Odd forms found maybe drifting ice origin

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BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 24. Afd. **III**. N:o 2.

DIATOMS

FROM

FRANZ JOSEF LAND

COLLECTED BY

THE HARMSWORTH-JACKSON EXPEDITION

AND EXAMINED

BY

P. T. CLEVE

COMMUNICATED 1898 MARCH 9TH

STOCKHOLM 1898
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER

There is already in existence a monograph of the diatoms from Franz Josef Land by A. Grunow (Denkschr. d. K. K. Akad. d. W. zu Wien mat. natw. Cl. XLVIII, 2, 1884). This eminent diatomist had for examination some samples, dredged from the bottom of the sea by the Tegethoff expedition. This bottom-mud was found to contain, besides well-known arctic marine species, a remarkable number of forms, belonging to types known from the Tertiary deposits of Archangelsk, Mors etc., and doubtless derived from rocks of that age.

A number of freshwater species were found also, but on examining the list published in Grunow's work, one is puzzled by the presence of forms which certainly do not live on Franz Josef Land. There can be only one explanation of this, namely that they have been transported by currents or, more likely, by drifting ice from the European or Asiatic continents. As such foreign forms I consider the following species:

Cocconeis lineata var.,
Cymbella gastroides,
Gomphonema geminatum var. hybrida,
Epithemia turgida,
Synedra ulna,
Stephanodiscus Niagaræ,
S. astræa var. spinulosa,
Melosira granulata,
M. lyrata.

Of these forms *Gomphonema geminatum var. hybrida* is known from Jenissey and Ochotch, which points to the Siberian origin of these forms.

Mr H. Fisher, member of the Harmsworth-Jackson expedition to Franz Josef Archipelago, 1896, brought thence a collection of samples containing freshwater diatoms. He also

collected on an ice-floe, drifting 48 miles south of Bell Isle, a small quantity of mud, which contained diatoms sparingly.

All these samples, amounting to about 20 and collected chiefly at Cape Flora, but with a few from Cape Neale and Bell Isle, were delivered to me for examination with the following results.

Caloneis fasciata (Ldt). — Cape Neale, on roots of Luzula, very rare. — L. 0,027; B. 0,006 mm. — Str. 20 in 0,01 mm.

C. Clevei (Ldt). — Cape Flora, eastern glacier, very rare.

C. silicula (Ehb.) *v. alpina* Cl. — Very rare, eastern glacier, Cape Flora. L. 0,028; B. 0,006 mm. Striæ 19 in 0,01 mm.

v. minuta Grun. — L. 0,02; B. 0,005 mm. Str. 25 in 0,01 mm. — Sparingly in almost all samples.

v. ventricosa Donk. — L. 0,05; B. 0,007 mm. Str. 20 in 0,01 mm. — Very rare, Cape Flora.

Neidium bisulcatum Ldt. — Common in all samples.

N. iridis Ehb. — Sparingly in most samples. L. 0,056; B. 0,017 mm. Striæ 17 in 0,01 mm.

v. ampliata. — Somewhat rare. L. 0,03; B. 0,01 mm. Str. 19 in 0,01 mm. — Scarcely distinct from *N. affine.*

Diploneis elliptica Kütz. — Cape Flora, rare.

D. arctica Cl. N. sp. — Valve elongated, with broad, rounded ends. L. 0,03; B. 0,007 mm. Central nodule small. Furrows narrow. Striæ 23 in 0,01 mm., more distant in the middle, indistinctly punctate.

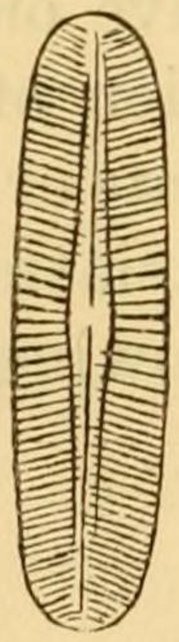

Fig. 1. 1000 t. m.

