamsund r +, Svolvær r, Raftsund r, Brettesnes—Skroven r, Gaukværø r, Stene r.

*Distribution*: Coasts of Western Europe and the North Sea. Arctic regions. Cape of Good Hope.**A. splendens** (EHRB.?) SHADB.SHADB. in PRITCH. Inf. p. 849. VAN HEURCK Synops. pl. 119, figs. 1—2, 4. *Halionyx splendens* EHRB. Abh. Berl. Ak. 1814?

Very rare: Moskenstrømmen r, Gaukværø r r.

*Distribution*: Coasts of the North Sea and the Baltic (Greifswald).**Asteromphalus heptactis** (BRÉB.) RALFS.

Cf. above p. 98.

Undoubtedly derived from the plankton.

Very rare: Moskenstrømmen r r.

*Distribution*: Cf. above p. 98.**5. Biddulphiæ.****Biddulphia** GRAY. V. II. (including *Amphitetras* EHRB., *Tricervalium* EHRB., *Cervalculus* EHRB.).**B. pulchella** GRAY.

GRAY Arrang. of Brit. Plants, I, p. 294. VAN HEURCK Synops. p. 204, pl. 97, figs. 1—3.

Rare: Stamsund r, Raftsund r, Brettesnes—Skroven r, Stene r.

*Distribution*: Frequent on the western and southern coasts of Europe. America. Africa.**B. regina** W. SM.

W. SM. Brit. Diat. II, p. 50, pl. 46, f. 323.

**var.***B. regina* A. SCHM. Atlas pl. 119, f. 18 (from Balearic Isles).

The 3 median elevated parts of the valve hispid, not smooth as stated by W. SM. both in his description and figure.

Very rare: Stene, a single valve.

*Distribution*: Balearic Isles. The main species known from the coast of the isle of Skye.

***B. aurita*** (LYNGB.) BRÉB.

Cf. above p. 99.

Probably derived from the plankton.

Frequent: Stamsund +, Svølvær + c, Stene r +.

*Distribution*: Cf. above p. 99.

***B. rhombus*** (EHRB.) W. SM.

W. SM. Brit. Diat. II, p. 49, pl. 45, f. 320. *Denticella r.* EHRB.

**var. *trigona*** CL. VAN HEURCK Synops. pl. 99, f. 2.

Very rare: Svølvær r.

*Distribution*: Coasts of the North Sea and Western Europe. Finmark (CLEVE).

***B. turgida*** (EHRB.) W. SM.

W. SM. Brit. Diat. II, p. 50, pl. 62, f. 38. VAN HEURCK Synops. pl. 104, figs. 1, 2. *Cerataulus t.* EHRB.

Very rare: Svølvær rr.

*Distribution*: Coasts of the North Sea and Western Europe.

***B. Smithii*** (RALFS) V. H.

VAN HEURCK Synops. p. 207, pl. 105, figs. 1—2. A. SCHMIDT Atlas pl. 116, figs. 5—6. *Cerataulus S.* RALFS in PRITCH. p. 847.

Very rare: Moskenstrømmen rr, Svølvær r.

*Distribution*: Coasts of the North Sea and Western Europe. Spitsbergen? (CLEVE).

***B. antediluviana*** (EHRB.) V. H.

VAN HEURCK Synops. pl. 109, figs. 4—5. *Amphitetras a.* EHRB., Mikrogeol. pl. 21, f. 25 a—c.

Rather frequent: Moskenstrømmen +, Stamsund r, Raftsund r, Gaukværø r, Stene r.

*Distribution*: Common species, cosmopolitan: very rare, however, in arctic regions: Spitsbergen (rr, CLEVE).

***B. lata*** (GREV.).

*Triceratium l.* GREV. Trans. Micr. Soc. 1865, p. 103, pl. 9, f. 20. A. SCHMIDT Atlas, pl. 77, figs. 38—39. *Amphitetras l.* DE TONI Syll. vol. II, sect. 3, p. 901.

Very rare: Raftsund r. Very similar to the figures referred to in SCHMIDT's Atlas. Side of the tetragone 67  $\mu$ . Marginal pearls 5 on 10  $\mu$ ; the rows of striae in the corners somewhat radiating, 10 on 10  $\mu$ .

*Distribution*: Tropical species, according to DE TONI (l. c.) only known from Singapore and North Celebes.

***B. favus*** (EHRB.) V. H.

VAN HEURCK Synops. pl. 107, figs. 1—4. *Triceratium favus* EHRB. A. SCHMIDT Atlas, pl. 82, f. 2.

Very rare: Raftsund, rr. Side of the triangle 92  $\mu$ ; 2 areoles on 10  $\mu$ .

*Distribution*: Rather common species, cosmopolitan on tropical and temperate coasts. Spitsbergen (CLEVE, „doubtful as an arctic species“).

***B. arctica*** (BRIGHTW.).

*Triceratium a.* BRIGHTW. Micr. Journ. 1853, p. 250, pl. 4, f. 11. A. SCHMIDT Atlas pl. 79, figs. 12—13.

Very rare: Stene r.

**forma *balæna*** (EHRB.).

*Zygoceros b.* EHRB. Mikrogeol. pl. 35 A, XXIII, f. 17. *Biddulphia b.* BRIGHTW. Micr. Journ. VII (1859), p. 181, pl. 9, f. 15. VAN HEURCK Synops. pl. 112, f. 1.

Very rare: Stene r.

*Distribution*: Arctic regions. Vancouver; Cape of Good Hope (DE TONI Syll. p. 921).

***B. formosa*** (BRIGHTW.).

*Triceratium f.* BRIGHTW. GRUN. in CLEVE et GRUN. Arkt. Diat. pp. 111—112. A. SCHMIDT Atlas, pl. 79 f. 2.

Very nearly related to the preceding species, from which it differs chiefly in having the centre of the valve irregularly punctate, not areolate, with scattered puncta smaller than the neighbouring areoles.

Very rare: Raftsund r.

**forma *balæna*.**

Answering to the *forma balæna* of the preceding species.

Very rare: Raftsund r.

***B. alternans*** (BAIL.) V. H.

VAN HEURCK Synops. p. 208, pl. 113, figs. 4—7. *Triceratium a.* BAIL. Micr. Obs. p. 40, figs. 55—56.

Very rare: Stamsund rr.

*Distribution*: Western Europe. West Indies.

***B. punctata*** (BRIGHTW.) V. H.

VAN HEURCK Synops. pl. 109, f. 10 (*forma 3-gona*). *Triceratium p.* BRIGHTW. Micr. Journ. 1856, p. 275, pl. 17, f. 18, non *Biddulphia punctata* GREV. 1864.

Very rare: Gaukværø, rr. Irregularly punctate with puncta very different in size, shape and distance from each other, on an average 5 on 10  $\mu$ . Side of the triangle 40  $\mu$ .

*Distribution*: Tropical coasts of America, Africa and Asia. The nearly related *B. sculpta* (SHADB.) V. H., which by DE TONI l. c. p. 944 is considered to belong to the same species, occurs in Western Europe, the Skagerack, and the Mediterranean.

***B. nobilis*** (WITT.).

*Triceratium n.* WITT. Diat. Simbirsk 1885, p. 34, pl. 10, f. 3; pl. 11, figs. 4, 7. A. SCHMIDT Atlas pl. 150, f. 25. Non *Biddulphia nobilis* BRUN 1889.

A specimen very similar to the figure referred to in SCHMIDT's Atlas (from Archangel) was found: Gaukværø rr; Stene rr. Large puncta, irregular in size and shape, intermingled with minute ones. Near the margin, larger areoles. In the centre, a conspicuous inward pointing spine is found. Side of the triangle 56  $\mu$ .

A nearly related species is *Triceratium Heibergii* GRUN., V. H. Synops. pl. 112, figs. 9—11 (from Mors).

*Distribution*: Only known fossil from Simbirsk. Perhaps also fossil in my samples (as is probably also the case with some of the other species).



**B. Weissei** (GRUN.)?

*Triceratium Weissei* GRUN. in A. SCHMIDT Atlas pl. 95, f. 2.

A specimen very similar to the figure referred to (from Archangel) was found: Stone, rr (a single specimen). Rather coarse radiating structure of puncta (pearls); about 6 rows on 10  $\mu$ . Large circular central space without puncta, only one or two near the periphery. Side of the triangle 57  $\mu$ .

Might also belong to the genus *Trinacria*. I have not seen a side view of the valve.

*Distribution*: Only known fossil (Simbirsk, Archangel).

**Isthmia** AG.**I. enervis** EHRB.

EHRB. Inf. p. 209, pl. 16, f. 6. VAN HEURCK Synops. pl. 96, figs. 1—3.

Rather frequent: Moskenstrommen rr. Stamsund r. Svolvær r. Raftsund r. Brettesnes—Skroven r. Stone r. More frequent on algae.

*Distribution*: Coast of Western Europe. Finmark; Spitsbergen (CLEVE). West Indies; Honduras.

**I. nervosa** KÜTZ.

KÜTZ. Bacill. p. 137, pl. 19, f. 5. VAN HEURCK Traité d. Diat. 452, pl. 34, f. 891.

Very rare: Raftsund r.

*Distribution*: Western Europe. Denmark. Arctic regions. Honduras; San Francisco. Kerguelen.

**6. Chaetocerae.****Bacteriastrum varians** LAUD.

LAUD. Trans. Micr. Soc. 1863, XII, p. 8, pl. III, figs. 1—6.

Derived from the plankton.

Very rare: Stone rr.

*Distribution*: Neritic plankton species, from the western coasts of Europe. Warmer coasts of the Atlantic, Indian and Pacific Oceans. Rare off the west coast of Norway.

**Chaetoceros** EHRB.**C. atlanticus** CL.

Cf. above p. 100.

Derived from the plankton.

Very rare: Gaukværø r.

**C. contortus** SCHÜTT.

Cf. above p. 101.

Thickened horns, most probably belonging to this species, is found now and then in the bottom samples, though seldom. Undoubtedly derived from the plankton.

**C. diadema** (EHRB) SCHÜTT.

The characteristic resting spores of this species (*Syndendrium diadema* EHRB.) occur rarely:

Stamsund r, Svolvær r, Gaukværø r. Derived from the plankton.

*Distribution*: Cfr. above p. 101. *Syndendrium diadema* EHRB. also in Peru guano.

**Stephanogonia** EHRB.

A specimen very similar to *S. actinoptychus* (EHRB.) GRUN. in VAN HEURCK Synops. p. 83<sub>3</sub>, figs. 2—4 was found in the sample from Moskenstrommen.

Nearly circular. Diameter 70  $\mu$ . 15 radii. On the smaller upper disc, a coarse spine seems to be found. In other respects corresponds very well to the figure referred to.

*Stephanogonia polygona* EHRB. seems to be a similar form, perhaps the same. Both are probably resting spores (cfr. SCHÜTT in ENGLER and PRANTL. Natürl. Pflanzenl., Th. 1, Abth. 1 b, p. 147).

*Distribution*: Both species mentioned are known from „North America” (Ehrenberg). The figure mentioned represents a fossil specimen from Nottingham deposit.

**Pyxilla baltica** GRUN.

A. SCHM. Nords. Diat. pl. 3, f. 25. VAN HEURCK Synops. pl. 83, f. 2.

According to the figure in HENSEN (5ter Ber. Komm. Kiel, pl. V, f. 38 c) *Pyxilla baltica* must be the resting spore (endocyst) of *Rhizosolenia setigera* BRIGHTW.

Undoubtedly derived from the plankton.

Very rare: *Rhizosolenia setigera* is a neritic plankton diatom from the coasts of Europe (Western E., Skagorak, Mediterranean), Pacific Ocean, Indian Ocean; north of South America. *Pyxilla baltica* is known from the Baltic, and fossil from Simbirsk.

**II. Pennatæ** SCHÜTT.**7. Syndreæ.****Synedra.**a. **Eusynedra** V. H.**S. affinis** KÜTZ.

KÜTZ. Bacill. p. 68, pl. 15, figs. 6, 11. VAN HEURCK Synops. pl. 41, f. 13.

**var. tabulata** (KÜTZ.) V. H.

V. H. Synops. pl. 41, f. 9 a. *Synedra t.* KÜTZ.

Very rare: Svolvær r, Ostnesfiord r.

*Distribution*: Frequent on the coasts of Europe. Arctic regions.

**S. kamtschatica** GRUN.

GRUN. in CL. et GRUN. Arkt. Diat. p. 106, pl. VI.

**var. intermedia** GRUN. l. c. f. 111.

Very rare: Stamsund r.

*Distribution*: Kamtschatka, Finmark, Spitsbergen, Greenland, Kara Sea, East Cape.

**S. ulna** (NITZSCH.) EHRB.

VAN HEURCK Synops. pl. 38, f. 7.

Fresh water species.

Very rare: Svolvær r.

*Distribution*: Common fresh water species.

b. *Ardissonia* (DE NOT.) V. H.*S. crystallina* (AG.) KÜTZ.

KÜTZ. Bacill. p. 69, pl. 16, f. 1. VAN HEURCK Synops. pl. 42, f. 10. *Diatoma c.*  
AG. Consp., p. 52.

Not unfrequent: Stamsund r. Svølvær +. Gaukværo r,  
Stene r.

*Distribution*: Coasts of Western Europe. The Mediterranean.  
Finmark.

*S. superba* KÜTZ.

KÜTZ. Bacill. p. 69, pl. 15, f. 13. VAN HEURCK Traité d. Diat., p. 316, pl. 30, f. 834.

Very rare: Ostnesfiord r. Stene r.

*Distribution*: Coasts of Western Europe. The Mediterranean.  
Finmark (*var. minor* GRUN.).

*S. baculus* GREG.

GREG. Trans. Micr. Soc. 1867, p. 88, pl. 1, f. 54. VAN HEURCK Synopsis pl. 42, f. 9.

Very rare: Svølvær r.

*Distribution*: Coasts of Scotland and Ireland.

c. *Toxarium* (BAIL.) V. H.*S. undulata* (BAIL.) W. SM.

W. SM. Brit Diat. II, p. 97. VAN HEURCK Synops. p. 154, pl. 42, f. 2. *Tox-*  
*arium undulatum* BAIL. Notes on new sp. and loc. of Micr. Org. p. 15, figs. 24—25.

Not unfrequent: Stamsund r, Svølvær +, Ostnesfiord r +,  
Gaukværo r.

*Distribution*: Coasts of Europe and North America. Red Sea.

*S. Henedyana* GREG.

GREG. Diat. of Clyde p. 532, pl. XIV, f. 108. VAN HEURCK Synops. pl. 42, f. 3.

Very rare: Stamsund r. 400  $\mu$  long.

*Distribution*: Coasts of Scotland and Belgium. The Mediter-  
ranean.

*S. (hyperborea var.?) rostellata* GRUN.

GRUN. Diat. Franz Jos. Land p. 54, pl. II, figs. 6 a—b.

A specimen very similar to the figure referred to was found:  
Gaukværo. 38  $\mu$   $\times$  3  $\mu$ . Striæ very fine.

*Distribution*: Franz Josef's Land.

*Thalassiothrix nitzschioides* GRUN.

Cf. above p. 102.

Derived from the plankton.

Very rare: Stamsund r, Gaukværo r.

*Distribution*: Cf. above p. 102.

*Sceptroneis* EHRR.*S. marina* (GREG.) GRUN.

GRUN. in VAN HEURCK Synops., pl. 37, f. 2. *Meridion marimum* GREG. Diat. of  
Clyde p. 497, pl. X, f. 41.

Not unfrequent: Stamsund r +, Raftsund r, Ostnesfiord r,  
Gaukværo r. Stene r.

*Distribution*: Coasts of the North Sea. Finmark. Balearic  
Isles.

*S. kamtschatica* GRUN.?

GRUN. in VAN HEURCK Synops. pl. 37, f. 6.

