This page intentionally left blank.

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 22. Afd. III. N:o 4.

DIATOMS

FROM

BAFFINS BAY AND DAVIS STRAIT

COLLECTED BY M. E. NILSSON

AND EXAMINED BY

P. T. CLEVE.

WITH 2 PLATES.

PRESENTED TO THE R. SWEDISH ACADEMY OF SCIENCES MAY 13 1896.

STOCKHOLM 1896.
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER.

DIATOMS

FROM

BAFFIN'S BAY AND DAVIS STRAIT

COLLECTED BY M. R. SUNDSOY

AND MOUNTED BY

P. T. CLEVE.

In the year 1894 M. E. Nilsson went in the whale-ship »Eclipse» from Dundee to search after the lost young and brave swedish arctic explorers M.M. Björling and Kallstenius. When crossing Baffins Bay and the northern part of Davis Strait, numerous samples of plankton were gathered. The collection, which had evidently been made with great care, comprised nearly 50 bottles, containing abundant materials for microscopical examination of the pelagic forms from these regions, hitherto scarcely known, and was the more valuable as it had extended from the beginning of May to the middle of October and was made at different stations.

The animals as well as the cilioflagellates, in this collection, have been examined by Dr Aurivillius, and as he intends to give a complete account of the plankton of Baffins Bay I shall here confine myself to a short summary only of my own researches so far as they relate to the diatoms.

In the month of May the gatherings were made at some distance from Disco. They consisted almost entirely of diatoms, the most predominant forms being *Coscinodiscus Oculus iridis*, *Fragilaria oceanica* and *F. Cylindrus*, *Podosira glacialis*. Of *Chætoceros* some few specimens only were found.

In June one sample only was taken, the 23:de of the month, near Melville Bay, composed mainly of cilioflagellates (*Ceratium Tripos* var.).

A sample taken the 5:th of July near Cape Dudley was of the same character. A number of gatherings, taken in the vicinity of Bylot Island between the 21:th of July and the 9:th of August consisted also mainly of *Ceratium Tripos* var., the diatoms being scarce and of the same species as in the sample taken in May. Two samples collected at 73° to 74°

Lat. North and 70° Long West, on the 8:th and 14:th of July contained chiefiy crustaceans.

A collection taken the 24:th of July east of Carey Island by another Swedish naturalist M. A. OHLIN consisted, on the contrary, almost exclusively of diatoms, *Thalassiosira Nordenskiöldii* being predominant.

From the 15:th of August to the 24:th of September five samples were collected off Bylot Island, all of a perfectly different character. The cilioflagellates were reduced to a minimum, and the diatoms predominant, but very different from those of the May-plankton. They consisted chiefly of Chætoceros, *C. groenlandicus* being by far the most predominant.

On the 2:d and 6:th of October two gatherings were collected east and north-east of Cumberland Strait, both very rich in diatoms, but of another character than the samples previously taken. They contained abundantly such forms as *Thalassiosira Nordenskiöldii*, which characterizes the Polar Sea, from Jalmal and Spitsbergen to the east coast and south-end of Greenland, and others, which occur in abundance in the northern Atlantic, especially south of Iceland, such as *Chætoceros atlanticus* and *Thalassiotrix longissima*. It is thus evident, that the plankton was mixed, derived partly from the polar stream and partly from the Atlantic.

Samples collected from the 7:th to the 10:th of October in Davis Strait consisted mainly of fragments of *Ceratium Tripos*, evidently killed either by the low temperature, or by the influence of water containing a different amount of salt. The scarcer diatoms in these samples were of the same character as in the gatherings of the 2:d and 6:th of October. Among the pelagic diatoms were found in most samples rarely some litoral forms, but of a particular interest. To obtain a larger supply of these forms I treated a quantity of the Ceratium-plankton, collected the 1:th of August about 30 nautical miles east of Cape Eglinton, with acids and by that mean obtained material for two or three slides, in which I found a considerable number of species, most of them known from the collection made by Professor KJELLMAN on the ice at Cape Wankarema, near Behrings Strait, or from GRUNOW's examination of a sample taken on a ice-flake between Novaja Semlja and Franz Josefs Land as well as from Oestrup's researches in the diatoms found on the ice-flakes, which drift

along the east-coast of Greenland. I will, in the following, treat first of the forms, which constitute the plankton, and later on of the last named diatoms, which after all may probably be derived from molten ice-flakes.

Plankton-diatoms.

Achnanthes tæniata GRUN., formerly met with in the sea of Kara, occurs sparingly in the August-plankton.

Amphiprora (paludosa var.) hyperborea GRUN. is a true plankton-diatom, occurring in long, sometimes sligthly spirally twisted, bands, formed by the frustules firmly coherent by their keels. It occurs by no means sparingly in the May-plankton from Disco, but not in the other samples. It has been found in the sea of Kara.

Asteromphalus atlanticus CL. N. sp. I have formerly [1]) considered this diatom as a variety of *A. Brookei*, later [2]) as a form of *A. Hookeri*, but am now more inclined to believe it to be a distinct species, peculiar to the Atlantic and perhaps also the Mediterranean. It is smaller and has a less number of rays than *A. Brookei*, figured by GREVILLE and in A. SCHMIDTS Atlas (Pl. XXXVIII, 21 to 23), but agrees better with the small form from Campeachy Bay (Atlas l. c. f. 9), also with *A. robustus* PERAG. (D. de Villefranche Pl. II f. 15).

Description: Disc orbicular, 0,03 to 0,04 in diameter. Segments 6 to 7, inside truncate, puncta forming rows parallel with the margin and oblique rows, both 12 in 0,01 mm. Radius of the hyaline area about half of the radius of the disc. Centro-lateral area clavate, reaching a little beyond the centre of the valve, and sending off, partly from the sides, partly from the top, umbilical lines, which are unbranched and either nearly straight or angularly bent in the middle.

Asteromphalus is a genus belonging to the plankton of the warmer seas. *A. atlanticus* has hitherto not been found at Spitsbergen, Finmark or in the North-siberian sea, for which reason it seems not to belong to the polar seas properly. On the other hand it has been found in soundings

---

[1]) Diatoms of the arctic sea p. 10 Pl. IV f. 19.
[2]) Diatoms of Vega p. 487.

from Davis Strait and on the east-coast of Greenland. De Toni indicates in his Sylloge that our form lives at Java, but this is a result of a mistake, the author of the Sylloge having confounded my paper on the diatoms from the arctic sea with that on the pelagic diatoms from Java. In Baffins Bay a single specimen was found in the September-plankton off Bylot Island, but it was not very scarce in the plankton from Cumberland Sound. Fossil specimens have been met with in the Cyprina-clay (reputed interglacial) in Denmark and Holstein. It has never been observed in the North Sea. At present it seems me the most probable that it belongs to the Gulf-stream, by which it has been in single specimens conveyed to the Mediterranean, as well as to the seas around Greenland.