This form comes nearest to *D. oculata* Bréb., from which it differs by larger size, more elongated form and by the striæ, more distant in the middle. It occurs in most samples, but never in any abundance.

Navicula minima v. atomoides Grun. — Cape Flora, very rare. L. 0,01; B. 0,005 mm. Striæ in the middle about 18.

N. seminulum Grun. — Not rare in several samples.

N. Rotaeana Rabh. — Sparingly in some samples.

v. oblongella Grun. — Cape Flora, rare.

N. mutica Kütz. — Common and very variable. The most frequent forms are v. *Cohnii* and v. *ventricosa.*

The variety *undulata* Hilse is very rare.

N. Heufleriana Grun. — Occurs in many samples, but never abundantly.

N. nivalis Ehb. — Cape Flora, West Point, very rare.

N. contenta var. biceps ARN. — Not rare in several samples.

N. semen EHB. — Cape Flora, very rare.

N. gibbula CL. — Not rare in several samples.

Stauroneis anceps EHB. — Common in most samples. The most frequent form is var. *amphicephala* KÜTZ. (L. 0,045; B. 0,011 mm. Str. 21 in 0,01 mm.). — Also v. *linearis* is not rare.

S. phoenicenteron v. amphilepta EHB. — Cape Flora, rather rare. (L. 0,075; B. 0,014 mm. Str. 21 in 0,01 mm.).

S. obtusa LAGST. — Rare at Cap Neale on roots of Luzula hyperborea.

S. javanica GRUN. — Very rare, Cape Flora.

Navicula capitata CL. N. sp. — Valve elongated, linear, with capitate ends. L. 0,035; B. 0,008 mm. Axial area very narrow. Central area small. Striæ 17, not more crowded at the ends, slightly radiate throughout, not distinctly punctate.

Occurs sparingly in some samples from Cape Flora.

This form is a true Navicula, having no loculiferous ring as Mastogloia, to which it bears some resemblance. It has the outline of N. subtilissima CL., but the striæ are very distinct. It might perhaps be the form figured by LAGERSTEDT as *Stauroneis linearis*.

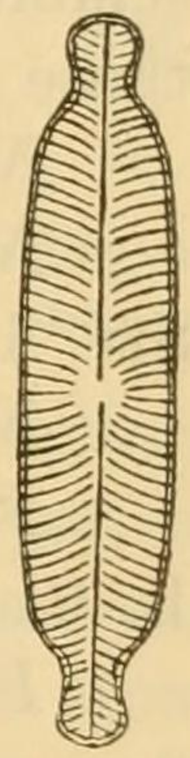

Fig. 2.

Cymbella amphicephala NÆGELI. — Not rare, but never abundant. L. 0,025; B. 0,0075 mm. Str. 12 in 0,01 mm.

C. lata GRUN. — L. 0,045; B. 0,015 mm. Str. 12—13 in 0,01 mm. — Cape Flora, sparingly in some samples. — Scarcely distinguishable from *C. Ehrenbergii v. delecta.*

C. stauroneiformis LDT. — Occurs in many samples.

C. naviculiformis AUERSW. — Not rare in many samples.

C. heteropleura v. minor CL. — Found sparingly in some samples.

C. ventricosa KÜTZ. — Cape Flora, rare.

C. cistula HEMPR. — Rare at the eastern glacier, Cape Flora.

v. arctica LDT. — Not rare in several samples. — Cape Flora, Bell Isle.

Gomphonema angustatum KÜTZ. — A variety with slightly rostrate ends. — L. 0,03; B. 0,007 mm. Str. 17 in 0,01 mm. — Not rare in most samples.

G. parvulum Kütz. — Some few specimens from Cape Flora, resembling G. Lagenula V. H. Syn. XXV, 8. — L. 0,032; B. 0,01 mm. Str. 17 in 0,01 mm.