A species very similar to the figure mentioned occurred in the  
sample from Stene, r (several specimens). Usually broader than  
the preceding, somewhat variable in shape. at the broader end  
sometimes rounded, sometimes only obtuse. Valve distinctly costate  
with linear pseudoraphe; costæ somewhat radiating, 6—6½ on 10  $\mu$ .  
Length 38—40  $\mu$ , breadth 7—8  $\mu$ . Also similar to *Opephora paci-*  
*fica* GRUN. in V.H. Synops. pl. 44, f. 22.

*Distribution*: Kamtschatka. *Opephora pacifica*, perhaps the  
same species, in the North Pacific.

*Rhaphoneis* EHRR.*R. nitida* (GREG.) GRUN.

*Cocconeis n.* GREG. Diat. of Clyde. p. 492, pl. IX, f. 26. GRUN. Alg. Novara p. 99.

Rare: Stamsund r +.

*Distribution*: Coasts of the North Sea. The Mediterranean.  
Auckland.

s. *Plagiogrammæ.**Plagiogramma staurophorum* (GREG.) HEIB.

HEIB. Consp. Diat. Dan. p. 55. *P. Gregorianum* GREG., VAN HEURCK Synops.  
p. 145, pl. 36, f. 2. *Denticula staurophora* GREG. Diat. of Clyde p. 496,  
pl. X, f. 37.

Frequent: Stamsund r, Svølvær r, Raftsund r, Ostnesfiord r,  
Gaukværo +, Stene +.

*Distribution*: Coasts of the North Sea and Western Europe.  
Finmark; Greenland. South America. Ceylon.

*Dimeregramma* RALFS.*D. minus* (GREG.) RALFS.

RALFS in PRITCH. Inf. p. 790. VAN HEURCK Synops. pl. 36, f. 10, 11 a.

*Denticula m.* GREG. Diat. of Clyde p. 496, pl. X, f. 35.

Somewhat rare: Stamsund r, Svølvær r, Gaukværo r, Stene r +.

*var. nana* (GREG.) V.H.

VAN HEURCK Traité p. 336, pl. 10, f. 393. *Denticula nana* GREG. l. c. f. 34.

Rare: Gaukværo r. Seems to be only a smaller form of the  
preceding species.

*Distribution*: Coasts of Western Europe. The Mediterranean.

*D. fulvum* (GREG.) RALFS.

RALFS l. c. *Denticula fulva* GREG. Diat. of Clyde, p. 496, pl. X, f. 38. VAN  
HEURCK Synops. pl. 36, f. 28.

Somewhat rare: Stamsund +, Gaukværo +, Stene r.

*Distribution*: Coasts of Western Europe. Sweden. The Me-  
diterranean.

*Glyphodesmis* GREG.*G. Williamsonii* (GREG.) GRUN.

Cf. above p. 102.

Rather frequent: Moskeustrømmen r. Stamsund + c, Gauk-  
væro r, Stene r.

*Distribution:* Coasts of the North Sea and Western Europe. The Mediterranean.

***G. distans*** (GREG.) GRUN.

GRUN. in VAN HEURCK Synops. pl. 36, figs. 15—16. *Denticula d.* GREG. Diat. of Clyde p. 495, pl. X, f. 36.

Very rare: Stene r; Stamsund r.

*Distribution:* Coasts of Western Europe. Sweden. The Mediterranean.

**9. Eunoticeæ.**

***Eunotia*** EHRB.

Fresh water species.

***E. arcus*** EHRB.

VAN HEURCK Synops. p. 141, pl. 34, f. 2.

Very rare: Stene r.

*Distribution:* Common fresh water species.

***E. major*** (W. SM.) RABENH.

VAN HEURCK Synops. p. 142, pl. 34, f. 14.

Very rare: Ostnesfiord r.

*Distribution:* Fresh water species from Western Europe.

***E. pectinalis*** (DILLW.?) RABENH.

VAN HEURCK Synops. p. 142, pl. 33, figs. 15—16.

Very rare: Svølvær r, Gaukværo r.

*Distribution:* Common fresh water species.

***E. prerupta*** EHRB.

VAN HEURCK Synops. p. 143, pl. 34, f. 19.

Very rare: Ostnesfiord r, Stene r.

*Distribution:* Northern Europe. America.

***E. bidentula*** W. SM.

W. SM. Brit. Diat. II, p. 83.

Very rare: Gaukværo r r; Stamsund r r.

*Distribution:* Great Britain and Ireland.

***E. triodon*** EHRB.

W. SM. Brit. Diat. I, p. 16, pl. 2, f. 18. VAN HEURCK Synops. pl. 33, f. 9.

Very rare: Gaukværo r; Stene r.

*Distribution:* Northern Europe. Switzerland. Cayenne.

***Ceratoneis arcus*** (EHRB.) KÜTZ.

VAN HEURCK Traité d. Diat., p. 305, f. 69.

Fresh water species.

Very rare: Gaukværo, r.

*Distribution:* Common fresh water species, especially in alpine localities.

**10. Meridioneæ.**

***Meridion circulare*** (GREG.) AG.

VAN HEURCK Synops. p. 161, pl. 51, figs. 10—12.

Fresh water species.

Very rare: Svølvær. Only two cells of a chain.

*Distribution:* Common fresh water species in temperate regions.

**11. Tabellariæ.**

***Tabellaria flocculosa*** (ROTH) KÜTZ.

VAN HEURCK Synops. p. 162, pl. 52, figs. 10—12.

Fresh water species.

Rare: Svølvær r, Gaukværo r, Stene r.

*Distribution:* Common fresh water species.

***Striatella unipunctata*** (LYNGB.) AG.

Cf. above p. 103.

Very rare: Gaukværo r.

*Distribution:* Frequent on the coasts of Europe. Finnmark. The Red Sea. Cape Horn.

***Rhabdonema*** KÜTZ.

***R. minutum*** KÜTZ.

KÜTZ. Bacill. p. 126, pl. 21, f. II, 4. VAN HEURCK Synops. p. 166, pl. 54, figs. 17—21.

Frequent: Stamsund r, Svølvær c, Raftsund r, Gaukværo r, Stene +.

*Distribution:* Frequent on the coasts of Europe, especially on the western and northern ones. Arctic regions. Cape of Good Hope.

***R. arcuatum*** (LYNGB.) KÜTZ.

KÜTZ. l. c. p. 126, pl. 18, f. VI. VAN HEURCK Synops. p. 166, pl. 54, figs. 14—16. *Diatoma a.* LYNGB. Hydroph. p. 180, pl. 62.

Frequent: Svølvær + c, Raftsund r, Gaukværo r, Stene r +.

*Distribution:* Frequent on the coasts of Europe and North America. Arctic regions.

***R. adriaticum*** KÜTZ.

KÜTZ. Bacill. p. 126, pl. 18, f. 7. VAN HEURCK Synops. p. 166, pl. 54, figs. 11—13. *Tessella catena* EHRB. Mikrogeol. pl. 22, f. 65.

Rare: Svølvær r, Raftsund r r, Stene r r.

*Distribution:* Frequent on the coasts of Europe and America. Finnmark (r r CLEVE who remarks (Vegaexped. p. 484) that this species else is wanting in the arctic regions). Africa. Pacific Ocean.

***Grammatophora*** EHRB.

***G. islandica*** EHRB.

VAN HEURCK Synops. pl. 53, f. 7.

Not unfrequent: Stamsund r, Svølvær r, Raftsund r, Brettesnes—Skroven r, Stene r +.

*Distribution:* Northern and western coasts of Europe. North Pacific. Cape Horn.

***G. serpentina*** RALFS.

RALFS in Ann. and Mag. XI, pl. IX f. 5. VAN HEURCK Synops. pl. 53, figs. 1—3.

Frequent: Moskenstrømmen r +, Stamsund r, Svølvær r, Raftsund r +, Brettesnes—Skroven r, Gaukværo r, Stene r.

*Distribution:* Frequent on the coasts of Europe. Ceylon. Cape Horn. Antarctic regions.



**G. marina** (LYNGB.) KÜTZ.

KÜTZ. Bacill. p. 128, pl. 17, f. XXIV, 1—6. VAN HEURCK Synops. p. 163, pl. 53, figs. 10—11. *Diatoma m.* LYNGB. Hydroph. p. 180, pl. 62 A.

Rare: Stamsund r.

*Distribution*: Frequent on the coasts of Europe. Africa. America. Ceylon.

**G. oceanica** EHRE.

EHRE. Mikrogeol. pl. 19, f. 36 a, pl. 18, f. 87 a.

Perhaps ought to be united with the preceding species.

Frequent: Stamsund r+. Svølvær + c. Ostnesfiord r+, Gaukværo r. Stene r.

**var. macilenta** (W. SM.) GRUN.

GRUN. in Wien Verh. 1862. VAN HEURCK pl. 53, 2, f. 16. *G. macilenta* W. SM. Brit. Diat. II, p. 43, pl. 61, f. 382.

Svølvær +. Stene r.

*Distribution*: Frequent on the coasts of Europe. Greenland. Cape Horn. Indian Ocean.

**G. arctica** CL.

CL. Diat. Spitsb. 1867. p. 664, pl. 23, f. 1. VAN HEURCK Synops. pl. 53, 2, f. 3. *G. africana* EHRE. Mikrogeol. pl. 35 A, XX, figs. 1—2, (non l. c. pl. 18, f. 86 a, b).

Very rare: Stene r r.

*Distribution*: Arctic regions.

**12. Nitzschia.****Bacillaria socialis** GREG.

Cf. above p. 103.

Not unfrequent: Stamsund +. The Ostnes Fiord r, Gaukværo r.

*Distribution*: Coast of Western and Northern Europe. Arctic regions. West Indies.

**Nitzschia** HASS.a. **Panduriformis** GRUN.**N. panduriformis** GREG.

GREG. Diat. of Clyde p. 529, pl. XIV, f. 102. VAN HEURCK Synops. p. 172, pl. 58, figs. 1—3.

Rare: Svølvær r, Stene r.

*Distribution*: Western coasts of Europe. Baltic. Adriatic Sea. Finmark. Spitsbergen. Indian Ocean. The Red Sea. Cape Horn.

**N. constricta** (GREG.) GRUN.

GRUN. in CL. et GRUN. Arct. Diat. 1880, p. 71. *Tryblionella c.* GREG. Micr. Journ. III, p. 40, pl. 1, f. 13.

Rare: Stamsund r, Svølvær r, Gaukværo r.

*Distribution*: Western Europe. The Mediterranean. Cape of Good Hope. Cape Horn. Ceylon.

b. **Tryblionella** (W. SM.) GRUN.**N. navicularis** (BRÉB.) GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 67. VAN HEURCK Synops. p. 171, pl. 57, f. 1. *Swirella navicularis* BRÉB. in KÜTZ. Spec. Alg. p. 36.

Very rare: Stene r.

*Distribution*: Coasts of the North Sea and Western Europe. Spitsbergen (uncertain, CL.)

**N. punctata** (W. SM.) GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 69. VAN HEURCK Synops. p. 171, pl. 57, f. 2. *Tryblionella p.* W. SM. Brit. Diat. I, p. 36, pl. X, f. 76 a.

Rare: Stamsund r, Svølvær r. Stene r.

*Distribution*: Coasts of the North Sea and of Western Europe. The Baltic. The Mediterranean.

**N. coarctata** GRUN.

GRUN. l. c. p. 68. VAN HEURCK Synops. pl. 57, f. 4.

Several specimens which seem to belong here were found: Gaukværo r.

*Distribution*: The Mediterranean; Japan; Cape Horn.

**N. (Tryblionella var.?) litoralis** GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 75. VAN HEURCK Synops. p. 172, pl. 59, figs. 1—3.

Very rare: Stamsund r.

*Distribution*: Frequent in fresh and brackish water.

c. **Apiculatae** GRUN.**N. apiculata** (GREG.) GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 73. *Tryblionella a.* GREG. Micr. Journ. V, p. 79, pl. 1, f. 43.

Very rare: Svølvær. r.

*Distribution*: Coasts of the North Sea and Western Europe. Finmark. Greenland.

**N. acuminata** (W. SM.) GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 73. VAN HEURCK Synops., p. 173, pl. 58, figs. 16—17. *Tryblionella a.* W. SM. Brit. Diat. I, p. 36, pl. 10, f. 77.

Rare: Svølvær r, Stene r.

*Distribution*: Coasts of England. The Mediterranean.

**N. marginulata** GRUN.

GRUN. l. c. p. 72.

**var. ? didyma** GRUN. l. c.

VAN HEURCK Synops. pl. 58, figs. 14—15.

Rare: Stamsund r, Svølvær r.

*Distribution*: Frequent on the coasts of Europe. Arctic regions. Indian Ocean. Pacific Ocean.

**N. hungarica** GRUN.

GRUN. in Wien Verh. 1862, p. 568, pl. 22, f. 13. VAN HEURCK Synops. p. 173, pl. 53, f. 19.

Species from brackish water.

Very rare: Svølvær. r.

*Distribution*: Frequent in fresh and brackish water.

d. *Dubia* GRUN.*N. littorea* GRUN. (?)

VAN HEURCK Synops. pl. 59, f. 21. *N. thermalis* v. *littoralis* GRUN. in CL. et GRUN. Arct. Diat. p. 78.

Very rare: Stamsund r. 113  $\mu$  long; 7 keel puncta on 10  $\mu$ . Similar to *N. hybrida*, but is longer and narrower, with more distant keel puncta and more excentric keel. Also Stene, r. r.

*Distribution*: Newcastle. Lysekil (Sweden).

e. *Bilobata* GRUN.*N. bilobata* W. SM.

W. SM. Brit. Diat. I. p. 42, pl. 15, f. 113. VAN HEURCK Synops. p. 175, pl. 60, f. 1.

Very rare: Ostnesfiord, r.

*Distribution*: Frequent on the coasts of Europe (the most northern ones excepted). Pacific Ocean.

*N. hybrida* GRUN.

Cf. above p. 103.

Perhaps derived from the plankton.

Very rare: Stamsund r.

*Distribution*: Cf. above p. 103.

*N. Mitchelliana* GREENL.

Cf. above p. 104.

Very rare: Ostnesfiord r. Stene r.

*Distribution*: North America. Arctic regions.

f. *Insignis* GRUN.*N. insignis* GREG.

GREG. Micr. Journ. V, p. 80, pl. I, f. 46.

Not unfrequent: Stamsund r, Ostnesfiord r, Gaukværo r, Stene r.

*Distribution*: Coasts of Western and Northern Europe. Arctic regions. Adriatic Sea. Red Sea.

var. *notabilis* GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 84. VAN HEURCK Synops. pl. 51, f. 5.

Very rare: Gaukværo r. 476  $\mu$  long; 9—10 striæ on 10  $\mu$ .

*Distribution*: The Mediterranean.

var. *spatulifera* GRUN.

VAN HEURCK Synops. pl. 61, f. 3.

Very rare: Stamsund r.

*Distribution*: The Mediterranean. West Indies.

*N. Smithii* RALFS.

RALFS in PRITCH. Inf. p. 781. VAN HEURCK Synops. pl. 61, f. 4.

Not unfrequent: Stamsund +, Stene r.

*Distribution*: Coasts of Western Europe. Adriatic Sea. Finmark (var. *marginifera* GRUN.).

g. *Spatulata* GRUN.*N. angularis* W. SM.

W. SM. Brit. Diat. I, p. 40, pl. 13, f. 117. VAN HEURCK Synops. p. 177, pl. 62, figs. 11—14.

Rather frequent: Stamsund r, Svolveær +, Ostnesfiord r, Gaukværo +.

*Distribution*: Frequent on the western and northern coasts of Europe. The Mediterranean. Arctic regions. Ceylon. Cape Horn.

*N. spatulata* BREB.

BREB. in W. SM. Brit. Diat. I, p. 40, pl. 31, f. 268. VAN HEURCK Synops. p. 177, pl. 62, figs. 7—8.

Somewhat rare: Stamsund r, Ostnesfiord, Gaukværo r.

*Distribution*: Frequent on the western and northern coasts of Europe. The Mediterranean. Arctic regions.

*N. distans* GREG.

GREG. Diat. of Clyde. p. 530, pl. XIV, f. 103. VAN HEURCK Synops. pl. 62, f. 10.