Biddulphia aurita (LYNGB.) occurs rarely in a few samples. It is a true plankton-form.

Chætoceros atlanticus CL. occurs sparingly in the samples collected in Baffins Bay, though found abundantly in the plankton of Davis Strait, collected in October. As to its distribution, it occurs in abundance in the northern Atlantic, south of Iceland, also in the plankton of Behrings Sea. In the North-Sea and on the coast of Sweden it has also been observed, though sparingly.

Chætoceros borealis BTW. occurs sparingly in most samples from Baffins Bay, its proper place being the northern Atlantic and its tributaries, as the North Sea. I have seen this species also in plankton from Ascension, Mediterranean, and from the antarctic regions. So far as we know for the present, it is a characteristic atlantic form. I have never found it in the Indian and Pacific Oceans.

Chætoceros contortus SCHÜTT (Ber. d. Deut. Bot. Ges. 1895 XIII p. 44), *C. compressus* CL. (Bih. t. K. Sv. Vet.-Akad. Handl. XX, 3, N:o 2 p. 12) occurs sparingly among other species in the September- and October-plankton. The geographical distribution is uncertain as it has been confounded with a very similar species, *C. compressus* LAUDER. It has been found on the west coast of Sweden and in the south western Baltic.

Chætoceros curvisetus CL. was found in few specimens only in the October-plankton (from Davis Strait). It occurs on

the west coast of Sweden, in the south western Baltic, also in the English Channel and on the south coast of Bretagne.

Chætoceros decipiens CL. occurs sparingly in most samples, but abundantly in the October-plankton. It is an atlantic species, found abundantly south of Iceland, also on the west coast of Sweden.

Dimensions: *long. ax.* 0,008; *sag. ax.* 0,014; *transv. ax.* 0,008 mm.

Chætoceros furcellatus (BAIL.) CL. — *Chains* membranaceous of 3 to many cellules, somewhat twisted, sometimes curved. Foramina very narrow. *Cellules* in the sagittal-view [1]) quadrate, in the transversal view broadly elliptical to almost orbicular. The awns marginal, with very short basis, filiform, curved, in the transversal view diverging in a right angle. Terminal awns not stronger than the others. *Endocysts* in transversal view elliptical, with two very strong diagonal awns, in sagittal view with more or less conical, finally punctate valves. From the connecting zone issue in the sagittal direction two strong, furcate awns. Dimensions: *long ax.* 0,016; *sag. ax.* 0,017; *transv. ax.* 0,009 mm.; awns in length 0,09 mm. — Pl. II 6, 7.

Syn. *Chæt. furc.* (BAIL.) GRUN. Arct. D. p. 120 Pl. VII f. 136, 137 (endocysts). *Chæt. vermiculus* SCHÜTT Ber. D. Bot. Ges. 1895 p. 39 (chains).

This species seems to be widely distributed among others found in sea of Kara, in the south-western part of the Baltic, in the northern Atlantic and in Davis Strait. It occurs sparingly in the August- and October-plankton of Baffins Bay.

Chætoceros groenlandicus CL. N. sp. *Chains* straight, multicellular, rigid, their form remaining almost unaltered after ignition. Foramina smaller than the cellules, narrow subhexagonal. *Cellules* in the sagittal view nearly quadrate, with slightly concave margins. Valves concave, elliptical. Dimensions: *long. ax.* 0,016 to 0,028; *sag. ax.* 0,022 to 0,038; *transv. ax.* 0,012 mm. Awns arising near the margin, their bases short (0,004 mm.) diagonal and longitudinal, their prolongations slightly curved, two sagittal and two contrary transversal. Terminal awns stronger than the others, di-

---

[1]) I use the terms proposed by SCHÜTT in his paper on Chætoceros in Ber. d. Deut. Bot. Ges. 1895.

verging at an acute angle, with spirally arranged small puncta. *Endocysts* with dissimilar valves, the one slightly convex or conical, unarmed, and the other more convex and covered with many spines, branching at the top. Dimensions: *long. ax.* 0,012 to 0,02; *sag. ax.* 0,02 to 0,04; *transv. ax.* 0,01 to 0,016 mm. — Pl. II, 3, 4.

This form which I cannot identify with any other described species resembles in sagittal view *C. curvisetus*, but the awns have a different direction. It occurs in large masses in the plankton of Baffins Bay from the beginning of August.

Var. leptopus Cl. — Chains of a few frustules only, their terminal awns filiform and curved inwards. Foramina narrow panduriform. Dimension: *long. ax.* 0,02 to 0,024; *sag. ax.* 0,06; *transv. ax.* 0,014 mm. Endocysts as in the type, but larger. — Pl. II, 5.

Chætoceros Mitra (Bail.) Cl. — *Chains* straight, solid, multicellular. Foramina narrow, slightly panduriform to narrow elliptical, shorter than the cellules. *Cellules* in sagittal view almost quadrate, with slightly protracted angles; in transversal view elliptical. Valves concave. Dimensions: *long. ax.* 0,032; *sag. ax.* 0,038; *transv. ax.* 0,024 mm. Awns marginal, their basal part short, their prolongations almost straight, in the sagittal view diverging in a right angle. Terminal awns stronger than the others, with spirally arranged puncta, obsoletely transversely striate. *Endocysts* with very different valves, one flat, and the other elevated to two large cones, having at the top a branched silicious awn; in transverse view elliptical. *Sag. ax.* 0,04; *transv. ax.* 0,024 mm. — Pl. II, 1, 2.

Syn. *Dicladia mitra* Bail., *D. groenlandica* Cl. (Diat. of the arct. sea p. 12 Pl. II f. 10).

The endocysts have been known for long and are widely distributed in the polar seas. They occur abundantly in the Cape Wankarema material, on the iceflakes, drifting along the east coast of Greenland. It is sometimes found in a fossil state in the Baltic deposits of the Litorina-epoch. In Baffins Bay it appears in the middle of August and continues to the end of September. It was not observed in the Davis Strait plankton, collected in October. All appears to show that this characteristic form is derived from the polar seas.

Chætoceros septentrionalis OESTR. — *Cellules* isolated, slightly silicious, in sagittal view nearly quadrate, with concave valvular margins. Angle prolonged in filiform, sagittal awns. Dimensions: *long. ax.* 0,006 to 0,014; *sag. ax.* 0,006 mm. *Endocysts* with similar, granulate valves, in sagittal view lenticular in transversal view elliptical. Dimensions: *long. ax.* 0,005; *sag. ax.* 0,01; *transv. ax.* 0,006 mm. — Pl. II, 8.