Navicula minuscula Grun. — Sparingly in some specimens from Cape Flora, West Point. — L. 0,016; B. 0,006 mm. Striæ very fine.

N. cocconeiformis Greg. — Rare in some sample.

N. cryptocephala var. veneta Kütz. — L. 0,03; B. 0,007 mm. Striæ 18 in 0,01 mm.

N. hungarica v. capitata Ehb. — Sparingly in several samples.

N. cincta Ehb. — Rather common. — L. 0,022; B. 0,005 mm. Striæ 14 in 0,01 mm. — Some specimens bear a close resemblance to *N. costulata* and it seems questionable whether these two forms really are distinct species.

N. gracilis Ehb. — Not rare in one sample from Bell Isle.

N. anglica Ralfs *v. minuta* Cl. — L. 0,018; B. 0,008 mm. Str. 18 in 0,01 mm. — Sparingly in some samples.

N. amphibola Cl. — Sparingly in some specimens.

Pinnularia gracillima Greg. — Cape Flora, rare. — L. 0,03; B. 0,004 mm. Str. 20 in 0,01 mm.

P. leptosoma Grun. — L. 0,032; B. 0,006 mm. Str. 18 in 0,01 mm. — Sparingly in several samples.

P. subcapitata Greg. — L. 0,032; B. 0,005 mm. Str. 12 in 0,01 mm., reaching to the median line (= N. Hilseana). — Rare in some samples.

P. interrupta W. Sm. *var. biceps.* — Not rare in most samples. — L. 0,05; B. 0,011 mm. Str. 12 in 0,01 mm.

P. mesolepta Ehb. — Rare.

P. microstauron Ehb. — Not common.

P. divergentissima Grun. — Rather common.

P. Brébissonii Kütz. — Common. — L. 0,036; B. 0,01 mm. Str. 11 in 0,01 mm.

P. divergens W. Sm. — Rather common. — The most frequent form belongs to *var. elliptica* Grun.

P. intermedia Lgt. — Very common. — L. 0,04; B. 0,007 mm. Str. 8 in 0,01 mm.

P. Balfoureana Grun. — Bell Isle, sparingly. — L. 0,016; B. 0,0055 mm. Str. 11 in 0,01 mm., very short.

P. borealis Ehb. — Common.

P. lata Bréb. — Not common and very variable.

v. curta GRUN. — L. 0,06; B. 0,022 mm. Str. 6 in 0,01 mm. Axial area narrow. — Rare.

P. spitsbergensis CL. — Cape Flora. Common in some samples.

P. stauroptera GRUN. — Rare, Cape Flora, Eastern Glacier. — L. 0,065; B. 0,01 mm. Str. 12 in 0,01 mm., interrupted by a broad fascia.

P. mesogongyla var. interrupta CL. — Common in some samples.

P. hyperborea CL. N. sp. — Narrow, gradually tapering towards the obtuse ends. L. 0,03; B. 0,005 mm. Str. 15 in 0,01 mm., radiate in the middle, convergent at the ends. Axial area lanceolate, reaching in the middle to the margin of the valve. — Rare, Cape Flora.

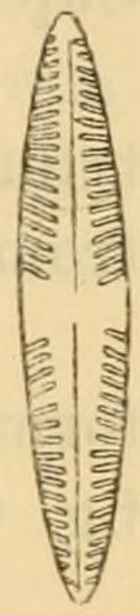

Fig. 3. 1000 t. m.

P. viridis var. fallax CL. — L. 0,055; B. 0,01 mm. Str. 12 in 0,01 mm. A. S. Atl. XLV 10, 11. — Common.

This form might be united to *P. isostauron*, which differs only by the transverse fascia, and considered as a separate species, characterized by its parallel striæ and narrow axial area.

P. viridis var. rupestris HANTZSCH. — In a sample from Cape Flora was met with some few specimens of a very small variety. L. 0,02; B. 0,013 mm. and 17 striæ in 0,01 mm.