Rare: Stamsund r (several specimens); Ostnesfiord r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Red Sea. Australia. Baffin's Bay and Davis' Strait. Cape Wankarema (CL., varieties).

h. *Sigmata* GRUN.*N. sigma* (KÜTZ.) W. SM.

W. SM. Brit. Diat. I, p. 39, pl. 13, f. 108. *Synedra* s. KÜTZ. Bacill. p. 67, pl. 30, f. 114.

Frequent: Stamsund +, Svolveær +, Ostnesfiord +, Gaukværo r +, Stene r.

*Distribution*: Cosmopolitan.

i. *Lanceolata* GRUN.*N. lanceolata* W. SM.

W. SM. Brit. Diat. I, p. 40, pl. XIV, f. 118. VAN HEURCK Synops. p. 182, pl. 68, figs. 1—4.

I have two times seen the wavy longitudinal lines, described and illustrated by W. SMITH. They were more distinct than the transverse striæ.

Very rare: Stamsund r, Gaukværo r, Stene r.

*Distribution*: Frequent on the coasts of Europe, the most northern ones only excepted. Indian Ocean.

k. *Nitzchiella* (RABENH.) GRUN.*N. longissima* (BREB.) RALFS.

Cf. above p. 104.

Very rare: Gaukværo r.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean. West Indies. Indian Ocean.

13. *Surirellæ*.**Campylodiscus** EHRB.*C. decorus* BRÉB.

*C. decorus* BRÉB. Diat. Cherb. p. 13, f. 2. VAN HEURCK Synops. pl. 75, f. 3.

Not unfrequent: Moskenstrømmen r, Stamsund r, Ostnesfiord r, Gaukværo r.

*Distribution* (including the nearly related *C. Ralfsii* W. SM.): Frequent on the coasts of Europe. Greenland. Java. Pacific Ocean.

*C. Ralfsii* W. SM.

W. SM. Brit. Diat. I, p. 30, pl. 30, f. 257. A. SCHM. Atlas pl. 14, figs. 2—3.

Differs from the preceding species in having a linear (not lanceolate) pseudoraphe. Smaller in size.

Very rare: Stene r. Stamsund r.

*C. angularis* GREG.

GREG. Diat. of Clyde p. 502, pl. XI, f. 53. A. SCHMIDT Atlas pl. 18, f. 7.

Frequent: Raftsund r, Brettesnes—Skroven r, Ostnesfiord r, Stene r.

*Distribution*: Scotland. The Skagerak. Arctic regions.

*C. Thuretii* BRÉB.

BRÉB. Diat. Cherb. pl. 1, f. 3. VAN HEURCK Synops. p. 190, pl. 77, f. 1.

Frequent: Moskenstrømmen r, Stamsund +, Svolvær r +, Raftsund r, Brettesnes—Skroven r, Ostnesfiord + c, Gaukværo + c, Stene r +.

*Distribution*: Frequent on the coasts of Europe. Arctic regions. Indian Ocean.

*C. parvulus* W. SM.

W. SM. in Brit. Diat. I, p. 30, pl. 6, f. 56. VAN HEURCK Synops. p. 191, pl. 77, f. 2.

Is by some authors considered to be a form of *C. Thuretii* BRÉB. (cf. DE TOXI Syll. p. 622) by others to belong to *C. decorus* BRÉB. (cf. VAN HEURCK Traité p. 376).

Very rare: Stene r.

*Distribution*: England. Belgium.

*C. eximius* GREG.

GREG. Diat. of Clyde p. 503, pl. XI, f. 54.

Very rare: Stene r r. Only a broken valve.

*Distribution*: Coasts of Western Europe. The Mediterranean. Red Sea. Indian Ocean.

**Surirella** TURP.*S. gemma* EHRB.

EHRB. Abh. Berl. Akad. 1840, p. 76, pl. IV, f. 5. VAN HEURCK Synops. p. 187, pl. 74, figs. 1—3.

Very rare: Gaukværo r r.

*Distribution*: Frequent on the coasts of Europe. Spitsbergen.

*S. ovalis* BRÉB.

KÜTZ. Bacill. p. 61, pl. 30, f. 64. VAN HEURCK Synops. p. 188, pl. 73, f. 3.

In fresh and brackish water.

Very rare: Gaukværo r.

*var. ovata* (KÜTZ.) V. H.

VH. Synops. p. 188, pl. 73, figs. 6—7. *Surirella ovata* KÜTZ. l. c. p. 62, pl. 7, figs. 1—4.

Very rare: Gaukværo r.

*Distribution*: Common species.

*S. fastuosa* EHRB.

EHRB. Abh. Berl. Ak. 1841, p. 19. VAN HEURCK Synops. p. 188, pl. 73, f. 18.

Rather frequent: Svolvær +, Raftsund r, Gaukværo r, Stene r +.

*var. lata* (W. SM.) VH

VAN HEURCK Synops. p. 188, pl. 72, f. 17. *Surirella l.* W. SM. Brit. Diat. I, p. 31, pl. 9, f. 61.

Frequent: Moskenstrømmen r +, Stamsund r, Svolvær r, Raftsund r, Brettesnes—Skroven r, Ostnesfiord r, Gaukværo r, Stene r.

*Distribution*: Frequent on the coasts of Europe. Gulf of Mexico.

14. *Achnanthæ* CL.**Achnanthes** BORY.*A. longipes* AG.

AG. Syst. p. 1. VAN HEURCK Synops. p. 129, pl. 26, figs. 13—16.

Very rare: Svolvær r.

*Distribution*: Frequent (on algæ) on the coasts of Europe. The Canary Isles.

*A. brevipes* AG.

AG. l. c. VAN HEURCK Synops. p. 129, pl. 26, figs. 10—12.

Rare: Stamsund r, Stene r, Ostnesfiord r.

*Distribution*: Frequent on the coasts of Europe.

**Eucocconeis** CL.

Valves ecostate, without marginal loculiferous rim. Both valves with narrow axial area, rather similar in structure.

*E. pseudomarginata* (GREG.) CL.

CL. Synops. Navic. Diat. II, p. 178. *Cocconeis p.* GREG. Diat. of Clyde p. 497, pl. IX, f. 27. *C. major* GREG. l. c. f. 28.

Rare: Stamsund r, Raftsund r, Ostnesfiord r, Stene r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Red Sea. Indian Ocean. Galapagos Islands. Honduras.

**Heteroneis** CL. (includ. *Disconeis* CL. l. c. p. 180 and *Actinoneis* CL. l. c. p. 185).

Valves very dissimilar, without marginal loculiferous rim. Upper valve costate, sometimes only striate, then with broad axial area.



**H. Allmanniana** (GREG.).

*Pinnularia* A. GREG. Diat. of Clyde p. 488, pl. IX, f. 21. *Cocconeis quarnerensis* A. SCHM. Nords. Diat. pl. III, f. 16; Atlas pl. 192, figs. 20—24. *Rhaphoneis q.* GRUN. Wien Verh. 1862. p. 381. pl. 7, f. 24. *Navicula ovalum* A. SCHM. Nords. Diat. pl. II, f. 12. *Heteroneis q.* CL. l. c. p. 184.

„Costæ apparently marginal, strong, about 20 in 0.001“, giving the appearance of a narrow marginal band of very strong costæ. Within this band, however, the valve, on close inspection, is found to be marked with similar but much fainter costæ nearly to the median line. The valve appears to be thicker near the margin than in the middle, and this perhaps is the reason why the costæ are so strong and conspicuous there.“ GREG. l. c.

It seems to me that there can scarcely be any doubt that *Pinnularia Allmanniana* GREG. is synonymous to *Cocconeis quarnerensis* GRUN. Size, shape and structure agree very well in both species.

There seems to be a marginal rim which has, however, only faint traces of loculi.

Rare: Stamsund r, Stene r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean.

**H. norvegica** (GRUN.?)

*Cocconeis norvegica* GRUN., CL. MÖLL. Diat. no. 102 (upper valve, teste CL.) A. SCHM. Nords. Diat. pl. III, f. 18. 1 (upper figure, „*Cocconeis sp.*“, upper valve).

Upper valve as illustrated l. c. by A. SCHMIDT. Instead of the median line (pseudoraphe), there is often a linear blank space, which sometimes (but rarely) is somewhat irregularly widened. The lower valve has a very delicate structure, consisting of close, somewhat radiating striæ, in the median part of the valve coarser and more conspicuous, about 15 on 10  $\mu$ , otherwise very faint, about 20 on 10  $\mu$ . Raphe strait, extending to the margin: the inner ends somewhat thickened, separated from each other. A rather broad hyaline border, but no loculiferous rim.

CL. Synops. Navic. Diat. II, p. 180 mentions that he has found a frustule of *Cocconeis lyra* with an upper valve like that illustrated by A. SCHM. l. c. (pl. III, f. 18, 1, upper figure). I have, however, found a frustule, showing this upper valve, in connection with a lower valve of the structure just described. There must therefore here be some mistake, if there are not two different species, with very similar upper valves.

There is a marginal rim, like a somewhat broad hyaline border, with only faint traces of loculi.

Rare: Stamsund r+ (many specimens); Stene r.

*Distribution*: West coast of Norway (Solsvik near Bergen).

**Cocconeis** EHRE., CL.

Valves ecostate, with a marginal loculiferous rim, dissimilar in structure.

**C. scutellum** EHRE.

EHRE. Infus. p. 194, pl. 14, f. 8. VAN HEERCK Synops. p. 132, pl. 29, figs. 1—3.

According to CLEVE exceedingly variable. It seems, however, that he has gone too far when referring so many different forms to this species, as he has done (l. c. pp. 170—171).

Not unfrequent, in different forms which only badly answer

to the varieties described: Stamsund r, Svolvær +, Ostnesfiord r, Stene r.

*Distribution*: Cosmopolitan.

**C. distans** GREG., A. SCHM.

GREG. Diat. of Clyde, p. 490, pl. IX, f. 23 (1857, non Micr. Journ. III, p. 39, pl. IV, f. 9, 1855 which GREG. l. c. p. 491 himself declares to be a var. of *C. scutellum* illustrated as *C. distans* by mistake). A. SCHM. Nords. Diat. pl. III, figs. 22—23 (*forma minima* PERAG.).

Small specimens, very well answering to the figures in A. SCHM. l. c. (f. 23 entire frustule) occurred. They had no loculiferous rim, only a hyaline border. Lower valve with very faint and indistinct striæ.

There is, however, such a remarkable agreement with a form of *C. scutellum*, most probably the one, mentioned above, which at first was figured by GREGORY as *C. distans*, that I do not feel quite sure if not these two forms after all belong together. The only difference seems to be the larger marginal areoles which are wanting in the true *C. distans*.

The variety of *C. scutellum* just mentioned differs remarkably from the common forms. There is a narrow marginal rim, but no loculi. Lower valve with straight raphe, stretching to the margin. Median pores somewhat separated from each other. Axial area indistinct except towards the central nodule, where it suddenly dilates into a small, round, central one. Striæ finely radiating, much curved towards the ends of the valve, most conspicuous near the margin, distinctly punctate, about 14 on 10  $\mu$ . A narrow striate border with striæ somewhat closer and less conspicuous than the marginal striæ of the valve, 15—16 on 10  $\mu$ . 38  $\mu \times 29 \mu$ .

Smaller specimens seem to pass insensibly into such forms, which A. SCHM. has figured l. c.

Very rare: Stamsund r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Indian Ocean. Central and Arctic America. Sea of Kara.

**C. lyra** A. SCHM.

A. SCHM. Nords. Diat. pl. III, f. 19 (right figure lower valve, left figure upper valve).

As mentioned above I think there must be some mistake, when CL. mentions having seen a frustule of this species with the upper valve of the species above named *Heteroneis norvegica*. Though I have seen no entire frustule of *C. lyra*, I should think that A. SCHM.'s illustrations to which I have referred, belong together, which also answers very well to the dimensions. I have repeatedly found this upper valve in connection with a loculiferous rim with 6 loculi on 10  $\mu$ . The species consequently is no *Disconeis* CL., but belongs to *Cocconeis* or *Pleuroneis*.

The remarkable lower valve occurred sparsely in my material, but corresponded in size and shape precisely to the supposed upper valve. Its structure is puzzlingly similar to that of small forms of *Navicula lyra* var. *atlantica*. On one side of the valve between the furrows and the margin, there is, however, an indistinct blank line or furrow, parallel to the main furrows, which is absent in the *Navicula* mentioned.

Upper valve with transverse and longitudinal costæ, the latter a little closer than the former. Between the costæ there is, therefore, a single row of conspicuous areolæ.

Rare: Stamsund r (both valves); Stene r (upper valve only).

*Distribution*: West coast of Norway.

**Pleuroneis** CL. I. c. p. 181.

Marginal loculiferous rim. Upper valve costate. Between the costae double rows of small pearls.

**P. costata** (GREG.) CL. I. c.

*Cocconeis c.* GREG. in Q. M. J. III, 1855, p. 39, pl. 4, f. 10. VAN HEURCK Synops. pl. 30, figs. 11—12.

Has a broad and well developed loculiferous rim.

Rare: Stamsund r. Ostnesfiord r. Stene r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Canada. Auckland.

**P. pinnata** (GREG.)

*Cocconeis p.* GREG. Micr. Journ. VII, p. 79, pl. 6, f. 1. VAN HEURCK Synops. pl. 30, figs. 6—7.

Lower valve: The raphe fine, straight, stretching to the ends of the valve, in the middle with clavate ends, somewhat separated from each other. Axial area not visible, central one very small, roundish. Striae very faint, not distinctly seen on my specimens.

There is a marginal rim with rudimentary loculi which are less than half developed, but very well visible, 4 on 10  $\mu$ . A distinct hyaline border. This species seems on the whole to be closely related to *Pleuroneis costata* though undoubtedly a separate species.

**P. britannica** (NÆG.) CL.

CL. I. c. p. 181. *Cocconeis b.* KÜTZ. Sp. Alg. p. 890. VAN HEURCK Synops. pl. 30, figs. 1—2.

Very rare: Stamsund r r.

*Distribution*: England. The Mediterranean. The Barbadoes.

**Rhoicosphenia** GRUN.**R. curvata** (KÜTZ.) GRUN.

GRUN. ALG. Novara p. 8. *Gomphonema c.* KÜTZ. 1833. *Gomphonema minutissima* EHRB. Mikrogeologie pl. 35 A, XII, f. 5, non *G. minutissima* GREV. (earlier name, = *G. exiguum* KÜTZ.).

In fresh or brackish water. A coarser form (var. *marina* VAN HEURCK Synops. pl. 26, f. 4) marine.

Very rare: Svølvær r, Ostnesfiord r.

*Distribution*: Cosmopolitan in fresh and brackish water.

**15. Gomphonemæ.****Gomphonema** AG.**G. constrictum** EHRB.

EHRB. Abh. Berl. Ak. 1830. VAN HEURCK Synops. p. 123, pl. 23, f. 6.

Very rare: Svølvær r.

*Distribution*: Common fresh water species.

**G. exiguum** KÜTZ.

KÜTZ. Bacill. p. 84, pl. 30, f. 58.

var. *pachyclada* (BRÈB.) VH. Synops. pl. 25, figs. 31—32.

*Gomphonema p.* BRÈB. Consid. p. 21.

Very rare: Stene r r.

*Distribution*: West coast of France. Arctic regions.

**G. kamtschaticum** GRUN.

GRUN. Casp. Sea Alg. p. 12. VAN HEURCK Synops. 25, f. 29.

Very rare: Svølvær, r r. Valve  $45 \times 8 \mu$ , narrow, clavate, with rounded broader end. Axial area narrow, dilated to an oblong central area. Striae little radiating, coarser outside the central area, about 15 on 10  $\mu$ . in the middle only 11.

*Distribution*: (Marine). Arctic America and Asia. Iceland.

**16. Naviculæ.****Auricula complexa** (GREG.) DE T.

DE TONI Syll. p. 347. *Amphipora complexa* GREG. Diat. of Clyde p. 508, pl. XII, f. 62; VAN HEURCK Traité d. Diat. p. 267, pl. 29, f. 807.