This form described and figured by OESTRUP (Meddelelser om Grönland XVIII p. 457 Pl. VII f. 88) occurs abundantly in the plankton of the east Greenland. It is found sparingly in the plankton of Baffins Bay from the middle of August. It is very similar to, if not identical with *C. pelagicus* CL. (Diat. of the Arct. sea p. 11 Pl. I f. 4), but as this form occurs in chains, I cannot at present unite them.

Chætoceros socialis LAUDER. -- *Chains* short, usually of 3 to 6 cellules, slightly silicious. Foramina smaller than the cellules, narrow rectangular, scarcely narrowed in the middle. *Cellules* in sagittal view quadrate to rectangular, in transversal view elliptical. Valves slightly concave. Awns marginal, their basis very short, longitudinal, their prolongations delicate and filiform, the two arising from the one pole diverging in an acute angle, the two from the opposite pole strongly diverging, almost transversal. Terminal awns not stronger than the others. Dimensions: *long. ax.* 0,006 to 0,012; *sag. ax.* 0,006 to 0,012; *trarsv. ax.* 0,002 to 0,004 mm. *Endocysts* unarmed enclosed in strongly silicious, cylindrical cellules, their valves somewhat dissimilar, one being more convex or conical than the other. *Sag. ax.* 0,005 mm. — Pl. II, 9.

Being not quite sure about the identity of this form with LAUDER's species I have given the above description. The chains occur associated in a very strange manner by one of the awns being much longer than the others. These prolonged awns are united at their ends, thus forming a mycelium-like very intricate mass.

The *Chæt. Wighami* GRUN. in Arct. D. Pl. VII f. 134 doubtless represents the endocysts of this species, which thus occurs also in the sea of Kara. It occurs at the west-coast of Sweden in February. If the form of Baffins Bay really be identical with LAUDER's species, it occurs also at Hongkong. In Baffins Bay it is seen sparingly in May, but abundantly in September.

Coscinodiscus bioculatus GRUN. (Franz Jos. L. D. Pl. III f. 30, Pl. IV f. 1, 2) occurs, rarely, in May but is not rare in the October-plankton from Davis Strait. Entire frustules are cylindrical, with long, transversely plicate, very thin connecting zone, and the species might so be considered as a *Lauderia*. *Cosc. bioc.* occurs in the Cape Wankarema material and was found on a iceflake, met with between Franz Josefs Land and Novaja Semlja, but nowhere else, so far as known. — Pl. II, 13.

Coscinodiscus excentricus EHB. This widely distributed species was found abundantly in Davis Strait in October. Whether it be an inhabitant of the polar sea properly, or not, requires further researches, as C. excentricus probably comprises different forms.

Coscinodiscus hyalinus GRUN. is a true polar form. It was found in abundance in May at Disco.

Coscinodiscus lacustris var. hyperboreus GRUN. was found sparingly in the plankton, collected the 15:th of August. It is probably derived from molten ice.

Coscinodiscus Oculus Iridis EHB., which I do not consider as specifically different from *C. asteromphalus*, occurred in immense masses in the month of May, later on in the year it became scarce. The form from Baffins Bay has very finely punctate alveoli, thus agreeing with C. asteromphalus found in the North Sea and in a fossil state in the Baltic deposits of the Litorina-epoch. It is to be considered as a cosmopolitan species, euryhaline to such a degree that it can endure water with about 0,9 percent of salt.

Coscinodiscus subglobosus CL. & GRUN. represents the endocysts of a diatom, named below as *Thalassiosira gravida.*

Eucampia groenlandica CL. N. Sp. *Chains* arcuate, with rounded quadrate foramina, many times shorter than the cellules. *Cellules* in sagittal view nearly rectangular, with short, truncate angular processes, in transversal view narrow, with parallel margins and rounded rostrate ends. Dimensions: *long. ax.* 0,032 to 0,1; *sag. ax.* 0,013 to 0,02; *transv. ax.* 0,01 mm. Zone with scarcely visible divisions. Valves with distinct central nodule and indistinct structure. — Pl. II, 10.

This species occurs sparingly in the plankton of Baffins Bay from the middle of August and in Davis Strait in the beginning of October.

Fragilaria cylindrus GRUN. This species, found on the ice of Cape Wankarema, Franz Josefs Land and the east-coast of Greenland, was very abundant in the May-plankton, but became scarce later on in the year. It is a species no doubt very characteristic of the polar sea-plankton. It occurs in bands as the other species, which do not differ in appearance. It is only on boiled specimens that one can distinguish the different pelagic species of Fragilaria.

Fragilaria oceanica CL. This species appeared in large masses in May, became later more scarce, but reappeared in Davis Strait in October. Fragilaria oceanica is a species characterizing the plankton of the polar sea and the northern Atlantic. It is difficult to define its exact distribution as it may be easily mistaken for other species, if not boiled with acids.

Lauderia confervacea CL. N. Sp. Cellules coherent in long and very thin threads, diameter 0,01 mm. Length of the frustule 0,015 to 0,03 mm. Spines at the periphery of the valve about 10 in 0,01 mm., very short. Divisions of the zone are seen only with difficulty. — Pl. II, 21.

This very delicate form, which occurs sparingly in some samples from Baffins Bay, is entirely destroyed on boiling with acids and greatly altered by ignition.

Melosira (nummularia var.) hyperborea GRUN. occurs sparingly in May, June and August. It is a characteristic form of the polar sea.

Navicula septentrionalis OESTRUP (Meddelelser om Grönland XVIII 1895, p. 439 Pl. VIII f. 97). This species is a very characteristic plankton-form, and occurs in long bands of firmly united frustules, which are so thin that they are destroyed on boiling with acids. I have not succeeded in resolving the structure. It occurs not rarely in May, but is very scarce in August.

Another Navicula occurred together with this species in a similar manner. Dimensions: *sag. ax.* 0,015; *transv. ax.* 0,004; *long. ax.* 0,005 mm. I was not able to resolve the structure of this species. On ignited specimens some very fine hairs were seen issuing from the central nodule. I call it provisionally *N. pelagica.* — Pl. I, 9.

Nitzschia Closterium W. SM. occurs sparingly in most samples. Probably a cosmopolitan species.

Nitzschia frigida Grun. is a true plankton diatom, which occurs in irregular, branched chains as *Thalassiothrix Frauenfeldii*. It was found sparingly from May to the middle of August and is characteristic for the polar seas.

Nitzschia lævissima Grun. was found in isolated specimens in most of the samples. Characteristic polar-diatom.

Nitzschia polaris Grun. was found in some few samples. Doubtful as a plankton-diatom.