P. streptoraphe v. styliformis GRUN. — Rare, Cape Flora.

P. isostauron GRUN. — Common. — See P. viridis var. fallax.

P. arctica CL. N. sp. — Narrow elliptical, with obtuse ends. L. 0,023; B. 0,006 mm. Striæ 13 in 0,01 mm., parallel. Axial area narrow, becoming wider towards the middle of the valve, where it expands into a transverse fascia. — Cape Flora, rare.

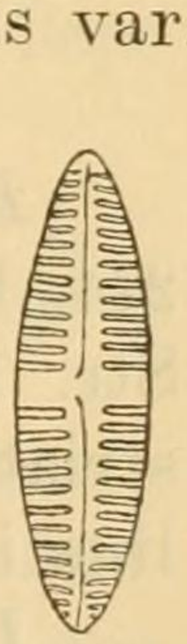

Fig. 4. 1000 t. m.

Amphora Normani RABH. — Rare, Cape Flora.

A. ovalis v. pediculus KÜTZ. — Rare in some samples.

Rhoicosphenia curvata KÜTZ. — Some few specimens were found in a sample from Bell Isle, probably derived from the sea.

Achnanthes marginulata GRUN. — Rare at Cape Flora.

A. minutissima KÜTZ. — Not rare.

A. linearis var. pusilla GRUN. — L. 0,015; B. 0,003 mm. Str. 24 in 0,01 mm. — Not rare in many samples.

Eunotia gracilis (Ehb.) Rabh. — Sparingly at Cape Flora. — L. 0,04—0,07; B. 0,0035 mm. Str. 12—14 in 0,01 mm.

E. lunaris (Ehb.) Grun. — L. 0,04—0,06; B. 0,004 mm. Str. 13—17 in 0,01 mm. — Sparingly in several samples. There is scarcely any specific distinction between *E. lunaris* and *E. gracilis*.

E. (impressa v.) minor Rabh. — To this form I refer a valve fig. 5. L. 0,038; B. 0,004 mm. Str. 12 in 0,01 mm. — Cape Flora, rare.

E. papilio Ehb. — L. 0,02; B. 0,01 mm. Ends broadly truncate. V. H. Syn. XXXIII, 8. — Sparingly in some samples from Cape Flora.

E. monodon v. alpina Kütz. — As such I consider a small form of E. monodon (L. 0,025; B. 0,005. Str. 14 in 0,01 mm. fig. 6) sparingly found in a sample from Cape Flora.

Fig. 5.

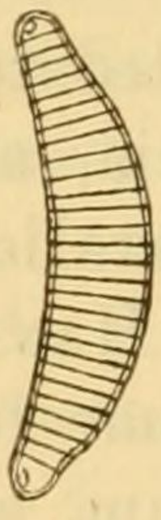

Fig. 6.

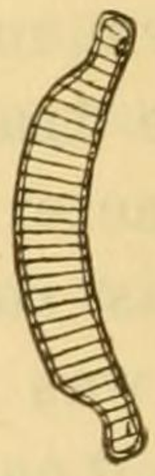

Fig. 7.

All 1000 t. m.

E. septentrionalis Oestr. — Meddelelser om Grönland XV, 274, Pl. 1, f. 10. — Some few specimens (L. 0,02; B. 0,004 mm. Str. 15 in 0,02 mm.) were found at Cape Flora. As to the striation this form agrees with E. fallax A. C., but the outline is different. (Fig. 7.)

E. prærupta v. curta Grun. — Rare at Bell Isle. — (L. 0,02; B. 0,01 mm. Str. 13 in 0,01 mm.).

v. laticeps Grun. (V. H. Syn. XXXIV, 25). — Cape Flora, rare. — (L. 0,025; B. 0,007 mm. Str. 11 in 0,01 mm.).

v. bigibba Kütz. (V. H. Syn. XXXIV, 26). — Cape Flora, rare. — (L. 0,02; B. 0,007 mm. Str. 10 in 0,01 mm.).