Probably derived from the plankton.

Very rare: Ostnesfiord r.

*Distribution*: Cf. above p. 108.

**Tropidoneis** CL.**T. maxima** (GREG.) CL.

CL. Synops. Navic. Diat. I, p. 26. *Amphipora m.* GREG. Diat. of Clyde p. 507, pl. XII, f. 61. VAN HEURCK Synops. p. 120, pl. 22, figs. 4—5.

Somewhat rare: Stamsund r, Svølvær r, the Ostnesfiord r, Stene r +, Gaukværo r.

*Distribution*: Coasts of the North Sea and Ireland. The Mediterranean. Finmark (var. *dubia* CL. et GRUN.). Indian Ocean.

**T. lepidoptera** (GREG.) CL.

CL. I. c. p. 25. *Amphipora l.* GREG. Diat. of Clyde p. 505, pl. XII, f. 59 a, b (non c). VAN HEURCK Synops. p. 120, pl. 22, figs. 2—3.

Not unfrequent: Stamsund +, Svølvær r, the Ostnesfiord r, Stene r +, Gaukværo r.

*Distribution*: Coasts of the North Sea and Western Europe. Finmark. The Mediterranean. West Indies. Indian Ocean. Pacific Ocean.

**Donkinia** RALFS.**D. recta** (DONK.) GRUN.

GRUN. in VAN HEURCK Synops. p. 119, pl. 17, f. 9. *Pleurosigma r.* DONK. Micr. Journ. VI, p. 23, pl. 3, f. 6. *Gyrosigma r.* CL. Synops. Navic. Diat. I, p. 119.

Very rare: Stamsund, r.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean. Florida. Pacific Ocean. Indian Ocean.

**D. carinata** (DONK.) RALFS.

RALFS in PRITCH. Inf. p. 921. VAN HEURCK Traité d. Diat. p. 248, pl. 35, f. 912. *Pleurosigma c.* DONK. Micr. Journ. VI, p. 23, pl. 3, f. 5; CL. I. c. p. 44.

Rare: The Ostnesfiord r, Stene r, Gaukværo r.

*Distribution*: Coasts of the North Sea and Ireland. Sea of Kara. Davis' Strait. Balearic Islands.



**Pleurosigma** W. SM.

a. *Eupleurosigma*. Striae in three directions (transverse and oblique).

***P. nubecula*** W. SM.

W. SM. Brit. Diat. I, p. 64, pl. 21, f. 201.

**var. *subrecta*** CL.

CL. Synops. Navic. Diat. I, p. 35. *Pleurosigma s.* CL. in CL. et GRUN. Arct. Diat. p. 53, pl. 3, f. 72.

Very rare: Stamsund, r.  $254 \mu \times 21 \mu$ ; oblique striae 18 on  $10 \mu$ , angle more than  $60^\circ$ , transverse striae indistinct. Raphe central, almost straight. Somewhat broader in the middle, with obtuse ends.

*Distribution* (of the variety): Finmark. Greenland. Sea of Kara. Balearic Islands.

***P. elongatum*** W. SM.

W. SM. Brit. Diat. I, pl. 20, f. 199. PERAGALLO Monogr. Pleuros. pl. 11, figs. 20-21.

Very rare: The Ostnesfiord r.

*Distribution*: Coasts of the North Sea and Ireland. Baltic. Arctic regions. The Mediterranean. Caspian Sea. North America, east coast. Pacific Ocean. Indian Ocean.

***P. rigidum*** W. SM.

W. SM. Brit. Diat. I, p. 64, pl. 20, f. 198. PERAGALLO l. c. pl. VI, figs. 4-6.

Very rare: Stamsund r, Gaukværo r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. West Indies. Straits of Magellan.

***P. Normanni*** RALFS.

RALFS in PRITCH. Inf. p. 919. *P. affine* GRUN. in CL. et GRUN. Arct. Diat. p. 51. VAN HEURCK Synops. pl. 18, f. 9.

Frequent: Stamsund r, Svolveær c, the Ostnesfiord + c, Stene c, Gaukværo +.

*Distribution*: Coasts of the North Sea. The Mediterranean. Spitsbergen. Davis' Strait. East coast of North America. Pacific Ocean. The Red Sea.

***P. strigosum*** W. SM.

W. SM. Brit. Diat. I, p. 64, pl. 21, f. 203; pl. 23, f. 203. PERAG. l. c. pl. V, figs. 1-2.

Very rare: Stamsund r, Svolveær r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Indian Ocean. Africa. America.

***P. formosum*** W. SM.

W. SM. Brit. Diat. I, p. 63, pl. 20, f. 195. VAN HEURCK Synops. p. 116, pl. 19, f. 4.

Rare: Stamsund r, Stene r, Gaukværo r.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean. The Red Sea. Indian Ocean. Pacific Ocean. West Indies.

***P. speciosum*** W. SM.

W. SM. Brit. Diat. I, p. 63, pl. 20, f. 197. PERAG. l. c. pl. II, figs. 13-16.

Very rare: Stene, r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Indian Ocean. Pacific Ocean. West Indies.

b. ***Gyrosigma*** (HASS.).***P. attenuatum*** (KÜTZ.) W. SM.

W. SM. Brit. Diat. I, p. 68, pl. 22, f. 216.

**var. *scalprum*** GAILL. et TURP.

GAILL. et TURP. Mem. du Mus. XV, pl. X, XI, f. 3. *P. acuminatum* W. SM. Brit. Diat. I, p. 66, pl. 21, f. 209.

Very rare: The Ostnesfiord, r.

*Distribution* (of the variety): North Sea, brackish and marine.

***P. balticum*** (EHRB.) W. SM.

W. SM. Brit. Diat. I, p. 66, pl. 22, f. 207. *Navicula b.* EHRB. Abh. Berl. Ak. 1830, p. 114.

Very rare: Stamsund r, Svolveær r r.

*Distribution*: Cosmopolitan in warm and temperate regions.

***Rhoicosigma*** GRUN., PER.***R. arcticum*** CL.

CL. Diat. Arct. Sea p. 18, pl. III, f. 16. PERAGALLO Mon. Pleur. pl. X, figs. 16-17. *Gyrosigma a.* CL. Synops. Navic. Diat. I, p. 119.

Frequent: Stamsund r, the Ostnesfiord + c, Gaukværo c.

*Distribution*: Scotland. West coast of Norway, frequent. Arctic regions.

***Scoliotropis*** CL.***S. latestriata*** (BRÉB.) CL.

CL. Synops. Navic. Diat. I, p. 72. *Amphiprora l.* BRÉB. in KÜTZ. Sp. Alg. p. 93. *Scolioptera l.* GRUN. in VAN HEURCK Synops. pl. 17, f. 12.

Very rare: Stamsund r, Stene r.

*Distribution*: Coasts of the North Sea and Western Europe. Caspian Sea. East coast of North America. West Indies. California.

***Scolioptera tumida*** (BRÉB.) RABENH.

RABENH. Fl. Eur. Alg. p. 229. VAN HEURCK Synops. p. 112, pl. 17, figs. 11, 13. *Navicula t.* BRÉB. in KÜTZ. Sp. Alg. p. 77; CL. l. c. p. 155.

Very rare: Gaukværo, r.

*Distribution*: Coasts of the North Sea and Western Europe. Franz Josef's Land. Black Sea. Ceylon. Sidney.

***Pseudoamphiprora*** CL.

CL. Synops. of Navic. Diat. I, p. 71.

According to CLEVE the following species has 2 chromatophores peculiar in shape and position.

***P. stauroptera*** (BAIL.) CL.

CL. l. c. *Amphora stauroptera* BAIL. SMITHS. Contrib. VII, p. 8, figs. 14-15. *Amphiprora obtusa* GREG. Diat. of Clyde p. 506, pl. XII, f. 60 and f. 59 c (*Amphiprora lepidoptera* GREG., non f. 59 a, b.). A. SCHM. Nords. Diat. pl. III, f. 1.

Very rare: Stamsund r, the Ostnesfiord r.

*Distribution*: North Sea. Finmark. Sea of Kara. Nova Scotia. Sidney. (CL. l. c.)



**Caloneis** CL.

CL. Synops. Navic. Diat. I, p. 46.

Valve striate; striæ parallel, except at the ends, crossed on each side of the raphe by one or more longitudinal lines. Connecting zone not complex.

**C. liber** (W. SM.) CL.CL. I. c. p. 54. *Navicula l.* W. SM. Brit. Diat. I, p. 48, pl. 16, f. 133.**var. linearis** (GRUN.) VH.VH. Synops. pl. 12, f. 35. *Navicula l.* GRUN. Verh. 1860, p. 546, pl. 3, f. 2.

Frequent: Stamsund +. Svølvær + c. the Ostnesfiord r +, Raftsund r, Stene r +, Gaukværo +.

*Distribution*: Cosmopolitan.

**var. maxima** (GREG.)

*Navicula m.* GREG. Diat. of Clyde p. 487, pl. IX, f. 18. A. SCHM. Nords. Diat. pl. II, f. 44.

Frequent: Stamsund + c. Stene r +.

*Distribution*: Coasts of the North Sea and Western Europe.

**var. elongata** (GRUN.) CL.CL. I. c. p. 55. *Navicula e.* GRUN. in A. SCHM. Nords. Diat. p. 91, pl. II, f. 42.

Very rare: Stamsund r.

*Distribution*: Coasts of the North Sea. Indian Ocean. Colon.

**C. consimilis** (A. SCHM.) CL.CL. I. c. p. 57. *Navicula c.* A. SCHM. Nords. Diat. p. 91, pl. II, f. 46.

Very rare: Stamsund r.

*Distribution*: North Sea. Balearic Islands.

**C. amphibana** (BORY.) CL.CL. I. c. p. 58. *Navicula a.* BORY Encycl. meth., t. 2. VAN HEURCK Synops. p. 102, pl. XI, f. 7.

Very rare: Stene. r.

*Distribution*: In brackish and fresh water, frequent especially in Northern and Western Europe. Caspian Sea.

**C. brevis** (GREG.) CL.CL. I. c. p. 61. *Navicula b.* GREG. Diat. of Clyde, p. 478, pl. IX, f. 4. A. SCHM. Nords. Diat. pl. II, f. 15.

Very rare: Stamsund r. the Ostnesfiord r. Stenerri.

*Distribution*: North Sea. Arctic regions.

**C. blanda** (A. SCHM.) CL.CL. I. c. p. 62. *Navicula b.* A. SCHM. Nords. Diat. p. 90, pl. II, f. 27.

Very rare: Stamsund r. r. the Ostnesfiord r.

*Distribution*: Coasts of the North Sea. Black Sea. Indian Ocean. Pacific Ocean.

**C. musca** (GREG.) CL.CL. I. c. p. 65. *Navicula m.* GREG. Diat. of Clyde, p. 479, pl. IX, f. 6. A. SCHM. Nords. Diat. p. 86, pl. I, f. 15.

Very rare: Stamsund r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Indian and Pacific Oceans. West Indies.

**Schizonema** AG.**S. Grevillei** AG.

AG. Consp. p. 18. VAN HEURCK Synops. p. 110, pl. 16, f. 2.

Rare: Stamsund r. Svølvær r.

*Distribution*: Coasts of the North Sea and Western Europe, frequent. Arctic regions. West Indies. California. Kerguelen.

**S. crucigerum** W. SM.

W. SM. Brit. Diat. II, p. 74, pl. 56, fig. 354; pl. 57, f. 356. VAN HEURCK Synops. p. 110, pl. 16, f. 1.

Rare: Svølvær. r.

*Distribution*: Coasts of the North Sea and Western Europe. The Baltic.

**Stauroneis** EHRE.**S. salina** W. SM.

W. SM. Brit. Diat. I, p. 60, pl. 19, f. 188. VAN HEURCK Synops. p. 68, pl. X, f. 16.

Rare: Stamsund r. Stene r.

*Distribution*: Coasts of the North Sea. The Baltic. The Mediterranean. Black Sea.

**S. Gregorii** RALFS.RALFS in PRITCH. Inf. p. 913. VAN HEURCK Synops. p. 68, pl. A (suppl.), f. 4. *S. amphiorys* GREG. Micr. Journ. IV, p. 48, pl. V, f. 23.

Rare: Stamsund r. Gaukværo r.

*Distribution*: Coasts of the North Sea. Black Sea. Caspian Sea. East coast of North America. Sea of Kara.

**S. phaniceron** EHRE.EHRE. Am. pl. II, 5, f. 1 etc. VAN HEURCK Synops. p. 67, pl. IV, f. 21 (*var. gemina* CL. Synops. Navic. Diat. I, p. 149).

Very rare: Stene, r.

*Distribution*: Fresh water species, especially frequent in Northern and Western Europe. America. New Zealand.

**Navicula** BORY.a. **Orthostichæ** CL. Synops. Navic. Diat. I, p. 107.

Valves with small puncta, arranged in parallel transverse striæ and also forming straight longitudinal ones, crossing the former at right angles.

**N. cuspidata** KÜTZ.

KÜTZ. Bacill. p. 94, pl. III, figs. 24, 37. VAN HEURCK Synops. p. 100, pl. XII, f. 4.

Very rare: Stamsund r. the Ostnesfiord r.

*Distribution*: Common fresh water species.

b. **Punctata** CL. I. c. II, p. 37.

Coarse puncta, arranged in transverse striæ (radiate at the ends) but not in straight longitudinal rows.

**N. humerosa** BRÉB.

BRÉB. in W. SM. Brit. Diat. II, p. 93. VAN HEURCK Synops. p. 98, pl. XI, f. 20.

Very rare: Raftsund r.

*Distribution*: Coasts of the North Sea. Baltic. Arctic regions. The Mediterranean. Black Sea. Caspian Sea. The Red Sea; Indian Ocean. Sidney. Cameroon.**N. monilifera** CL.CL. l. c. p. 43. *N. granulata* BRÉB. in DONK. Micr. Journ. VI, p. 17, pl. III, f. 19, non *N. granulata* BAIL.

Very rare: The Ostnesfiord r.

**var. heterosticha** CL.CL. l. c. *N. granulata* A. SCHM. Atlas, pl. 6, figs. 15—16.

Very rare: Raftsund. r.

*Distribution* (of the main species): North Sea. Ceylon. Madagascar. The var. only known from Hungary, fossil.**N. latissima** GREG.

GREG. Micr. Journ. IV, p. 40, pl. V, figs. 4, 4\*. A. SCHM. Nords. Diat. pl. I, f. 30.

Frequent: Moskenstrømmen r +, Svolveær r, the Ostnesfiord r, Raftsund r, Stene r +.

*Distribution*: Coasts of the North Sea. Finmark. The Mediterranean. Black Sea. Indian Ocean. Pacific Ocean.**N. punctulata** W. SM.

W. SM. Brit. Diat. I, p. 52, pl. 16, f. 151. VAN HEURCK Synops. p. 98, pl. 11, f. 16.

Very rare: Stamsund r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Caspian Sea. America. Indian Ocean.**N. fraudulenta** A. SCHM.A. SCHM. Atlas pl. 70, f. 60; Nords. Diat. pl. III, f. 18<sub>o</sub> (without name).

Rare: Stamsund r +. Many specimens.

*Distribution*: North Sea. Sebastopol.c. **Lineolatae** CL. l. c. 11. p. 10.

Radiate or parallel striae, transversely lineate.

**N. radiosa** KÜTZ.KÜTZ. Bacill. p. 91, pl. IV, f. 23. VAN HEURCK Synops. p. 83, pl. 7, f. 20. Incl. *Pinnularia acuta* W. SM. Brit. Diat. I, p. 56, pl. XVIII, f. 173.

Rare: Stene, r.

*Distribution*: Frequent fresh water species, especially in Northern and Western Europe. Asia, Africa, America.**N. peregrina** EHRB.

EHRB. Am. p. 133, pl. I, f. 5—6. A. SCHM. Atlas pl. 47, figs. 57—60.

Very rare: Gaukværo, r.