Nitzschia seriata Cl. (Vega Pl. XXXVIII f. 75) is a characteristic plankton-diatom, occurring in rows of coherent frustules. It was found abundantly in May, scarcer later on in the year. It was also found in Davis Strait in October, but rarely. It is not mentioned by Oestrup as occurring on the east-coast of Greenland, but occurs on the west-coast of Sweden in the month of February.

Pleurosigma Stuxbergii Cl. and its variety *rhomboides* Cl. occur sparingly in most samples; are no doubt characteristic of the plankton of the polar seas.

Podosira glacialis Grun. (*Pod. horm. var. glac.* Grun. in Franz Josefs Land. Diat. Pl. IV f. 32). In the plankton of May a form occurs abundantly, which in size and structure seems to me to agree with the fig. of above in Grunow's work, but as the valves are almost plane I cannot consider it a variety of *P. hormoides*, but rather of *P. Febigerii* Grun. There occurs constantly near the margin a small pseudonodule, not to be seen on Grunow's figure. It is no doubt nearly related, perhaps a large form only, of *Thalassiosira gravida* named bellow. — Pl. II, 17—20.

Rhizosolenia hebetata Bail. This species, which I have seen abundantly only in the plankton of Behring Sea, occurs very rarely in a sample collected at the end of September. Some few specimens were also found in the October-plankton from Davis Strait.

Rhizosolenia setigera Btw. occurs sparingly in most samples.

Rhizosolenia styliformis Btw. This species, so abundant in the northern and middle Atlantic, was met with, in a few specimens only, in many of the samples. It is evidently no polar form and has been found as well in the Mediterranean as in the Indian Ocean.

Thalassiosira gravida Cl. N. Sp. *Cellules* coherent by a central mucous thread, in sagittal view with quadrate outline,

in transversal orbicular. Valves almost flat, with numerous and irregularly arranged small spines near the margin, about 5 in 0,01 mm. Structure: fine puncta arranged in rows, radiate from the centre (where is a cluster of small, irregular puncta) to the periphery, 20 in 0,01 mm., and crossed by oblique and somewhat curved rows. Diameter of the valve 0,025 to 0,04 mm. *Endocysts* are identic with *Coscinodiscus subglobosus* CL. a. GRUN. — Pl. II, 14, 15, 16.

This interesting form occurs in the same peculiar manner as *Thalassiosira Nordenskiöldii* and may under a low power be easily mistaken for it, but it is distinguished by the numerous, short marginal spines, *Th. Nord.* having a single row of strong spines at a distance from the margin.

Specimens, collected in the middle of August were frequently found containing endocysts, in all respects agreeing with *Coscinodiscus subglobosus*, so widely diffused in the polar basin. I have placed this species in Thalassiosira, as it resembles *Th. Nordenskiöldii*, but only provisionally, because all the forms of Coscinodiscus, Lauderia and others want a thorough revision, and to be arranged in a more scientific manner than hitherto.

Thalassiosira Nordenskiöldii CL. This species occurs in great abundance in the whole polar sea, being common on the ice at Cape Wankarema, and forming, almost alone, the plankton north of Jalmal, north of Finmark, north-west of Spitsbergen, and there colouring the sea for many miles in extent. From there it spreds southwards, and occurs, sparingly, in the plankton of the west-coast of Sweden down to Kiel. A sample of plankton, collected the 24:th of July off Cary Islands, at the northern end of Baffins Bay, was very rich in this species and Th. gravida. From the middle of August to the beginning of October it occurred abundantly in most of the samples from Baffins Bay. According to OESTRUP it is abundant in the plankton of the east-coast of Greenland.

This species is frequently found together with *Coscinodiscus excentricus* which seems to comprise different forms one of which probably represents the endocysts of T. Nordenskiöldii.

Thalassiothrix longissima CL. a. GRUN. occurs in the October-plankton of Baffins Bay.

Diatoms from a mass of cilioflagellates, collected at Cape Eglinton.

As stated above I tried to get from a mass of cilioflagellates the diatoms which were met with sparingly in this plankton. I succeeded in mounting some few slides, which contained a considerable number of species. I have arranged them in the following list, from which it will be seen what forms among them have been already found on the east coast of Greenland (according to OESTRUP), at Franz Josefs Land and the sea of Kara (according to GRUNOW), at Cape Wankarema (near Behrings Strait) and in seas outside the polar basin.

Diatoms found at Cape Eglinton.

	East Greenland.	Franz Josefs Land.	Kara and East Cape.	Cape Wankarema and East Cape.	Outside the Polar seas.
Achnanthes hyperborea GRUN.	.	+	.	.	0
» tæniata GRUN.	.	+	.	.	0
Actinocyclus alienus var arctica GRUN.	.	.	+	.	0
Amphiprora concilians CL.	.	.	.	.	0
A. decussata var. septentrionalis GRUN.	+	.	.	+	0
A. kariana var. subtilis	.	+	.	.	0
A. Kjellmanii CL.	.	.	+	.	0
A. kryophila CL.	+	.	+	.	0
A. paludosa var. borealis GRUN.	.	+	.	.	0
» var. punctulata GRUN.	+	+	+	.	0
Amphora lævissima var. minuta CL.	+	+	.	.	+
A. (coffeif. var.) perpusilla GRUN.	.	+	.	.	0
Chætoceros atlanticus CL.	+	.	.	.	+
C. borealis BTW.	+	.	+	.	+
C. decipiens CL.	+	.	.	.	+
C. (Mitra (BAIL.) CL.	+	+	+	.	+
C. septentrionalis OESTR.	+	+	.	.	0
Coscinodiscus bathyomphalus CL.	+	+	+	.	0
C. bioculatus GRUN.	.	+	+	.	0
» var. exigua GRUN.	.	+	.	.	0
C. curvatulus var. genuina GRUN.	+	+	+	.	+