Diatoma tenue Ag. — *Diatoma vulgaris v. linearis* and *D. tenue* in V. H. Syn. L. 7, 14. — L. 0,015—0,026; B. 0,003 mm. Costæ 7—10 in 0,01 mm. — Very common in several samples.

Hantzschia amphioxys (EHB.). — Common. — L. 0,06; B. 0,01 mm. Puncta 6. Str. 22 in 0,01 mm.

v. hyperborea GRUN. (Fr. Jos. Land. Diat. I, 59). — L. 0,15; B. 0,015 mm. Puncta 6. Str. 14 in 0,01 mm. — Cape Flora, in some samples.

Meridion circulare AG. — Very common.

Fragilaria lapponica GRUN. *v. minuta* A. C. — L. 0,01; B. 0,003 mm. Str. 10 in 0,01 mm. — Very rare, Cape Flora.

F. nodosa CL. N. sp. — Valve gibbous in the middle, with broad, rounded ends. L. 0,014—0,017; B. 0,0035 mm. Axial area narrow linear, or slightly dilated in the middle. Striæ strong, 12—13 in 0,01 mm. — Sparingly in several samples. — Fig. 8.

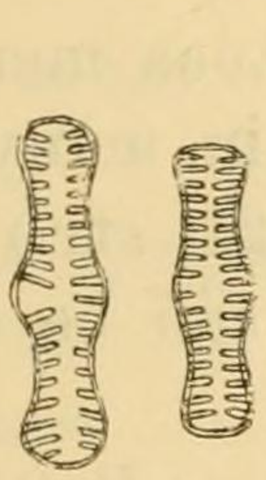

Fig. 8.
1000 t. m.

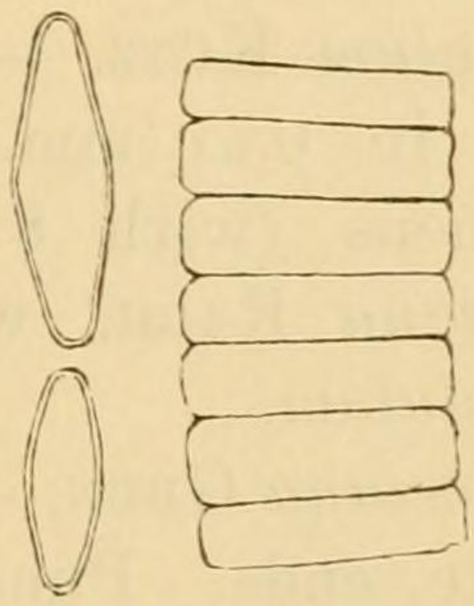

Fig. 9.
1000 t. m.

F. lævissima CL. N. sp. — Valve more or less rhomboid, with broad rounded ends. L. 0,011—0,016; B. 0,004 mm. — No striation seen. — Abundant in one sample from Cape Flora. — Fig. 9.

Synedra Vaucheriæ KÜTZ. (*Fragilaria intermedia* GRUN.). — Not rare in several samples. — (L. 0,03—0,035; B. 0,003—0,0035 mm. Str. 14 in 0,01 mm.).

Fragilaria capucina DESM. — Valve linear, with cuneate ends. L. 0,025; B. 0,003 mm. Axial area narrow lanceolate. Str. 20 in 0,01 mm. — Common in some samples from Cape Flora.

F. arcus KÜTZ. (*Ceratoneis arcus* AUCT.). — Very common.

var. recta CL. (*Fragilaria capucina v. inæquidentata* LAGST. Spitsb. D. 16, II, 1). — L. 0,06; B. 0,004 mm. Str. 17 in 0,01 mm. — Common, frequently together with F. arcus.