*Distribution*: Brackish water. Coasts of the North Sea. Baltic. Adriatic Sea. Arctic regions. America. Pacific Ocean. Indian Ocean.**var. kefwingensis** (EHRB.) CL.CL. l. c. p. 18. *Pinnularia k.* EHRB. Berl. Ak. 1849, p. 20. *Naricula k.* A. SCHM. Atlas pl. 47, figs. 61—62.

Very rare: Svolveær. 141 p. long.

*Distribution*: Brackish water: Scotland.**N. digito-radiata** (GREG.) A. SCHM.A. SCHM. Nords. Diat. p. 92, pl. III, f. 4. *Pinnularia d.* GREG. Micr. Journ. IV, pl. 1, f. 32.

Frequent: Stamsund +, Svolveær r, the Ostnesfiord r, Stene r.

*Distribution*: Coasts of the North Sea. Arctic regions. Caspian Sea. New York.**N. directa** W. SM.W. SM. Brit. Diat. I, p. 56, pl. 18, f. 172. A. SCHM. Atlas pl. 47, figs. 4—5 (*var. gemina* CL. l. c. p. 27).

Rare: Stamsund r +, the Ostnesfiord r, Stene r.

*Distribution*: Coasts of the North Sea. Arctic regions. Yokohama.**var. remota** GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 39. A. SCHM. Nords. Diat. pl. III, f. 2.

Somewhat rare: Stamsund +, the Ostnesfiord r, Gaukværo r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Red Sea. Central America.**var. subtilis** (GREG.) CL.CL. Vega p. 467. *Pinnularia s.* GREG. Dat. of Clyde, p. 488, pl. IX, f. 19.

Rare: Stene r, Gaukværo r.

*Distribution*: Scotland. Arctic regions.**N. finmarchica** (CL. et GRUN.) CL.CL. l. c. p. 28. *Stawoekis f.* CL. et GRUN. Arct. Diat. p. 47, pl. III, f. 63.Very rare: Stene. rr. Very similar to the figure quoted, though wanting the fainter or blank lateral areas. Also very similar to *N. transitans forma minuta* CL. Vega pl. 36, f. 37.**N. frigida** GRUN.GRUN. in CL. et GRUN. Arct. Diat. p. 39. GRUN. Diat. Franz Jos. Land, p. 103, pl. I, f. 25. *Naricula kariana v. frigida* CL. l. c. p. 28.

Probably derived from the plankton.

Rare: Stamsund, r +.

*Distribution*: Arctic regions. Cf. above p. 105.**N. cancellata** DONK.

DONK. Brit. Diat. p. 55, pl. 8, figs. 4 a. b. A. SCHM. Nords. Diat. pl. II, figs. 36—37.

Very variable, probably also including *N. zostereti* and *N. north-umblica*.

Very frequent: Moskenstrømmen +, Stamsund +, Svolveær +, the Ostnesfiord +, Raftsund r, Stene +, c, Gaukværo c. c.

*Distribution*: Coasts of the North Sea. Baltic. Arctic regions. The Mediterranean. Indian Ocean. Pacific Ocean. Kerguelen.

**var. Gregorii** (RALFS.) GRUN.

GRUN. in CL. and GRUN. Arct. Diat. p. 37. *Navicula Gregorii* RALFS in PRITCH. Inf. p. 901. A. SCHM. Nords. Diat. pl. II, f. 22.

Very rare: Stamsund r. Gaukværo r.

*Distribution*: Coasts of the North Sea. Baltic. Arctic regions. Pacific Ocean. Kerguelen.

**N. northumbrica** DONK.

DONK. Micr. Journ. I, p. 9, pl. I, f. 5. A. SCHM. Atlas pl. 47, figs. 19—20.

Very rare: Stamsund r. Stene r. r.

*Distribution*: North Sea.

**N. zostereti** GRUN. (?)

GRUN. in Wien. Verh. 1860 p. 528, pl. IV, f. 23. A. SCHM. Atlas pl. 47, f. 43.

Rare: Stamsund r. Stene r. Gaukværo r.

*Distribution*: The Mediterranean. Indian Ocean. Pacific Ocean. Brazil.

**N. fortis** (GREG.) DONK.

DONK. Brit. Diat. p. 57, pl. 8, f. 8. *Pinnularia* f. GREG. Micr. Journ. IV, p. 47, pl. V, f. 19. A. SCHM. Atlas pl. 46, figs. 37—39.

Perhaps only a coarse variety of *N. cancellata*.

Very rare: Stene, r.

*Distribution*: North Sea. Arctic regions (Spitsbergen, Finmark, Greenland).

**N. rostellata** (GREG.) A. SCHM.

A. SCHM. Nords. Diat., expl. ad pl. II (*N. rostellaria* GREG.?) *Pinnularia* r. GREG. Diat. of Clyde p. 488, pl. IX, f. 20.

Very rare: Stene, r. Probably the same species as the following one. There does, however, really exist a form answering to GREGORY'S figure, without a central transverse area.

*Distribution*: Coasts of the North Sea.

**N. crucifera** GRUN.

A. SCHM. Atlas pl. 46, figs. 50—53; Nords. Diat. pl. II, f. 31 (*N. rostellaria* GREG.?)

Must be reckoned as a variety to the preceding species (or vice versa).

Very rare: Stamsund r; Gaukværo r.

*Distribution*: Coasts of the North Sea. Baltic. The Mediterranean. Sumatra.

**N. distans** (W. SM.) CL.

CL. l. c. p. 35. *Pinnularia* d. W. SM. Brit. Diat. I, p. 56, pl. 18, f. 169.

Very rare: Raftsund r. Stene r.

*Distribution*: North Sea. Arctic regions.

**N. compressicauda** A. SCHM.

A. SCHM. Nords. Diat. p. 91, pl. II, f. 35; Atlas pl. 46, f. 62.

The peculiar aspect of the ends of the valve is due to the convexity. The valve is boatshaped with sharp stems, at the bottom of which the terminal nodules are situated. Thus they are rather distant from the very ends.

Rare: Stamsund r +.

*Distribution*: Coasts of the North Sea. Morocco. The Mediterranean.

**N. superimposita** A. SCHM.

A. SCHM. Nords. Diat. p. 90, pl. II, f. 34; Atlas pl. 46, f. 61.

In many respects answering to the preceding species, though undoubtedly distinct.

Very rare: Stamsund, r. Several specimens observed.

*Distribution*: West coast of Norway. Baltic. Morocco. China.

**N. opima** GRUN.

*N. fortis* var.? *opima* GRUN. Novara p. 110, pl. 1A, f. 13. *N. opima* A. SCHM. Atlas pl. 46, figs. 24—26.

Very rare: Stamsund, r.

*Distribution*: West coast of Norway. Baltic. Arctic regions. Barcelona.

d. **Levistriatæ** CL. l. c. p. 66.

Radiate striae, not distinctly punctate nor lineolate. Valve more or less lanceolate.

**N. palpebralis** BREB.

BREB. in W. SM. Brit. Diat. I, p. 50, pl. 31, f. 273. VAN HEURCK Synops. p. 96, pl. 11, f. 9.

Rare: Stamsund r +, Moskenstrømmen r. Gaukværo r.

*Distribution*: Coasts of the North Sea. The Mediterranean. East coast of North America. Davis' Strait. Galapagos Islands.

**var. Barclayana** (GREG.) VII.

VII. Synops. p. 97, pl. 11, f. 12. *Navicula* B. GREG. Diat. of Clyde p. 480, pl. IX, f. 9.

Rare: Stamsund, r.

*Distribution*: Coasts of the North Sea. The Mediterranean.

**var. semiplena** (GREG.) CL.

CL. l. c. p. 70. *Pinnularia* s. GREG. Micr. Journ. VII, p. 84, pl. VI, f. 12.

Rare: Stamsund, r.

*Distribution*: Scotland. Finmark. Spitsbergen.

**var. angulosa** (GREG.) VII.

VAN HEURCK Synops. pl. 11, f. 10. *Navicula* a. GREG. Micr. Journ. IV, p. 42, pl. V, f. 8. A. SCHMIDT Nords. Diat. pl. II, f. 19.

Rather frequent: Stamsund +, Stene r. Gaukværo r +.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean.

**var. minor** GRUN.

GRUN. in CL. et GRUN. Arct. Diat. p. 30, pl. I, f. 23. *Navicula* m. GREG. Diat. of Clyde p. 477, pl. IX, f. 1.

Rare: Stamsund r, Gaukværo r.

*Distribution*: Finmark. Belgium.

**N. præsecta** A. SCHM.

A. SCHM. Nords. Diat. pl. II, f. 20.

Recalls the var. *semiplena* of the preceding species (cf. CL. l. c. p. 70), but has a much finer structure. Striae 15 on 10  $\mu$ . An obscure line is to be seen between the central area and the margin. Perhaps a species of *Caloneis*.



Very rare: Stamsund r. 53  $\mu$  long.  
*Distribution*: West coast of Norway. Bohuslän (Sweden).

e. *Lyrata* CL. l. c. p. 52.

*N. prætexta* EHRB.

EHRB. 1840, Mikrogeolog. pl. 19, f. 28 (*Pinnularia* p.). VAN HEURCK Synops. p. 92, pl. IX, f. 13.

Not unfrequent: Moskenstrømmen +, Stamsund r, Svolveær r, Raftsund r, Stene r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. Kerguelen. Cape Horn. America.

*N. Henedyi* W. SM.

W. SM. Brit. Diat. II. p. 93. A. SCHM. Nords. Diat. pl. I, f. 41.

Very variable.

Frequent: Stamsund e, the Ostnesfiord r, Brettesnes Skroven r, Raftsund +, Stene r +.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. Atlantic Ocean.

*var. circumsecta* GRUN.

GRUN. in A. SCHM. Nords. Diat. p. 89, pl. I, figs. 36, 42 (*N. polysticta* var. c.).

Frequent: Stamsund + e, Raftsund r, Stene +.

*Distribution*: Coasts of the North Sea. Finmark. The Mediterranean. Red Sea. Indian Ocean. America.

Besides, a fine variety from Stamsund, r. with short marginal striæ between the main ones.

*N. spectabilis* GREG.

GREG. Diat. of Clyde p. 481, pl. IX, f. 10. A. SCHM. Atlas. pl. 3, figs. 20—21.

Though usually easily recognizable, this species is scarcely distinct from all forms of the very variable *N. lyra* (cfr. CL. l. c. p. 60).

Not unfrequent: Moskenstrømmen r +, Stamsund r +, Svolveær r, Raftsund r, Stene r +.

An analogous variety to that of *N. Henedyi*, with more numerous marginal striæ, occurs (Stene, r).

*Distribution*: Coasts of the North Sea. Greenland. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. Cape Horn.

*N. abrupta* (GREG.) DONK.

DONK. Brit. Diat. p. 13, pl. II, f. 6. A. SCHM. Nords. Diat. pl. I, f. 37. *N. lyra* var. a. GREG. Diat. of Clyde p. 486, pl. IX, figs. 14, 14 b.

Frequent: Moskenstrømmen r, Stamsund r, Svolveær + e, the Ostnesfiord e, Raftsund r, Stene +, Gankværo + e.

*Distribution*: Coasts of the North Sea. Finmark. Spitsbergen. The Mediterranean. Black Sea. Red Sea. Indian Ocean. China.

*N. clavata* GREG.

GREG. Micr. Journ. IV, p. 46, pl. V, f. 17. A. SCHM. Nords. Diat. pl. I, f. 33.

Characteristic form, though hardly specifically different from certain varieties of *N. lyra*.

Not unfrequent: Moskenstrømmen r, Stamsund r, Svolveær r, the Ostnesfiord r, Raftsund r +, Stene r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. East coast of America.

*N. lyra* EHRB.

EHRB. Amer. p. 131, pl. I, f. 9. VAN HEURCK Synops. p. 93, pl. 10, f. 1. *N. lyra* var. *Ehrenbergii* CL. l. c. p. 63.

Somewhat rare: Moskenstrømmen r, Stamsund r +, Svolveær +, the Ostnesfiord r, Stene r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. America.

*var. elliptica* A. SCHM.

A. SCHM. Nords. Diat. pl. I, f. 39. VAN HEURCK Synops. pl. 10, f. 2.

Very frequent: Stamsund +, Svolveær +, Raftsund +, Brettesnes—Skroven r, Stene e, Gankværo +.

*Distribution*: Coasts of the North Sea. The Mediterranean. Red Sea. Indian Ocean. Philippines.

*var. atlantica* A. SCHM.

A. SCHM. Nords. Diat. pl. I, f. 34.

Very characteristic. Recalls sometimes *N. abrupta*, but always easy to distinguish from that species.

Rare: Stamsund r +, Moskenstrømmen r.

*Distribution*: Coasts of the North Sea.

*N. forcipata* GREV.

GREV. in Micr. Journ. VII, p. 83, pl. VI, figs. 10—11. A. SCHM. Nords. Diat. pl. I, f. 45; pl. II, figs. 16, 18.

Frequent: Stamsund e, Raftsund r, Stene r, Gankværo + e.

*Distribution*: Coasts of the North Sea, frequent. Greenland. The Mediterranean. Black Sea. Red Sea. Cape of Good Hope. Indian Ocean. Pacific Ocean. Florida.

*var. versicolor* (GRUN.) GRUN.

GRUN. in V. H. Synops. pl. X, f. 6. *Naricula* v. GRUN. in A. SCHM. Nords. Diat. pl. II, f. 17.

A very well marked variety.

Rare: Stamsund, +.

*Distribution*: North Sea. The Mediterranean. Sumatra.

*N. pygmaea* KÜTZ.

KÜTZ. Sp. Alg. p. 77. VAN HEURCK Synops. p. 94, pl. 10, f. 7.

It is hardly possible to keep this species distinct from certain varieties of the preceding species (cfr. CL. l. c. p. 66).

Very rare: Stamsund r, Stene r.

*Distribution*: Brackish water: Coasts of the North Sea. Baltic. Arctic regions. America.

*Pinnularia* EHRB.

a. *Capitata* CL. Synops. Navic. Diat. II, p. 75.

*P. microstauron* EHRB.

A. SCHM. Atlas pl. 44, f. 16.

Very rare: Raftsund, r.

*Distribution*: Fresh water species. Arctic regions. Northern Europe. North America.

*P. nobilis* EHRB.

EHRB. Berl. Ak. 1840. p. 214. A. SCHM. Atlas pl. 43, f. 1.

Rare: Stene r; the Ostnesfiord r.

*Distribution*: Fresh water species, especially frequent in Northern and Western Europe.b. *Divergentes* CL. l. c. p. 77.*P. legumen* EHRB.EHRB. Mikogeol. pl. II, 2, f. 12. *Navicula l.* A. SCHM. Atlas pl. 44, figs. 44-47.

Very rare: The Ostnesfiord, r.

*Distribution*: Fresh water species, frequent especially in Northern and Western Europe. Africa. Asia. Australia. America.*P. divergens* W. SM.W. SM. Brit. Diat. I, p. 57, pl. 18, f. 177. *Navicula d.* A. SCHM. Atlas pl. 44, f. 9.

Very rare: The Ostnesfiord, r.

*Distribution*: Fresh water species, frequent especially in Northern and Western Europe. Asia. Australia. America.c. *Distantes* CL. l. c. p. 80.*P. lata* (BRÉB.) W. SM.W. SM. Brit. Diat. I, pl. 18, f. 167. *Frustulia lata* BRÉB. Cons. p. 18.

Frequent: Svolvær r. Raftsund r. the Ostnesfiord r. Stene + c.

*Distribution*: Fresh water species. Arctic regions. Western Europe. Switzerland. Australia.*P. borealis* EHRB.EHRB. Am. pl. I, 2, f. 6. *Navicula b.* A. SCHM. Atlas pl. 45, figs. 15-21.

Very rare: Stamsund, r r.

*Distribution*: Frequent fresh water species, especially in arctic and alpine regions: Northern and Western Europe; Switzerland. Asia. Africa, America and Australia.d. *Marinæ* CL. l. c. p. 94.*P. quadratarea* (A. SCHM.) CL.A. SCHM. Nords. Diat. p. 90. pl. II, f. 26. *Navicula pinnularia* CL. Svensk. N. Diat. p. 224, pl. IV, figs. 1-2 (earlier name).