	Outside the Polar seas.	Cape Wankarema and East Cape.	Kara and Franz Josefs Land.	East Greenland.
C. curvatulus var. kariana GRUN.	+	+	+	0
C. kryophilus GRUN.	+	. . .	+	0
C. Oculus iridis EHB.	+	. . .	+	+
C. polyacanthus var. intermedia GRUN.	+	. . .	+	0
Diploneis litoralis var. arctica CL.	+	. . .	+	0
» » var. clathrata OESTR.	+	. . .	+	0
» » var. hyperborea CL.	+	. . .	+	0
Fragilaria cylindrus GRUN.	+	+	+	0
» oceanica CL.	+	+	+	+
Gomphonema exigua var. pachyclada BRÉB.	+	. . .	+	+
» » var. arctica GRUN.	. . .	. . .	+	0
G. kamtschaticum var. groenlandica OESTR.	+	. . .	+	0
Melosira nummularia var. hyperborea	+	+	+	0
Navicula algida GRUN.	+	. . .	+	0
N. decipiens CL.	+	. . .	+	0
N. directa var. genuina CL.	+	+	+	+
» var. subtilis GREG.	+	+	+	+
N. forcipata var. minima OESTR.	+	. . .	. . .	0
N. gelida GRUN. var. pusilla CL.	. . .	. . .	. . .	0
N. hyalosira CL. var.	. . .	. . .	. . .	+
N. kariana GRUN.	+	+	+	0
N. Kepesii GRUN.	. . .	+	+	0
N. Kjellmanii CL.	+	+	+	0
N. kryokonites var. semiperfecta CL.	+	. . .	+	0
N. (Rhoiconeis) obtusa CL.	+	. . .	+	0
N. Oestrupi CL.	. . .	. . .	. . .	0
N. Pediculus CL.	. . .	. . .	. . .	0
N. sibirica CL.	+	. . .	+	0
N. solitaria CL.	. . .	. . .	. . .	0
N. subinflata GRUN.	+	. . .	+	+
N. (Rhoiconeis) superba CL.	+	. . .	+	0
N. transitans CL.	+	. . .	+	0
» var. derasa GRUN.	+	. . .	+	0
» var. erosa GRUN.	+	. . .	+	0
N. trigonocephala CL.	+	. . .	+	0
» var. minor OESTR.	+	. . .	. . .	0

	Outside the Polar seas.	Cape Wankarema and East Cape.	Kara and Franz Josefs Land.	East Greenland.
N. vaga Cl.	. . .	. . .	. . .	0
N. valida Cl.	+	+	+	0
» var. minuta Cl.	+	. . .	+	0
N. vitrea Cl.	+	+	+	+
Nitzschia Acus Cl.	. . .	. . .	. . .	0
N. arctica Cl.	. . .	. . .	+	0
N. Brébissonii var. borealis Grun.	+	. . .	+	0
N. diaphana Cl.	. . .	. . .	. . .	0
N. distans var. erratica Cl.	. . .	. . .	+	0
» var. labradorica Cl.	. . .	. . .	. . .	0
N. frigida Grun.	+	+	. . .	0
N. hybrida Grun.	+	+	+	+
N. lævissima Grun.	+	+	+	0
N. lanceolata var. pygmæa Cl.	. . .	. . .	+	0
N. linearis var. tenuis	+	+	+	+
N. polaris Grun.	+	+	+	0
N. recta Hantzsch	+	. . .	. . .	+
Pinnularia ambigua Cl.	+	. . .	+	+
P. quadratarea A. S.	+	+	+	+
» var. bicontracta Oestr.	+	. . .	. . .	0
» var. densestriata Cl.	. . .	. . .	. . .	0
» var. minima Oestr.	+	. . .	. . .	0
» var. Stuxbergii Cl.	+	+	+	0
» var. subcontinua Grun.	. . .	+	+	0
» var. subconstricta Oestr.	+	. . .	. . .	?
Pleurosigma Clevei Grun.	+	+	+	0
» » var. sibirica Grun.	. . .	. . .	+	0
P. Stuxbergii Cl.	+	+	+	0
» var. minor Grun.	. . .	+	. . .	0
» var. rhomboides Cl.	+	+	+	0
Podosira glacialis Grun.	. . .	+	+	0
Stauroneis septentrionalis Grun.	. . .	+	. . .	0
S. Spicula Hickie	+	. . .	+	+
S. pellucida forma arctica Cl.	+	. . .	+	0
S. perpusilla Grun.	+	+	. . .	0
Stenoneis inconspicua var. Baculus Cl.	+	. . .	+	0

	Outside the Polar seas.	Cape Wankarema and East Cape.	Kara and Frauz Josefs Land.	East Greenland.
Synedra hyperborea var. rostellata GRUN. . . .	0	. . .	+	. . .
Thalassiosira gravida CL.	?	+	+	+
T. Nordenskiöldii CL.	+	+	+	+
Thalassiothrix longissima CL.	+	+	. . .	+
Sum 97	23	65	42	66
Percentage	23,7	68	43	68

The above list shews in a striking manner how few of these forms have been found outside the polar basin, 23,7 percent only. At the east-coast of Greenland as well as at Cape Wankarema 68 percent have been found. Almost all of them occurred on ice-flakes and it seems very probable that the forms found in the sample of Ceratium Tripos, 30 naut. miles from Cape Eglinton, are also derived from molten ice, which drifted with the Labrador-stream. It can hardly be assumed that so many litoral forms, among which many are extremely small and delicate, may live so far from the shore. Besides most species were found in few specimens only.

The great resemblance between the diatoms found on the ice at Cape Wankarema, between Franz Josefs Land and Novaja Semlja, and at the east-coast of Greenland and those observed in the Labrador-stream, tends to shew that the ice-flakes are drifted from Behrings Strait to the north of Greenland, where one portion of them continues to drift along the east-coast of Greenland and another with the Labrador-stream.

Remarks on the forms, indicated in the above list, or found sparingly in the plankton.

Achnanthes polaris OESTR. (p. 408 Pl. VII f. 86). Frustule not genuflexed. V. in length 0,05 and in breadth 0,01 mm., lanceolate, gradually tapering from the middle to the somewhat obtuse ends. Upper valve with narrow and central axial area; striæ costate, 10 in 0,01 mm., very slightly radiate.

Lower valve with distinct median line and nodules. Striæ, 10 in 0,01 mm., costate, nearly parallel throughout. No areas. — Pl. I, 5.

This is a remarkable species of the subgenus *Microneis*, being, as OESTRUP has pointed out, most nearly related to *A. Hauckiana*.

Actinocyclus alienus var. arctica GRUN. The form I have identified with this variety agrees perfectly with specimens in the Wankarema material, determined by GRUNOW, but differs in some respects from the figure in the VAN HEURCK's synopsis, as to structure, for which reason I have given a sketch of it. — Pl. II, 11, 12.

Amphiprora (?) **concilians** CL. N. Sp. V. elongated, with obliquely attenuated, acute ends. L. 0,08; B. 0,009 mm. Median line sigmoid. No areas, and no junction-line. Striæ oblique, 25 in 0,01 mm. — Pl. I, 12, 13.

Of this strange form a single valve only has been observed, for which reason the zone could not be examined. It is questionable whether this form really be an Amphiprora or a Navicula of the section *Microstigmaticæ*.

A. (coffæiformis var.?) perpusilla GRUN. A few specimens, perfectly agreeing with GRUNOW's figure and description were found.

Chætoceros septentrionalis OESTR. In Arct. Diat. Pl. VII f. 135 GRUNOW has figured a very strange form, which I believe may represent this species in a somewhat oblique position. At least, I have seen in my slides some specimens of *C. septentrionalis* in such a position that they had some resemblance to GRUNOW's figure.