The only difference between *Ceratoneis arcus* and the *v. recta* is the arcuate flexure of the frustule of the former, as already Dr LAGERSTEDT has remarked.

Diatomella Balfoureana Grev. — W. Sm. Syn. II, LXI, 383. — Not rare in some samples.

Nitzschia (*Tryblionella*) *debilis* (Arnott). — Occurs in several samples, but nowhere in any abundance.

N. hungarica Grun. — L. 0,04; B. 0,009 mm. Puncta 8. Str. 20 in 0,01 mm. — This species was found abundantly in one sample.

N. thermalis v. minor Hilse. — V. H. Syn. LIX, 22. — Common. — L. 0,032; B. 0,004 mm. Puncta 11 in 0,01 mm. No striation seen.

N. hybrida Grun. var. — L. 0,06 mm. Puncta 10. Str. 25 in 0,01 mm. — Rare.

N. Clausii Hantzsch. — L. 0,038 mm. Puncta 10 in 0,01 mm. — Common.

N. frustulum Kütz. — L. 0,04; B. 0,003 mm. Puncta 10 and str. 22 in 0,01 mm. — Not rare in many samples. — Some specimens (with 8 puncta and 21 str.) agree with *N. Hantzschiana* Rabh., which scarcely can be distinguished from *N. frustulum*.

N. Heufleriana Grun. — L. 0,035—0,055; B. 0,03—0,06 mm., with capitate ends. Puncta 9—10. Str. 22 in 0,01 mm. — Sparingly, Cape Flora.

N. palea W. Sm. — Common in several samples. — L. 0,02—0,04; B. 0,025—0,05 mm. Puncta 11—13 in 0,01 mm. Striation not seen. — Common.

Denticula tenuis Kütz. — Some few specimens only were observed in a sample from Bell Isle.

Surirella angusta Kütz. — More or less common in several samples.

S. ovalis Bréb. — Bell Isle, one specimen only.

Melosira Roeseana Rabh. — Rare, Cape Flora.

The diatomaceous flora of the polar regions is now, with this addition, comparatively well known, I dare say better known than any other region of the world. The diatoms of Spitzbergen and Beeren Island were in 1873 carefully worked out by Dr. N. G. W. Lagerstedt.[1] The diatoms of Jan Mayen[2] and of East Greenland[3] by E. Oestrup. The diatoms of

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[1] Bih. t. K. Sv. Vet.-Akad. Handl. 1, N:o 14.
[2] Botanisk tidskrift XXI; 1 Heft. Copenh. 1897.
[3] Meddelelser om Grönland B. XV. Copenh. 1897.

West Greenland [1] and from Russian Lappland [2] have been catalogued by myself. Lastly the diatoms of Luleå Lappmark have been described by Miss ASTRID CLEVE.[3]

In order to get a general view of the diatomaceous flora of the polar regions I have compiled from the above works the following list, which may give as good an idea of the distribution of the arctic diatoms as can be formed at present.

	Frans Josef Land.	Spitzbergen.	Jan Mayen.	East Greenland.	West Greenland.	Russian Lappmark.	Luleå Lappmark.
Caloneis fasciata LDT	+	+	+	.	.	.	*r*
C. Clevei LDT	+	+	+	+	.	.	.
C. silicula EHB. v. alpina CL.	+	+	+	+	.	+	*r*
v. genuina CL.	.	.	.	+	.	.	*r*
v. inflata GRUN.	.	.	.	.	.	.	*r*
v. capitata LDT	.	+	.	.	.	.	.
v. minuta GRUN.	+	+	.	.	.	.	.
v. ventricosa DONK.	*r*	.	.	.	.	.	*r*
v. jenisseyensis GRUN.	.	.	.	.	.	.	*r*
C. bacillaris GREG.	.	.	.	.	.	.	*r*
v. thermalis GRUN.	.	.	.	.	.	.	*r*
C. obtusa W. SM.	.	.	.	*r*	+	+	*c*
C. Holstii CL.	.	.	.	.	+	.	.
Neidium bisulcatum LDT	*c*	*c*	.	*c*	+	+	*cc*
N. affine EHB. v. longiceps GREG. . . .	.	.	.	.	+	.	+
v. amphirynchus f. minor	.	+	.	+	.	+	+
f. major	.	+	.	.	.	.	.
v. genuina CL. f. minor	.	+	.	.	.	+	*r*
f. media	.	+	.	.	+	.	.
N. productum W. SM.	.	.	.	.	.	.	+
N. iridis EHB.	+	.	.	+	.	.	*r*
v. ampliata EHB.	*r*	.	.	.	.	.	*r*
N. amphigomphum EHB.	.	+	.	+	+	+	+
N. Hitchcockii EHB.	.	.	.	.	.	.	*r*