Frequent: Stamsund +, Svolvær r, the Ostnesfiord r. Stene r +. Gaukværo + c.

*Distribution*: Coasts of the North Sea. Arctic regions, frequent. The Mediterranean. Australia.*P. clavicularis* (GREG.) CL.CL. l. c. p. 96. *Navicula c.* GREG. Diat. of Clyde, p. 478, pl. IX, f. 5. A. SCHM. Nords. Diat. pl. II, f. 28.

Rare: Stamsund r +. Gaukværo r.

*Distribution*: Coasts of the North Sea. Sweden. Balearic Islands.*P. cruciformis* DONK.

DONK. Micr. Journ. (n. s.) I, p. 10, pl. I, f. 7. A. SCHM. Nords. Diat. pl. II, f. 25.

Rare: Stamsund r, Svolvær r, Gaukværo r.

*Distribution*: Coasts of the North Sea. Finmark. Baltic. West Indies. Cape Horn. Seychelles.*P. Trevelyana* (DONK.) RABENH.RABENH. Fl. Eur. Algar I, p. 210. *Navicula T.* DONK. Micr. Journ. I, 1861, p. 8, pl. I, f. 2.

Rare: Stamsund r, Svolvær r, Stene r.

*Distribution*: Coasts of the North Sea. Florida. Japan.**Diploneis** EHRB., CL. Synops. Navic. Diat. I, p. 76.

The material examined was especially rich in forms of this beautiful genus. For the sake of greater clearness, they are arranged in the two groups Didymæ and Ellipticæ, although these groups by some intermediate forms pass into each other.

a. *Ellipticæ* V. H. Synops.*D. hyalina* (DONK.) CL.CL. l. c. p. 80. *Navicula h.* DONK. Micr. Journ. I, p. 10, pl. I, f. 6. A. SCHM. Atlas pl. 70, figs. 1-5.

Very rare: Stamsund, r.

*Distribution*: Coasts of the North Sea. Finmark.*D. coffeæformis* (A. SCHM.) CL.CL. l. c. p. 81. *Navicula c.* A. SCHM. Nords. Diat. p. 88, pl. I, f. 22; pl. II, f. 13.

Perhaps a variety of the following species.

Rare: Stamsund, r +.

*Distribution*: Coasts of the North Sea. Naples. Macassar Straits.*D. suborbicularis* (GREG.) CL.CL. l. c. p. 81. *Navicula Smithii* var. s. GREG. Diat. of Clyde p. 487, pl. IX, f. 17.

Somewhat rare: Stamsund +, Svolvær r.

*Distribution*: Coasts of the North Sea. Davis' Strait. The Mediterranean. Caspian Sea. Indian Ocean. America.*D. eudoxia* (A. SCHM.)*Navicula e.* A. SCHM. Atlas pl. VIII, f. 40, pl. 70, f. 71. *N. mediterranea* A. SCHM. Nords. Diat., pl. II, f. 10, non KÜTZ. *D. contigua* var. *eudoxia* CL. l. c. p. 83.This beautiful species is so easily recognizable and seems to be so well distinguished from the following that I prefer to keep them separate instead of referring both to *D. contigua*, as CL. (l. c. p. 82) does.

Rare: Stamsund r +, Raftsund r.

*Distribution*: West coast of Norway. The Mediterranean. Red Sea. Indian Ocean. Galapagos Islands.*D. sejuncta* (A. SCHM.)*Navicula s.* A. SCHM. Nords. Diat. p. 87, pl. I, f. 18. *N. eugenia* A. SCHM. Atlas pl. 8, figs. 44-45. *Diploneis contigua* (A. SCHM.) var. *eugenia* CL. l. c. p. 83.This species is certainly a *Diploneis*, not a *Caloneis* as CL. l. c. supposes. A. SCHM. (Nords.) compares it with *D. nitescens* and mentions it (*N. eugenia*) another time (Atlas l. c.) as a connecting link between *D. nitescens* and *D. eudoxia*.

Horns of the central nodule not plainly separated. Now and then, the division line is, however, seen. Costæ apparently lineate; the very faint longitudinal lines form a single row of alveoli between the costæ. Sometimes the valves are a little constricted in the middle.

I can find no essential difference between this form and *N. eugenia*. The costæ in the latter are stated to be 8-9 on 10  $\mu$ , in the former 12. The structure of *D. sejuncta* is, however, somewhat variable, and answers perhaps best to 10 costæ on 10  $\mu$ .

There is also a remarkable agreement in their occurrence, as both are mentioned from Campeachy Bay.

Very rare: Stamsund r+, here in rather large numbers.

*Distribution* (of *N. sejuncta* A. SCHM.): West coast of Norway (Hvidingsø). Campeachy Bay.

*Distribution* of *N. eugenia* A. SCHM.: Ceylon. Macassar Straits. Campeachy Bay.

***D. notabilis*** (GREY.) CL.

CL. I. c. p. 93. *Navicula notabilis* GREY. Mier. JONH. XI, p. 18, f. 9.

**var. *expleta*** A. SCHM.

A. SCHM. Nords. Diat. pl. I, f. 20, pl. II, f. 11.

Rare: Stamsund r, Raftsund r, Stene r, Gaukvarø r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Black Sea. Red Sea. Indian Ocean. Pacific Ocean. West Indies. Brazil.

***D. fusca*** (GREG.) CL.

CL. I. c. p. 93. *Navicula fusca* A. SCHM. Atlas pl. 7, figs. 2-3 (var. *norvegica* CL. I. c.).

This species is exceedingly variable and includes probably *D. hyperborea* and *D. aestiva*. Even the limit towards *D. Smithii* seems not to be reliable.

Frequent: Moskenstrømmen r, Stamsund +, Svølvar +, the Ostnesfiord r, Raftsund r, Stene r, Gaukvarø +.

**var. *Gregorii*** CL. I. c. p. 94.

*Navicula Smithii* var. *f.* GREG. Diat. of Clyde IX, f. 15.

Large, beautiful form. Differs from the main species in the same way as *D. major* CL. from *D. Smithii*. Central nodule elongated; terminal nodules distant from the ends.

Very rare: Stamsund, r.

*Distribution*: Coasts of the North Sea. Naples.

***D. hyperborea*** (GRUN.) CL.

CL. I. c. p. 95. *Navicula hyperborea* GRUN. Wien Verh. 1860 p. 531, pl. III, f. 16.

Furrows swelling round the central nodule.

Rare: Stene r, the Ostnesfiord r, Stamsund r.

*Distribution*: Bohuslän (Sweden).

**var. *excisa*** A. SCHM.

*Navicula fusca* v. *excisa* A. SCHM. Nords. Diat. pl. II, f. 9.

Beautiful and characteristic form. Large, conspicuous pearls as in *D. fusca* var. *Gregorii*.

Rare: Stamsund, r+.

*Distribution*: West coast of Norway.

***D. Smithii*** (BREB.) CL.

CL. I. c. p. 96. *Navicula Smithii* BREB. in W. SM. Brit. Diat. II, p. 92. A. SCHM. Atlas pl. 7, figs. 16-17.

Exceedingly variable, probably also including *D. major* and *D. borealis*.

Very frequent: Moskenstrømmen r, Stamsund e, the Ostnesfiord r, Raftsund r, Stene e, Gaukvarø e.

*Distribution*: Coasts of the North Sea. Baltic. Arctic regions. The Mediterranean. Indian Ocean. Pacific Ocean. Central America.

***D. major*** CL.

CL. I. c. p. 96. *Navicula Smithii* A. SCHM. Atlas, pl. VII, f. 19.

Beautiful form, but hardly anything other than a coarse variety of *D. Smithii*. It seems quite impossible to keep it distinct from large forms of the latter species, with coarser structure.

The central nodule is usually broadened, broader than the distance between the horns, while it, in *D. Smithii*, is of equal breadth. The terminal nodules are generally distant from the ends, while they in *D. Smithii* lie close to them. Both these characteristics are, however, unreliable. Thus forms occur, which, on account of the structure and the terminal nodules, should be referred to *D. major*, but on account of the form of the central nodule to *D. Smithii*, and vice versa.

Not unfrequent: Moskenstrømmen +, Stamsund r+, Stene r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Indian Ocean. Pacific Ocean.

***D. borealis*** (GRUN.) CL.

CL. I. c. p. 96. *Navicula Smithii* var. *borealis* GRUN. Diat. Franz Jos. Land p. 56, pl. I, f. 40.

Furrows swelling round the central nodule.

Frequent: Stamsund e, Stene r, the Ostnesfiord r, Gaukvarø r.

My specimens differ somewhat from GRUNOW'S figure, especially in the central nodule, which is not elongated. The double rows of pearls between the costae are very delicate, but are now and then distinctly seen. Agree very well with the description in GRUNOW I. c.

*Distribution*: Sweden (Bohuslän). Arctic regions. Java.

***D. litoralis*** (DONK.) CL.

CL. I. c. p. 94. *Navicula l.* DONK. Brit. Diat. p. 5, pl. I, f. 2. A. SCHM. Nords. Diat. pl. I, figs. 24-25 (var. *subtilis*).

Very rare: Stamsund, r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Indian and Pacific Oceans.

***D. nitescens*** (GREG.) CL.

CL. I. c. p. 97. *Navicula Smithii* var. *nitescens* GREG. Diat. of Clyde p. 487, pl. IX, f. 16.

Somewhat rare: Stamsund +, Stene r, Gaukvarø r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Black Sea. Indian Ocean. Pacific Ocean. Central America.

b. ***Didymæ*** VH. SYLOPS.

***D. constricta*** (GRUN.) CL.

CL. I. c. p. 83. *Navicula c.* GRUN. in Wien Verh. 1860, p. 535, pl. III, f. 18. *N. Doukii* A. SCHM. Nords. Diat. pl. I, f. 12, pl. II, f. 8.

Coarser structure than in the following species, horns of the central nodule more divergent, and obtuse angles in the lateral contour. At a certain focus, a few very indistinct oblique longitudinal costae are sometimes to be seen.

Not unfrequent: Stamsund + e, the Ostnesfiord r, Stene r.

*Distribution*: Coasts of the North Sea. Finmark. Balearic Islands. Ceylon. Florida.



***D. incurvata*** (GREG.) CL.

CL. l. c. p. 81. *Navicula i.* GREG. Micr. Journ. IV, p. 44, pl. V, f. 13.  
A. SCHM. Nords. Diat. pl. I, figs. 10—11; pl. II, f. 6.

Frequent: Stamsund + c. Stene r +.

*Distribution*: Coasts of the North Sea. Finmark. America.

***D. interrupta*** (KÜTZ.) CL.

CL. l. c. p. 84. *Navicula i.* KÜTZ. Bacill. p. 100, pl. 29, f. 93. A. SCHM.  
Nords. Diat. pl. I, f. 8.

Somewhat rare: Stamsund r. the Ostnesfiord r. Raftsund r.  
Stene r.

*Distribution*: Brackish water. Coasts of the North Sea,  
Baltic. Arctic regions. The Mediterranean. Red Sea. Indian  
Ocean. Pacific Ocean. East coast of America.

***D. lineata*** (DONK.) CL.

CL. l. c. p. 85. *Navicula l.* DONK. Micr. Journ. VI, p. 32, pl. III, f. 17.  
A. SCHM. Nords. Diat. pl. I, figs. 16—17.

Rare: Stamsund r. Stene r. Both forms illustrated by A.  
SCHM. l. c., occur.

*Distribution*: Coasts of the North Sea. The Mediterranean.

***D. subcineta*** (A. SCHM.) CL.

CL. l. c. p. 86. *Navicula s.* A. SCHM. Nords. Diat. pl. II, f. 7.

Very variable. Structure coarse, coarser than in the preceding  
species.

Frequent: Svolveær r +. the Ostnesfiord r +, Raftsund r,  
Stene + c.

*Distribution*: Coasts of the North Sea. Arctic regions. The  
Mediterranean. Indian Ocean.

***var. media*** (GRUN.)

*Navicula bomboïdes var. media* GRUN. Arct. Diat. p. 41, pl. III, f. 54; Diat. Franz  
Jos. Land pl. I, f. 39 (*N. subcineta*). *Diploneis entomon* CL. Synops. Navic.  
Diat. I, p. 87.

Two, or a few, broad, irregular longitudinal costæ, anastomosing  
through oblique ones.

This form is very remarkable. By CLEVE it has been referred  
to *D. entomon* (cf. under that species), by GRUNOW as a variety  
to *D. bomboïdes*. GRUN. has, however, noted the close relationship  
to *D. subcineta*. As this species is very variable as regards the  
development of longitudinal costæ, and often shows similar peculi-  
arities as the present variety, I have thought it best to consider  
the latter a variety of *D. subcineta*, though it is, on the whole,  
so characteristic that it might very well be regarded as a separate  
species.

I also think I have seen forms distinctly transitional to *N.*  
*subcineta*. Such forms are, however, rare.

Not unfrequent: Stamsund r +, the Ostnesfiord r +, Raft-  
sund r. Stene r.

*Distribution*: Arctic regions.

***D. entomon***.

Regarding the interpretation of this name CL. l. c. is not quite  
clear. His species seems to be = A. SCHM. Nords. Diat. pl. I,  
f. 14, a figure, on which the longitudinal costæ are very indistinct.  
CL. quotes, however, also A. SCHM. l. c. f. 13, a figure which

undoubtedly represents another species. A. SCHM. himself remarks  
that these two figures cannot be referred to the same species, but  
that GRUNOW considers them to be *D. entomon* EHRE.

CLEVE's species is partly identical with *D. bomboïdes var.*  
*media* GRUN. (in CL. et GRUN. Arct. Diat. p. 41, pl. III, f. 54),  
a form, which, according to GRUNOW, is an intermediate one be-  
tween *D. bomboïdes* and *subcineta*. This *var. media* I have referred  
to *D. subcineta* (cf. above). It is hardly essentially different from  
that form from Franz Jos.'s Land, which GRUN. illustrates (Diat. F. J.  
L. pl. I, f. 39) as *Navicula subcineta*. In this figure the irregular  
ramification of the longitudinal costæ is seen, producing two auosto-  
mosing ones.

The figures from A. SCHM. Atlas (pl. 13, figs. 48—49) refer-  
red to by CL. l. c. represent a species, which I have not seen,  
and which hardly occurs with us.

*D. entomon* of VAN HEURCK Traité p. 195, pl. 26, f. 732 is  
a different species, identical with A. SCHM. Nords. Diat. pl. I, f. 13.  
This figure seems, however, to represent a form of *D. constricta*.  
The furrows, especially, answer very well to the latter species.  
VAN HEURCK who is on the whole conservative on the question of  
species, also mentions the near relationship between *D. entomon*  
and *D. incurvata*, a species which again is very nearly connected  
with *D. constricta*.

When CLEVE l. c. remarks that *D. entomon* by intermediate  
forms passes into *D. splendida*, this also shows clearly that his  
species is different from that of A. SCHMIDT (f. 13) and VAN  
HEURCK.

The furrows of *D. entomon* CL. answer very well to those of  
*D. bomboïdes*, less so to those of *D. splendida*.

I have, however, never seen specimens where it was doubtful,  
whether they should be referred to *D. entomon* CL. (= *bomboïdes*  
*var. media* GRUN.) or *D. bomboïdes*.

*D. entomon* EHRE. Mikrogeologie pl. 33, XVII, f. 13 has the  
shape of *D. constricta*, but very narrow furrows. *D. entomon* EHRE.  
l. c. may be VAN HEURCK's species (A. SCHM. Nords. Diat. pl. I,  
f. 13): the specimen seems to lie somewhat obliquely, which may  
have caused the median constriction of the furrows.

***D. splendida*** (GREG.) CL.

CL. l. c. p. 87. *Navicula s.* GREG. Micr. Journ. IV, p. 44, pl. V, f. 14. A. SCHM.  
Nords. Diat. pl. I, figs. 3—4; pl. II, f. 2.