Diploneis litoralis var. arctica CL. N. var. L. 0,023 to 0,042; B. 0,014 to 0,021 mm. Striæ 17 to 20 in 0,01 mm. not distinctly punctate. — Pl. I, 7.

This form is, as I know by examination of original specimens, the same form which OESTRUP has figured Pl. V f. 52 as *Nav. parca*.

Diploneis litoralis var. clathrata OESTR. (*Nav. clat.* OESTR. Pl. III f. 15) is, as I have found by inspection of original specimens, a form with fine striation, intermediate between *D. advena* and *D. litoralis*. — Pl. I, 2.

Diploneis litoralis var. hyperborea CL. Linear with rounded ends. L. 0,09; B. 0,018 mm. Furrows and central nodule

as in the type. Transverse striæ 10 in 0,01 mm., parallel, radiate at the ends. Alveoli also 10 in 0,01 mm. — Pl. I, 1.

This form is the same as OESTRUP figures (Pl. IV f. 4) as *Nav. didyma var.*, as I have convinced myself by inspection of original specimens.

Gomphonema exiguum var. pachyclada BRÉB. is to judge from specimens from east Greenland the same as *G. septentrionale* OESTR. (p. 414 Pl. III f. 9).

Gomphonema kamtschaticum var. groenlandica OESTR. This form, which is frequent in the Wankarema material, and has been named by GRUNOW in CL. & MÖLL. Diat. 315—318 *G. kamtschaticum var. siberica* is to judge from original specimens the same as *G. groenlandicum* OESTR. (p. 414 Pl. III f. 8, 11, 12).

Navicula decipiens CL. N. Sp. V. linear, with rounded ends, 0,04 to 0,05 mm. in length and 0,008 to 0,01 mm. in breadth. Axial area indistinct or very narrow. Central area an irregular, transverse fascia, frequently prolonged into narrow bands across the striæ. Terminal nodules at some distance from the margin. Striæ 14 to 16 in 0,01 mm. parallel, radiate around the terminal nodules, not distinctly punctate, but frequently interrupted. — Pl. I, 3, 4.

This form has been figured by me as an extreme variety of GRUNOW's *Nav. algida* (Vega Pl. LXXXVII f. 41). It is doubtless the same as OESTRUP's *Nav. latefasciata var. angusta* (Pl. IV f. 35) of which *Nav. semiinflata* OESTR. (l. c. f. 39) seems to be a variety only. Also *Nav. glacialis var. inæqualis* OESTR. (Pl. V f. 53) and *var. angusta* (l. c. f. 55) seem to be varieties of the same species, but have the striæ split up in fragments, as is the case with so many other of the diatoms found on the iceflakes in the polar sea. The two last forms seem to be related to the former as *Nav. erosa* to *Nav. transitans.*

The systematic place of this form is very uncertain. Perhaps it may be related to *Pinnularia quadratarea.*

Navicula gelida var. perpusilla CL. L. 0,022; B. 0,007 mm. Striæ 17 in 0,01 mm. parallel. This form resembles *Nav. bahusiensis* OESTR. (Pl. IV f. 31), which however cannot be the species so named by GRUNOW, as the latter is far more delicate and has finer striæ. I cannot identify this variety with OESTRUP's fig. as the latter shews the striæ radiate. — Pl. I, 15.

Navicula Hyalosira var. I was unable to resolve the striation, for which reason the identification is somewhat uncertain.

Navicula kryokonites var. semiperfecta Cl. differs in nothing from Oestrup's *Nav. semistriata* (p. 438 Pl. VI f. 66).

Navicula Oestrupi Cl. N. Sp. Linear, slightly biconstricted, obtuse. L. 0,067; B. 0,007 mm. Median line central and straight; its terminal fissures turned in contrary directions. No axial or central area. Striæ parallel, reaching to the median line, about 24 in 0,01 mm., somewhat wider in the middle of the valve, crossed near the margin by a fine longitudinal line. — Pl. I, 10.

This form is either nearly related or perhaps identical with »*Amphiprora? amphoroides*» Oestr. (p. 442 Pl. VI f. 70), but I am unable to identify them as Oestrup does not give the number of the striæ. That Oestrup's form is acute and my obtuse is of no importance. As to the systematic place of this form I am uncertain. Were is not for the longitudinal lines I should be inclined to place it in the section *Fusiformes* near *N. parallelistriata* Pant.

Navicula Pediculus Cl. N. Sp. V. elliptical. L. 0,012; B. 0,0065 mm. No areas. Striæ 27 in 0,01 mm. parallel, slightly radiate at the ends. — Pl. I, 14.

This very small species resembles Grunow's *N. debilissima*, but the striæ are very distinct. From *N. muralis* it differs by its marine habitat and parallel striæ.

Navicula solitaria Cl. N. Sp. V. linear, with rounded obtuse ends. L. 0,03 to 0,04; B. 0,006 to 0,007 mm. Median line central, straight, with approximate median pores and marginal terminal nodules. Striæ 10 to 11 in 0,01 mm., parallel throughout, not distinctly punctate. No areas. — Pl. I, 6.

This form occurred very sparingly in the Cape Eglinton material. Its nearest allies seem to be in the *N. directa*-group.

Navicula vaga Cl. V. lanceolate, with long and narrow, protracted ends. L. 0,045; B. 0,0035 mm. Terminal nodules marginal. Structure could not be resolved. — Pl. I, 16.

This species is evidently nearly related to *Nav. Lineola* Grun. from which it differs by its gibbous centre.

Navicula valida var. minuta Cl. (Vega D. p. 466). L. 0,029; B. 0,015 mm. Striæ 9 in 0,01 mm.

Exactly the same form as from Cape Wankarema.

Nitzschia Acus CL. N. Sp. Linear, attenuated at the ends. Keel very excentric. L. 0,07; B. 0,002 mm. Puncta 10 in 0,01 mm., the median distant. Striæ could not be resolved.

This species, of which I have seen a single specimen only, seems to be allied to *N. tubicola* GRUN. — Pl. I, 35.

Nitzschia arctica CL. Frustule linear. L. 0,13; B. 0,014 mm. with obsoletely plicate connecting zone. Valve narrow linear, attenuate to the acute ends. Keel very excentric, its puncta 8 in 0,01 mm. a little wider in the middle, where is a trace of a central nodule. Striæ 25 in 0,01 mm. — Pl. I, 21, 22.

This is the same form as I have found in a gathering from Bessels Bay and named *N. vitrea var.* (Linn. Soc. J. Bot. XX p. 316).