[1] Öfvers. af K. Sv. Vet.-Akad. Förh. 1881 N:o 10.
[2] Acta societatis pro fauna et flora fennica VIII, 2, 1891.
[3] Bih. t. K. Sv. Vet.-Akad. Handl. XXI, 3, N:o 2, 1895.

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	Esst Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
Diploneis domblittensis v. subconstricta A. Cl.	.	.	.	.	.	.	*rr*
D. elliptica Kütz.	*r*	.	.	.	.	.	*r*
D. arctica Cl.	*r*	.	.	.	.	.	.
D. Boldtiana Cl.	.	.	.	.	.	.	*r*
D. finnica (Ehb.)	.	.	.	.	.	.	*r*
D. ovalis Hilse	.	.	+	*r*	.	+	*r*
Navicula cuspidata v. ambigua Ehb.	.	.	.	*r*	.	.	.
Gyrosigma scalproides Rabh.	.	.	.	*r*	.	.	.
Frustulia vulgaris Thw	.	.	.	*r*	.	.	*r*
F. rhomboides Ehb.	.	.	.	*c*	.	+	*cc*
v. crassinervia Bréb.	.	+	.	+	.	+	*r*
v. amphipleuroides Grun.	.	.	.	.	.	+	*r*
Navicula minima v. atomoides Grun.	*r*	.	.	.	.	.	.
N. seminulum Grun.	+	+	.	.	.	.	*r*
N. Rotaeana Rabh.	+	+	+	+	.	+	*c*
v. oblongella Grun.	*r*	.	.	.	.	.	.
N. depressa Cl.	.	.	.	.	.	*r*	.
N. mutica Kütz. v. Cohnii Hilse	*c*	.	+	+	.	.	.
v. Göppertiana Bleisch	*c*	.	.	.	.	.	*rr*
v. ventricosa Kütz.	+	.	+	+	.	.	.
v. undulata Hilse	*rr*	.	.	*r*	.	.	.
N. Kotschyii Grun.	.	.	.	*r*	.	.	.
N. Heufleriana Grun.	+	.	.	.	.	.	.
N. nivalis Ehb.	*r*	.	.	.	.	.	.
N. pupula Kütz.	.	+	.	.	.	.	*r*
v. bacillarioides Grun.	.	.	.	.	.	.	*r*
N. contenta Grun.	.	.	.	+	.	.	.
v. biceps Arn.	+	.	.	+	.	.	.
N. perpusilla Grun.	.	.	.	.	.	*r*	.
N. bacillum Ehb.	.	.	.	.	.	.	*r*
N. semen Ehb.	*r*	.	.	.	.	.	*r*
N. gibbula Cl.	+	+	+	+	.	.	.
v. oblonga Ldt	.	+	.	.	.	.	.
v. capitata Ldt	.	+	.	.	.	.	.
N. Lagerstedtii Cl.	.	*r*	.	*r*	.	.	.