This beautiful species is very similar to *D. bomboïdes*, but the  
furrows do not swell in the middle and narrow evenly elliptically off  
towards the ends. The costæ, besides, distinctly cross the furrows at  
the sides of the central nodule (i. e., in the furrows are here distinct  
transverse costæ), while these furrows else are almost smooth. The  
median structure of the valve generally is a little coarser, the  
areoles here somewhat larger.

I have seen no distinct transition between *D. splendida* and  
the other species.

Somewhat rare: The Ostnesfiord r +, Raftsund r. Stene r +.

*Distribution*: Coasts of the North Sea. Arctic regions (Fin-  
mark. Baren Eiland, Spitsbergen, Greenland). Indian Ocean. Pacific  
Ocean. West Indies. Florida.

***D. bomboïdes*** (A. SCHM.) CL.

CL. l. c. p. 88. *Navicula b.* A. SCHM. Nords. Diat. pl. I, f. 2.

Similar to the preceding species, but the furrows swell slightly  
round the central nodule, and the structure here is like that of the

other parts of the valve. The furrows are also more protracted towards the ends, and not conspicuously crossed by transverse costae at the sides of the central nodule.

Always easy to distinguish from the preceding species.

Frequent: Stamsund + c, Brettesnes—Skroven r +, Raftsund r +, Stene r +.

*Distribution*: Coasts of the North Sea. Alexandria. Indian Ocean. Pacific Ocean. Central America.

***D. didyma* (EHRB.) EHRB.**

EHRB. Mikrogeolog. pl. 19, f. 32. *Pinnularia d.* EHRB. Kreideth. p. 75. *Navicula didyma* A. SCHM. Nords. Diat. pl. I, f. 7.

Not unfrequent: Moskenstrømmen r, Svolveær r +, the Ostnesfiord r, Raftsund r, Stene r.

*Distribution*: Especially in brackish water. Coasts of the North Sea. Arctic regions. Baltic. Black Sea. Caspian Sea. Indian Ocean. Pacific Ocean. Cape Horn. West Indies.

***D. bombus* EHRB.**

EHRB. Mikrogeol. pl. 19, f. 31. *Navicula b.* GREG. Diat. of Clyde, p. 484, pl. IX, f. 12. *N. gemma* A. SCHM. Nords. Diat. pl. I, f. 3; pl. II, f. 1.

Frequent: Moskenstrømmen r +, Stamsund c, Svolveær +, the Ostnesfiord r, Raftsund r, Stene +, Gaukværo r +.

*Distribution*: Coasts of the North Sea and Western Europe. Finnmark. The Mediterranean. Black Sea. Caspian Sea. Indian Ocean. Pacific Ocean. America.

***D. ckersonensis* (GRUN.) CL.**

CL. l. c. p. 91. *Navicula c.* GRUN. in A. SCHM. Atlas pl. 12, f. 49; pl. 69, f. 21. *Navicula apis* (DONK.) A. SCHM. Nords. Diat. pl. I, f. 9.

Not unfrequent: Stamsund +, Svolveær r, Gaukværo r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Indian Ocean. Pacific Ocean. West Indies. Florida.

***D. crabro* EHRB.**

Mikrogeol. pl. 19, figs. 29 a, b (non c). A. SCHM. Nords. Diat. pl. I, figs. 5—6; pl. II, f. 4. *D. crabro var. multicostrata* (GRUN.) CL. l. c. p. 102. *Navicula multicostrata* GRUN. Wien Verh. 1860, p. 524, pl. III, f. 13.

Rather frequent: Moskenstrømmen r, Stamsund +, the Ostnesfiord +, Raftsund r, Stene r, Gaukværo r +.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. West Indies.

**var. *pandura* (BRÉB.) VII.**

VAN HEURCK Synops. pl. 9, f. 1. *Navicula pandura* BRÉB. Diat. Cherb. f. 4. A. SCHM. Nords. Diat. pl. II, f. 3.

Peculiar form with tongue-shaped segments.

Very rare: Gaukværo, r r.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean. Red Sea. Indian Ocean. Pacific Ocean. America.

***Frustulia* Ag.**

***F. rhomboides* (EHRB.) DE TONI.**

DE TONI Syll. p. 277. *Navicula rhomboides* EHRB. Amer. pl. 3, f. 15. *Van-heurckia r.* BRÉB. Ann. Soc. phyt. Belg. I, p. 204. V. H. Synops. p. 112, pl. 17, figs. 1—2.

Very rare: Svolveær r, Brettesnes—Skroven r.

*Distribution*: Fresh water species, rather common.

***Stenoneis inconspicua* (GREG.) CL.**

CL. Synops. Navic. Diat. I, p. 124. *Navicula? i.* GREG. Diat. of Clyde p. 478 pl. IX, f. 3. *N. fistula* A. SCHM. Nords. Diat. pl. II, f. 29.

Frequent: Moskenstrømmen r, Stamsund r, Gaukværo + c.

*Distribution*: Coasts of the North Sea. Bohuslän (Sweden). Balearic Islands. Arctic regions.

***Trachyneis aspera* (EHRB.) CL.**

CL. Synops. Navic. Diat. I, p. 191. *Stawoptera a.* EHRB. Amer. pl. I, figs. 1—2; Mikrogeol. pl. 35 A, XXIII, f. 13. *Navicula a.* VAN HEURCK Synops. pl. X, f. 13 (var. *gemina* CL.).

Common: Moskenstrømmen r, Stamsund + c, Svolveær +, the Ostnesfiord c, Raftsund r +, Stene c, Gaukværo +.

*Distribution*: Cosmopolitan.

***Mastogloia* THW.**

***M. exigua* LEWIS.**

LEWIS Proc. Ac. Nat. Sc. Philad. 1861 p. 65, pl. II, f. 5. VAN HEURCK Synops. p. 70, pl. 4, figs. 25—26.

Very rare: Svolveær, r.

*Distribution*: Brackish and marine: Baltic. Belgium. Atlantic coast of America. Behring Island.

***M. Smithii* THW.**

W. SM. Brit. Diat. II, p. 65, pl. 54, f. 341. VAN HEURCK Synops. p. 70, pl. 4, f. 13.

Very rare: Svolveær, r.

*Distribution*: In brackish water. Baltic. England. Saxony. Caspian Sea. Australia.

***M. apiculata* W. SM.**

W. SM. Brit. Diat. II, p. 65, pl. 62, f. 387. A. SCHM. Atlas pl. 185, f. 43; pl. 186, f. 23.

Very rare: Svolveær, r.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean. Black Sea. China.

**17. *Cymbelleæ*.**

***Cymbella* Ag.**

***C. cistula* (HEMPR.) KIRCHN.**

VAN HEURCK Synops. p. 64, pl. 2, figs. 12—13.

Very rare: Brettesnes—Skroven, r.

*Distribution*: Fresh water species, frequent in arctic, northern or alpine localities. Also in slightly brackish water.

***C. cymbiformis* (Ag.?) V. H.**

VAN HEURCK Synops. p. 63, pl. II, figs. 11 a—c.

Very rare: Stamsund r, the Ostnesfiord r.

*Distribution*: Frequent fresh water species, especially from Northern and Western Europe. Arctic regions. Asia, Africa, America and Australia.



**Amphora** EHRB.

*Amphora* CL. s. s., Synops. Navic. Diat. II, p. 100.

Valves with transverse rows of coarse puncta, forming longitudinal lines, or strong transverse costæ, crossed by longitudinal ones. Connecting zone simple.

**A. proteus** GREG.

GREG. Diat. of Clyde p. 518, pl. XIII, f. 81. A. SCHM. Atlas, pl. 27, f. 3.

Very variable.

Frequent: Stamsund +, Svølvar r. Raftsund r. Stene +, Gaukværo + c.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Black Sea. The Atlantic, Indian and Pacific Oceans.

**var. contigua** CL.

CL. l. c. p. 103. A. SCHM. Atlas, pl. 28, f. 4.

Perhaps a separate species.

Not unfrequent: Stamsund r, Svølvar r, the Ostnesfiord r.

*Distribution* (of *var. contigua* CL.): North Sea. The Adriatic. Labuan. New Caledonia.

**A. robusta** GREG.

GREG. Diat. of Clyde p. 519, pl. XIII, f. 79.

Not unfrequent: Stamsund r, the Ostnesfiord +.

*Distribution*: Coasts of the North Sea. Spitsbergen. The Mediterranean. Macassar Strait. Pacific Ocean.

**A. ovalis** KÜTZ.

KÜTZ. Synops., figs. 5-6. VAN HEURCK Synops. p. 59, pl. 1, f. 1.

Very rare: Stamsund, r.

*Distribution*: Fresh or slightly brackish water. Frequent in Northern and Western Europe. Arctic regions.

b. **Diplamphora** CL. l. c. p. 107.

Connecting zone complex, with more or less numerous longitudinal divisions and transverse striæ or costæ. Valves with transverse costæ, or rows of puncta, on the dorsal side with one or two longitudinal lines.

**A. crassa** GREG.

GREG. Micr. Journ. V. p. 72, pl. I, f. 35; Diatoms of Clyde p. 524, pl. XIV, f. 94. A. SCHM. Atlas pl. 39, f. 30.

Rare: Stamsund r, Svølvar r. Stene r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Indian Ocean. China.

**var. solsvigiensis** PETIT.

PETIT Diat. Cap Horn, p. 120, pl. X, f. 15, p. p. A. SCHM. Atlas pl. 48, f. 17.

Beautiful form.

Very rare: Stamsund, r.  $111 \times 18 \mu$ ; costæ  $4\frac{1}{2}$  on  $10 \mu$ , lineate. Strong longitudinal line. The costæ answer to the fig. 18 in A. SCHM. Atlas, the margin of the ventral side to fig. 17 (these figures thus correspond to different focussing).

**A. Græffii** GRUN.

GRUN. in A. SCHM. Atlas pl. 25, fig. 40.

Very rare: Stamsund, r.  $63 \times 14 \mu$ ; striæ 17 on  $10 \mu$ , crossed on the dorsal side by a blank line. Ends little protracted. Axial area a little constricted in the middle.

Not unfrequent: Stamsund r +, Stene +, Gaukværo r.

*Distribution*: Naples. Indian Ocean. Pacific Ocean.

**A. Grevilleana** GREG.

GREG. Micr. Journ. V, p. 73, pl. I, f. 36. Diat. of Clyde p. 522, pl. 13, f. 89. A. SCHM. Atlas pl. 25, f. 41. *A. fasciata* GREG. l. c. pl. 13, f. 90 (cfr. CL. l. c.).

Rare: Stamsund r, Stene r.

*Distribution*: Coasts of the North Sea and Western Europe. Spitsbergen. The Mediterranean. Pacific Ocean. Central America.

**A. sulcata** BRÉB.

BRÉB. Diat. Cherb. f. 8. GREG. Diat. of Clyde p. 523, pl. XIII, figs. 92, 92 b. CL. l. c. p. 112.

Very rare: Stamsund r, the Ostnesfiord r. 15 striæ on  $10 \mu$ ,  $74 \mu$  long. Corresponds exactly to the figures and description in GREGORY l. c. Also tolerably well answering to CLEVE's species.

*Distribution*: West coast of Europe. Balearic Islands.

**A. Mülleri** A. SCHM.

A. SCHM. Atlas pl. 26, f. 31. *A. monilifera* GREG.? Diat. of Clyde, p. 511, pl. XII, f. 69.

Very rare: Stamsund, r. Valve  $73 \times 11 \mu$ , with  $7\frac{1}{2}$  striæ on  $10 \mu$ , obtuse. The ventral side as illustrated by A. SCHM., rather narrow, towards the ends broader, then again narrowing. The raphe is not so distinctly bent as in the figure. On the broader part of the ventral side, inside the marginal striæ, there is a band of short striæ, as in *A. proteus*, separated from the marginal striæ by a blank line. Dorsal striæ, as in the figure mentioned, crossed by a broad blank, longitudinal line. Another sharp line is seen close to the dorsal margin.

*Distribution*: West coast of Norway (Hvidingsø).

**A. alata** PERAG.

PERAG. Diat. de Villefr. p. 41, pl. II, f. 11. VAN HEURCK Traité d. Diat. pl. 24, f. 677.

Very rare: Stamsund, r.

*Distribution*: West coast of Norway. Morocco. The Mediterranean. Macassar Straits. America.

**A. binodis** GREG.

GREG. Diat. of Clyde p. 510, pl. XII, f. 67. CL. l. c. p. 124.

Very rare: Stamsund, r.  $34 \mu$  long. Completely answering to the illustration in GREG. l. c.

*Distribution*: Scotland. Balearic Islands.

c. **Halamphora** CL. l. c. p. 117.

Connecting zone complex. Raphe close to the ventral margin. Transverse, punctate striæ, not crossed by any longitudinal line. Ends of the valve usually rostrate or capitate.



*A. macilenta* GREG.

GREG. Diat. of Clyde p. 510, pl. XII, f. 65. CL. l. c. p. 121.

Answers best to *A. ergulensis* GREG. l. c. p. 512, pl. XII, f. 71, which by CLEVE l. c. — probably rightly — is considered a variety of *A. macilenta*. Frustule  $48 \times 19 \mu$ , with rather narrow connecting zone. 11 striae on 10  $\mu$ .

Very rare: Stamsund, r.

*Distribution*: Coasts of Sweden and Scotland. The Mediterranean. Macassar Straits.

*A. eunotia* CL.

CL. Diat. Arct. Sea. p. 24, pl. III, f. 17. *A. cymbifera* var. A. SCHM. Atlas pl. 25, f. 35.

Very rare: Stamsund, r.

Similar to an *Amphora terroris*, with distinctly punctate transverse striae. Valve  $80 \times 15 \mu$ ; its ends a little capitate-rostrate. Striae  $7\frac{1}{2}$  on 10  $\mu$ .

*Distribution*: Bohuslän (Sweden). Arctic regions. Indian Ocean.

*A. costata* W. SM.

W. SM. Brit. Diat. l. p. 20, pl. 39, f. 253. GREG. Diat. of Clyde p. 527, pl. XIV, f. 99. *A. inflata* GRUN. in A. SCHM. Atlas pl. 25, figs. 29—30.

Rare: Stamsund, r.

Frustule  $34 \times 16 \mu$ , coarse structure; 9—10 striae on 10  $\mu$ ; many longitudinal division lines. Ends protracted.

*Distribution*: Coasts of the North Sea. Mediterranean. Sumatra. East coast of America. Galapagos Islands.

*A. terroris* EHRB.

*A. crebi* EHRB. Microgeol. pl. 35 A, f. 2. *A. cymbifera* GREG. Diat. of Clyde p. 526, pl. XIV, f. 97. A. SCHM. Atlas pl. 26, f. 33; pl. 39, f. 18; pl. 25, figs. 17—19, 33—31, 36.

Not unfrequent: Stamsund +, the Ostnesfiord r. Gaukværo r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. Macassar Straits. Gulf of Mexico.

d. *Oxyamphora* CL. l. c. p. 125.

Complex connecting zone. Valves acute with the raphe close to the ventral margin. No dorsal longitudinal lines. Usually delicate structure of transverse or slightly radiate striae with puncta arranged in undulating, longitudinal lines. Ventral side usually of still finer structure than the dorsal side. Often a stauros.

*A. acuta* GREG.

GREG. Diat. of Clyde p. 524, pl. 14, f. 93. A. SCHM. Atlas pl. 26, figs. 19—20.

Not unfrequent: Stamsund r, the Ostnesfiord r, Raftsund r. Gaukværo r.

*Distribution*: Coasts of the North Sea. Arctic regions. The Mediterranean. China. Straits of Magellan.

*A. groenlandica* CL.

CL. l. c. p. 128, pl. IV, f. 1.

No stauros.

## var.

Median striae 12 on 10  $\mu$ , towards the ends of the valve somewhat closer. Puncta elongated, 10 on 10  $\mu$ .

Very rare: Stamsund, r.

*Distribution* of the main species: Davis' Strait.

*A. ostrearia* BRÈB.