Nitzschia Brébissonii var. borealis GRUN. Valve in length 0,14 to 0,17, in breadth 0,006 to 0,008 mm. Keel excentric, its puncta 7 to 8 in 0,01 mm. Striæ 17 to 18 in 0.01 mm. punctate. — Pl. I, 28 to 32.

To this form, which occurs not rarely on the ice at Cape Wankarema, GRUNOW has given the above name (CL. & M. Diat. N:o 315—318). OESTRUP names it *N. socialis var. septentrionalis* (p. 445 Pl. VII f. 80).

Nitzschia diaphana CL. N. Sp. V. slightly sigmoid, linear-lanceolate, acute. L. 0,07; B. 0,006 mm. Keel central. Keel-puncta 14 in 0,01 mm., more distant in the middle, where there is a distinct central nodule. Striæ 26 in 0,01 mm. — Pl. I, 33.

This form seems, from its central nodule, to belong to the group of *N. obtusa*, and has its nearest relation in *N. Vidovichii* GRUN.

Nitzschia distans var. erratica. Valve in length 0,18 and in breadth 0,01 mm. Keel-puncta 4 in 0,01 mm. Striæ about 30 in 0,01 mm. — Pl. I, 23, 24, 25.

An exactly similar form occurs not very rarely in the Wankarema-material.

Nitzschia distans var.? labradorica CL. Valve in length 0,13 and in breadth 0,006 mm. Keel-puncta 6 in 0,01 mm. Striæ about 30 in 0,01 mm. somewhat corroded, for which reason the valve seems under certain illumination to be punctate, which is also the case with the previous variety. — Pl. I, 26, 27.

Nitzschia hybrida GRUN. One valve was found exactly similar to the variety figured by GRUNOW in Franz Josefs

Land Diat. Pl. I f. 61; also a more typical specimen. L. 0,08; B. 0,005 mm. Striæ 24 in 0,01 mm. — Pl. I, 17, 18.

Nitzschia lanceolata var. pygmæa Cl., identical with the form in Wankarema material (Vega Diat. p. 481). L. 0,035 to 0,047; B. 0,004 to 0,005 mm. Keel-puncta 12 in 0,01 mm. — Pl. I, 19, 20.

Nitzschia recta Hantzsch. L. 0,12; B. 0,05 mm. Keel-puncta 6 and striæ more than 30 in 0,01 mm. — Pl. I, 34.

Pinnularia ambigua Cl. One specimen identical with the form from Cape Wankarema (*Nav. retusa* Cl. Vega D. Pl. XXXVI f. 35). L. 0,06 mm. Striæ 7 in 0,01 mm. Striæ on the divisions of the connecting zone 24 in 0,01 mm.

Pinnularia quadratarea var. densestriata Cl. V. slightly biconstricted, with cuneate ends. L. 0,04; B. 0,009 mm. Striæ 14 in 0,01 mm. — Pl. I, 8.

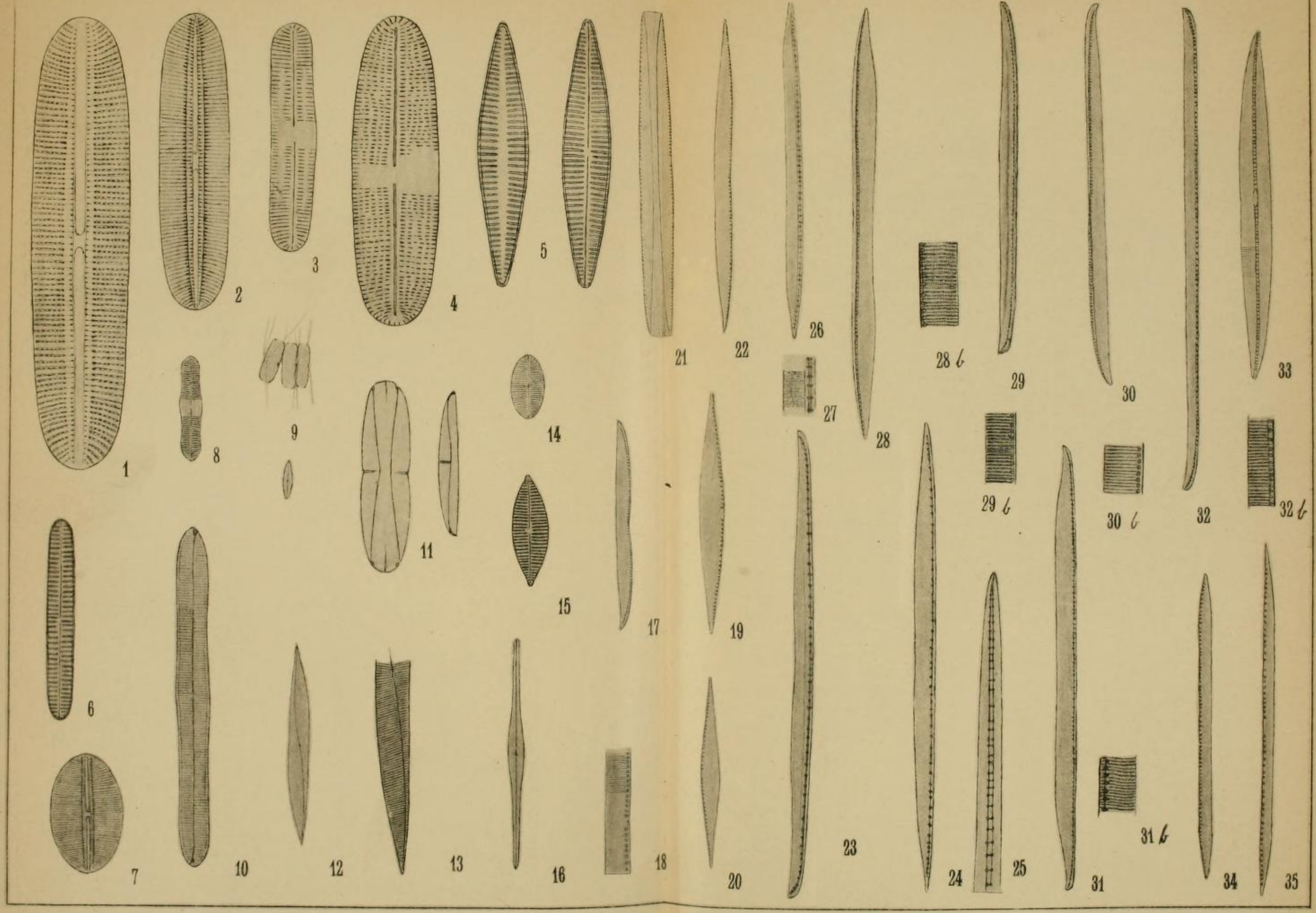
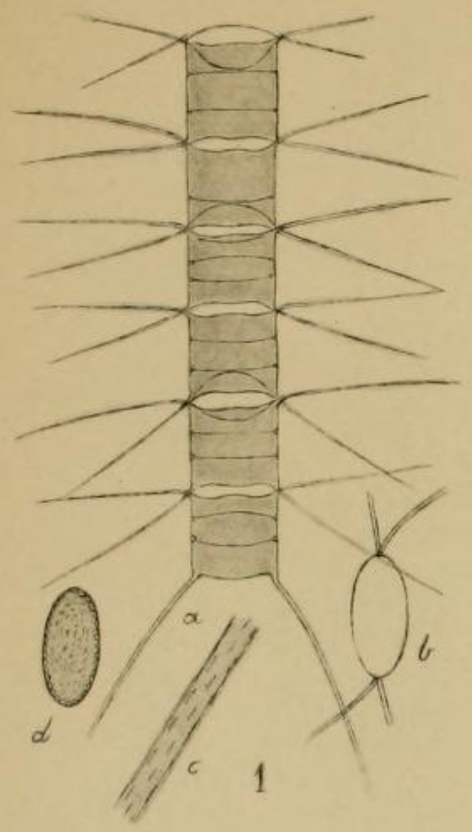
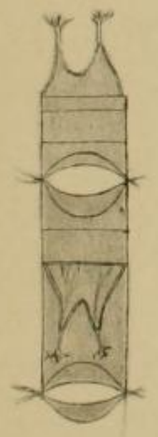

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
28 b
29
29 b
30
30 b
31
31 b
32
32 b
33
34
35

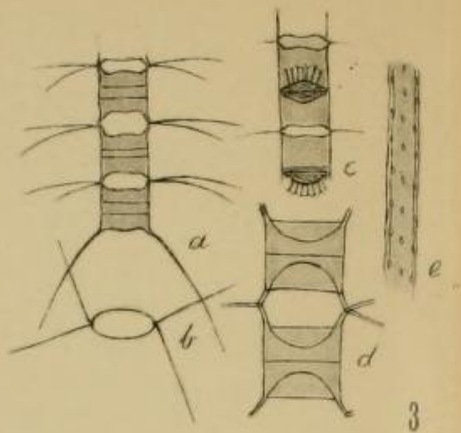
Plate I.

Plate II.

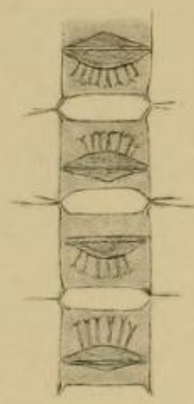


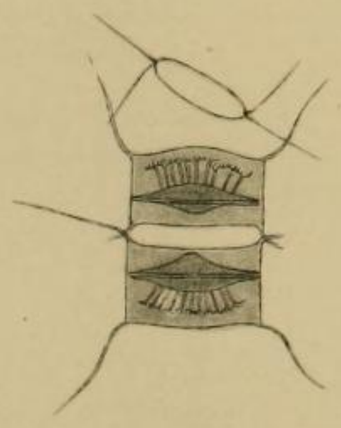
1

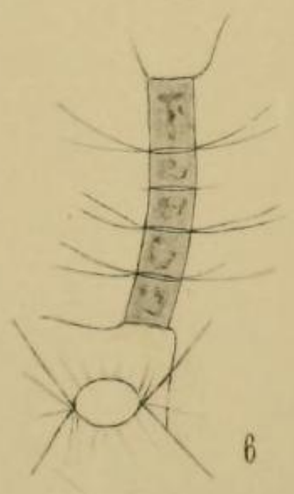

2

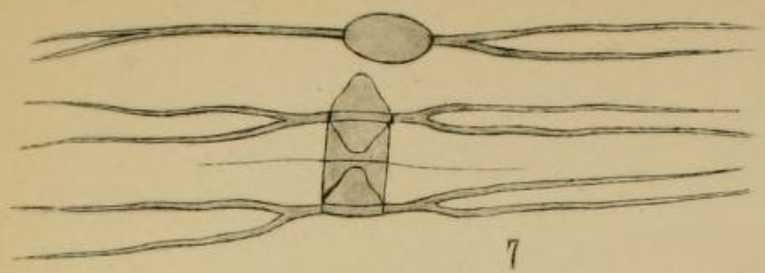


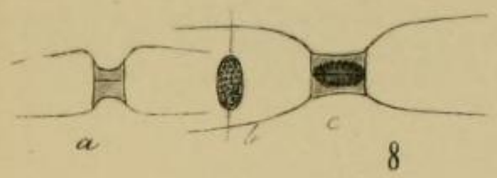
3


4

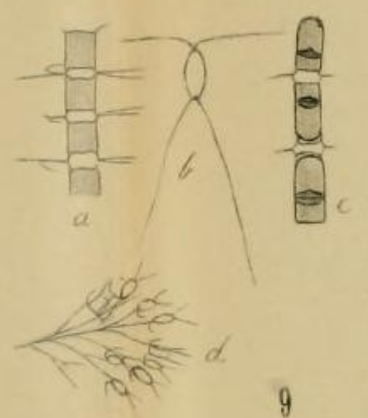

5


6

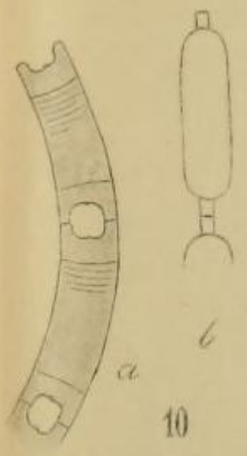

7



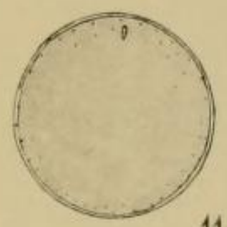
8

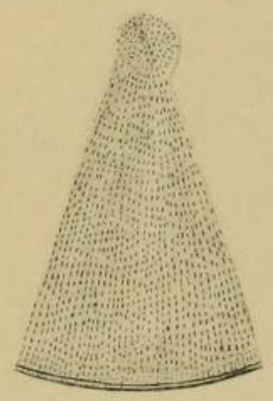


9

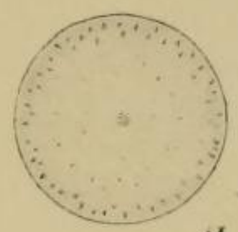


10


11


12

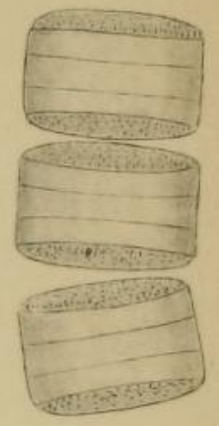

13


14


15


16


17


18


19


20