BRÈB. in KÜTZ. Spec. p. 94. A. SCHMIDT Atlas pl. 26, f. 23. VAN HEURCK Synops. p. 55, pl. I, f. 25 (var. *typica* CL. l. c. p. 129).

Rare: Stamsund, r; Gaukværo, r.

*Distribution*: Coasts of the North Sea. Finmark. The Mediterranean. Indian Ocean. Pacific Ocean.

*A. levis* GREG.

GREG. Diat. of Clyde p. 514, pl. XII, figs. 74 a—c. A. SCHM. Atlas, pl. 26, f. 10.

Rare: Stamsund, r +.

*Distribution*: Coasts of the North Sea. Finmark. Balearic Islands. Java.

var. *levissima* (GREG.) CL.

CL. l. c. p. 130. *Amphora levissima* GREG. Diat. of Clyde, p. 513, pl. XII, f. 72. A. SCHM. Atlas pl. 26, figs. 3, 13—14.

Rare: Stamsund r, Stene r.

*Distribution*: Coasts of the North Sea. Finmark. Sea of Kara.

e. *Amblyamphora* CL. l. c. p. 130.

Connecting zone complex. Valves obtuse with the raphe diverging dorsally. No longitudinal lines. Fine puncta, arranged in transverse striae. Structure not finer on the ventral part of the valve.

*A. obtusa* GREG.

GREG. Micr. Journ. V. p. 72, pl. I, f. 34. A. SCHM. Atlas pl. 40, figs. 4, 7, 11—13.

Very rare: Stamsund, r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Black Sea. Red Sea. Indian Ocean. China. East coast of America.

*A. spectabilis* GREG.

GREG. Diat. of Clyde, p. 516, pl. XIII, figs. 80 a, c. A. SCHM. Atlas pl. 40, figs. 18—23.

Not unfrequent: Stamsund +, Stene r. Gaukværo r.

*Distribution*: Coasts of the North Sea. The Mediterranean. Indian Ocean. Pacific Ocean. West Indies. Davis' Straits.

f. *Psammamphora* CL. l. c. p. 132.

Connecting zone simple. Else as *Amblyamphora*.

*A. ocellata* DONK.

DONK. Micr. Journ. 1861 (n. s.) I, p. 11, pl. I, f. 11. VAN HEURCK Synops. p. 56, pl. I, f. 26 (var. *typica* CL. l. c. p. 133).

Somewhat rare: Stamsund r. Svolveær r. the Ostnesfiord r +, Gaukværo +.

*Distribution*: Coasts of the North Sea. Sweden. The Adriatic.

g. *Cymbamphora* CL. l. c. p. 134.

Connecting zone simple. Valves of rather delicate structure. No longitudinal lines. Raphe close to the ventral margin.

*A. angusta* GREG.? CL.

CL. l. c. p. 135. GREG.? Diat. of Clyde p. 510, pl. XII, f. 66 (var. *typica* CL.).

Rare: Stamsund, r. Hardly Gregory's species.

*Distribution*: Scotland. Arctic regions. East coast of North America. West Indies.

*var. ventricosa* (GREG.) CL.

CL. l. c. p. 135. *Amphora* v. GREG. Diat. of Clyde p. 511, pl. XII, f. 68.

Not unfrequent, Moskenstrømmen r. Stamsund r. the Ostnesfjord r +. Stene r. Gaukværo +.

Answers completely to Gregory's species, but is very variable.

*Distribution*: Coasts of the North Sea: Sweden. Arctic regions. The Mediterranean. Red Sea.

**Epithemia** BRÉB.*E. turghida* (EHRB.) KÜTZ.

KÜTZ. Bacill., pl. 5, f. 14. VAN HEURCK Synops., pl. 31, figs. 1—2. *Navicula* t. EHRB. 1830.

Fresh water species.

*var. Westermanni* (EHRB.) GRUN.

GRUN. in Wien Verh. 1862, p. 325. VAN HEURCK Synops. p. 138, pl. 31, f. 8. *Navicula* W. EHRB. 1833.

Very rare: Gaukværo, r; Moskenstrømmen, r.

*Distribution*: In brackish water. Coasts of the North Sea.

*E. argus* (EHRB.) KÜTZ.

KÜTZ. Bacill. pl. 29, f. 55. VAN HEURCK Synops. pl. 31, figs. 15—17. *Eunotia* *argus* EHRB., Mikogeol. pl. XV A, f. 59.

Very rare: Brettesnes—Skroven r, Gaukværo r.

*Distribution*: Fresh water species; also in brackish water. Frequent, especially in Northern Europe and in alpine localities.

*E. zebra* (EHRB.) KÜTZ.

KÜTZ. Bacill. pl. 5, f. 12; pl. 30, f. 5. VAN HEURCK Synops. pl. 31, figs. 9, 11—14. *Eunotia* z. EHRB. Inf. p. 191. pl. 21, f. 19.

Very rare: Gaukværo r, Stene r.

*Distribution*: Common fresh water species.

*E. musculus* KÜTZ.

KÜTZ. Bacill. pl. 20, f. 6. VAN HEURCK Synops. pl. 32, figs. 14—15.

*var. constricta* (BRÉB.) V. H.

VAN HEURCK Synops. p. 140; Traité d. Diat. p. 297, pl. 9, f. 360. *Epithemia* c. BRÉB. in W. Sm. Brit. Diat. I, p. 14, pl. 30, f. 248.

Very rare: Svølvar r, Gaukværo r.

*Distribution*: Coasts of the North Sea and Western Europe. The Mediterranean.

*E. gibberula* KÜTZ.

KÜTZ. Bacill., pl. 30, f. 3. VAN HEURCK Traité d. Diat., p. 297, pl. 30, f. 825.

Rare: Svølvar, r.

*var. producta* GRUN.

VAN HEURCK Synops. pl. 32, figs. 11—13.

Rare: Stamsund, r.

*Distribution*: Marine, also in brackish and fresh water (*var. producta* GRUN.), frequent in Europe and America.

*Rhopalodia gibba* (EHRB.) OTTO MÜLL. 1895.

*Epithemia gibba* KÜTZ. Bacill. p. 35, pl. 4, f. 22. VAN HEURCK Synops. p. 139; pl. 32, figs. 1—2.

*var. ventricosa* (KÜTZ.) GRUN.

GRUN. in Wien Verh. 1862, p. 327. *Epithemia ventricosa* KÜTZ. Bacill. pl. 30, f. 9.

Very rare: Gaukværo, r; the Ostnesfjord, r.

*Distribution*: Common fresh water species.

## General remarks on the character of the bottom diatom flora.

The most striking facts regarding the distribution of the diatoms in the foregoing list of bottom species are, that the arctic forms are rare and that the flora, on the whole, has a much more pronounced southern character than would be expected from the geographical situation. This is in sharp contradistinction to the character of the diatom flora during „the diatom inflow“ of plankton species in spring (cf. above p. 88), when the actual arctic species predominate.

Generally speaking, the bottom flora shows a remarkable agreement with that of the east coast of Scotland. It is especially striking that a great many of the species described by GREGORY in Diatoms of the Clyde (1854) are common to these two regions, situated at a rather considerable distance from each other. On the other hand, these species also occur on the west coast of Norway, at any rate most of them. It may, consequently, be concluded that the characteristic western bottom flora of diatoms which inhabit the coasts of the North Sea extend to the north as far as to past the Vest-Fiord, probably, however, but little farther.

For the sake of clearness, I divide the species found into 6 groups:

- I. The actual arctic species, only found in the arctic region.
- II. Species with a western and arctic distribution.
- III. Species with a very wide distribution, occurring from southern regions right up into the arctic one. Some of these species seem to be cosmopolitan. In Europe, the species belonging to this group are generally found from the Mediterranean to the arctic regions.
- IV. Western species, especially known from the coasts of the North Sea, but not before mentioned from the arctic zone.
- V. Species with a southern and western distribution, generally occurring from the Mediterranean — or still farther to the south — to the coasts of the North Sea.
- VI. Species with only southern distribution, not before found so far north as on the coasts of the North Sea.

Most of the species observed belong to group III, and many of these species will probably later on be found to have a still wider distribution than is at present known. For such more or less decidedly cosmopolitan species, a thorough treatise on their varieties and forms is a very important and valuable work, indispensable when one wishes to obtain an accurate knowledge of the distribution of identical and closely related species. Notwithstanding the extensive material consisting of an immense number of facts and observations, often made with the utmost care and accuracy as to details in structure, we are still obliged to acknowledge with regret that our knowledge of the individual variations and real constancy of the various distinguishing characters is very deficient.

These species play an unimportant part with regard to the character of the flora. It is, however, an interesting fact that, apparently, so many species of diatoms are common to most seas of the world. Even if a good many of these widely distributed species, on a more thorough examination, should prove to consist of similar, but separate species, having different areas of distribution, there will still remain a great number of species which, in Europe, occur from the Mediterranean to the Arctic Sea. It must, however, be remembered that the valves of diatoms are almost of eternal



duration and that thus fossil valves will enlarge the apparent area of distribution of the still living species.

Most of the species of this group III are probably recent ones, a great number of them being observed alive on the west coast near Bergen.

Next to group III it is group V, which contains the greatest number of species. Many of them have a predominating southern distribution, but occur, more or less frequently, as far north as the coasts of the North Sea. To this group belong the following (a few of which might perhaps rightly be reckoned to another group):

<i>Coscinodiscus Rothii</i> .	<i>Stauroneis salina</i> .
<i>Biddulphia pulchella</i> (a broken valve, Tromsø, Cl.).	<i>Naricula moniliformis</i> .
<i>B. regina</i> (only exceptionally found as far north as Scotland).	<i>N. latissima</i> .
<i>B. furus</i> (once found in Spitsbergen).	<i>N. compressicauda</i> .
<i>B. alternans</i> .	<i>N. superimposita</i> .
<i>B. punctata</i> .	<i>N. palpebralis</i> a. var. <i>Barclayana</i> , var. <i>angulosa</i> .
<i>Synedra undulata</i> .	<i>N. proteola</i> .
<i>S. Hennedyana</i> .	<i>N. clarata</i> .
<i>Raphoneis nitida</i> .	<i>N. foreipata</i> var.
<i>Dimeregramma minus</i> .	<i>Pinnularia clariculus</i> .
<i>D. fulvum</i> .	<i>P. Trereyana</i> .
<i>Glyphodesmis distans</i> .	<i>Diploneis coffeiformis</i> .
<i>Grammatophora serpentina</i> .	<i>D. lineata</i> .
<i>Nitzschia punctata</i> .	<i>D. (contigua</i> var.) <i>eudoxia</i> .
<i>N. acuminata</i> .	<i>D. notabilis</i> (var. <i>expleta</i> ).
<i>N. bilobata</i> .	<i>D. fusca</i> var. <i>Gregorii</i> .
<i>N. lanceolata</i> (a).	<i>D. major</i> .
<i>Campylodiscus eximius</i> .	<i>D. nitescens</i> .
<i>Surirella fastuosa</i> .	<i>D. sejuncta</i> .
<i>Achnanthes longipes</i> .	<i>D. didyma</i> .
<i>Pleuroneis distans</i> .	<i>D. chersonensis</i> .
<i>P. britannica</i> .	<i>D. erabro</i> et var. <i>pandura</i> .
<i>Donkinia recta</i> .	<i>Mastogloia apiculata</i> .
<i>Pleurosigma rigidum</i> .	<i>Amphora proteus</i> var. <i>contigua</i> .
<i>P. formosum</i> .	<i>A. macilentia</i> .
<i>P. speciosum</i> .	<i>A. costata</i> .
<i>P. balticum</i> .	<i>A. binodis</i> .
<i>Scoliotropis lulestriata</i> .	<i>A. sulcata</i> .
<i>Caloneis consimilis</i> .	<i>A. alata</i> .
<i>C. blanda</i> .	<i>A. obtusa</i> .
<i>C. musca</i> .	<i>A. spectabilis</i> .
	<i>A. ocellata</i> .
	<i>Epithemia musculus</i> .

Many of these species were for the first time described and illustrated in the work by GREGORY above mentioned.

All these species have not previously been mentioned from the arctic zone. To this group should properly also most of those be reckoned which are previously known from the arctic zone, but only from the coast of Nordland („Finmarken“).

Less numerous are the species of a mere western European distribution, group IV. Such species are, however, on the whole not numerous. Here belong the following species:

<i>Coscinodiscus apollinis</i> var. (west coast of Norway).	<i>C. Normanni</i> , <i>C. fasciculatus</i> A. Sæm.
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<i>Actinocyclus crassus</i> .	<i>Pleurosigma attenuatum</i> (?).
<i>Actinoplychus splendens</i> .	<i>Caloneis liber</i> .
<i>Biddulphia lurgida</i> .	<i>Schizonema crucigerum</i> (?).
<i>Synedra baculus</i> .	<i>Naricula northumbrica</i> .
<i>Nitzschia litorea</i> .	<i>N. peregrina</i> var. <i>kefvingensis</i> .
<i>N. naricularis</i> (Spitsbergen?).	<i>N. prasceta</i> (west coast of Norway).
<i>Campylodiscus parvulus</i> .	<i>Diploneis hyperborea</i> var. <i>excisa</i> (west coast of Norway).
<i>Cocconeis lyra</i> (west coast of Norway).	

These species, the first and the last ones only excepted, are common to Great Britain and Norway.

A closely related group is group II, including species with a predominating western area, though also occurring right up to the arctic zone. These are the following:

<i>Coscinodiscus Kützingii</i> .	<i>Naricula diveta</i> et var. <i>subtilis</i> .
<i>Hyalodiscus scoticus</i> .	<i>N. fortis</i> .
<i>Biddulphia rhombus</i> .	<i>N. distans</i> .
<i>B. Smithii</i> .	<i>N. palpebralis</i> var. <i>semiplena</i> .
<i>Nitzschia apiculata</i> .	<i>N. pygmaea</i> .
<i>Campylodiscus angularis</i> .	<i>Diploneis hyalina</i> .
<i>Rhoicosigma arcticum</i> .	<i>Amphora laevis</i> .
<i>Caloneis brevis</i> .	

The genuine arctic species, belonging to group I, are few:

<i>Coscinodiscus borealis</i> .	<i>Nitzschia Mitchelliana</i> .
<i>Actinocyclus alienus</i> ?	<i>Gomphonema kantschaticum</i> .
<i>Biddulphia arctica</i> .	<i>Amphora groenlandica</i> .
<i>Synedra kantschaticum</i> .	<i>Diploneis entomon</i> Cl. p. p. (=
<i>S. rostellata</i> .	<i>D. subcineta</i> var. <i>media</i> ).
<i>Grammatophora arctica</i> .	

All these species, except the last one, are besides very rare.

At last we have the remarkable group VI of only southern forms, partly only known from regions situated far to the south or even only from the tropical zone. Their distribution (as earlier known) extends northwards only as far as to the Mediterranean. To this group belong:

( <i>Coscinodiscus leptopus verus</i> ).	<i>Nitzschia (insignis</i> var.) <i>spathulifera</i>
<i>C. nodulifer</i> .	<i>N. coarctata</i> .
<i>Aulacodiscus Kittoni</i> .	<i>N. (Smithii</i> var.) <i>notabilis</i> .
<i>A. Johnsonianus</i> .	<i>Amphora Graeffii</i> .
<i>Biddulphia regina</i> var.	
<i>B. lata</i> .	

There may, however, be some doubt as to whether the forms observed of *Biddulphia lata* and *Amphora Graeffii* are identical with those, which usually occur in southern regions. Moreover, *Coscinodiscus leptopus*, *Nitzschia spathulifera*, *N. coarctata*, *N. notabilis* and *Biddulphia regina* var. are all very rare and scarce. There remain, however, *Coscinodiscus nodulifer* and the two species of *Aulacodiscus*, all of which occur in comparatively large numbers, and in several samples. These species are easily recognizable, and have a pronounced tropical area of distribution.

Probably these species are all fossil, but I cannot at present with certainty decide this. *Coscinodiscus nodulifer* has most probably occurred as a plankton species.

All the species of groups IV, V and VI, a considerable number of species in all, have not before been known from the arctic zone.



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