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
N. subtilissima Cl.	.	.	*r*	.	.	*r*	*r*
Stauroneis anceps Ehb.	.	.	.	.	.	*r*	.
v. hyalina Br. & Per.	.	.	.	.	.	.	*r*
v. linearis Ehb.	.	+	+	+	.	.	+
v. elongata Cl.	.	.	.	.	.	.	*r*
v. amphicephala Kütz.	*c*	+	+	+	.	.	*c*
v. leiostauron A. C.	.	.	.	.	.	.	*r*
S. phoenicenteron v. amphilepta Ehb.	*r*	.	.	+	+	+	*c*
S. parvula v. prominula Grun.	.	.	.	.	*r*	.	*r*
v. producta Grun.	.	.	.	+	.	.	.
S. obtusa Lagst.	*r*	+	+	.	.	.	*r*
S. legumen Ehb.	.	.	.	.	.	.	*r*
S. lapponica A. C.	.	.	.	.	.	.	*rr*
S. exigua Oestr.	.	.	.	*r*	.	.	.
S. javanica Grun.	*r*	.	.	*r*	.	.	.
v. oblonga Oestr.	.	.	.	*r*	.	.	.
v. truncata Oestr.	.	.	.	*r*	.	.	.
Navicula capitata Cl.	*r*	.	.	.	.	.	.
Cymbella microcephala Grun.	.	.	.	.	+	.	*r*
C. Cesatii Rabh.	.	.	.	.	+	+	*c*
C. angustata W. Sm.	.	+	.	+	+	+	*r*
C. borealis Cl.	.	.	.	.	.	+	*r*
C. delicatula Kütz.	.	.	.	.	.	+	*r*
C. lævis Naegl.	.	.	.	.	.	+	.
C. leptoceros Grun.	.	.	.	.	.	.	*r*
C. amphicephala Nægel.	+	+	.	+	.	+	*c*
C. lata Grun.	*r*	.	.	.	.	.	.
C. Ehrenbergii Kütz.	.	.	.	*r*	.	.	.
C. lapponica Grun.	.	.	.	.	.	.	*r*
C. stauroneiformis Lagst.	+	+	.	+	.	.	.
C. naviculiformis Auersw.	*c*	+	.	+	+	.	*c*
C. cuspidata Kütz.	.	.	.	+	+	.	*c*
C. heteropleura Ehb.	.	.	.	+	+	+	*c*
v. minor Cl.	+	+	.	.	.	+	*c*
v. lanceolata A. C.	.	.	.	.	.	.	*r*
C. turgida Greg.	.	.	.	+	.	+	*r*

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
C. ventricosa KÜTZ.	*r*	+	.	*c*	.	+	*cc*
v. cæspitosa KÜTZ.	.	.	.	.	.	+	*r*
C. hebridica GRUN.	.	.	.	.	.	+	*r*
C. gracilis RABH.	.	.	.	+	+	+	*r*
v. lunata W. SM.	.	.	.	.	.	+	*c*
v. lævis OESTR.	.	.	.	*r*	.	.	.
C. norvegica GRUN.	.	.	.	.	+	+	*r*
C. incerta v. naviculacea GRUN.	.	.	.	*r*	+	+	*c*
C. æqualis W. SM.	.	.	.	*r*	+	+	*r*
C. perpusilla A. C.	.	.	.	.	.	.	*r*
C. parva W. SM.	+	.	.	.	+	+	*r*
C. botellus LDT	.	+	.	+	.	.	.
C. cymbiformis KÜTZ.	.	.	.	.	.	.	+
C. cistula HEMPR.	*r*	+	.	*r*	.	+	*c*
v. maculata KÜTZ.	+	+	.	.	+	.	*r*
v. arctica LDT	+	*c*	.	+	.	+	*r*
C. lanceolata EHB.	.	.	.	.	.	.	*r*
C. helvetica KÜTZ.	.	.	.	.	+	+	+
C. aspera EHB.	+	.	.	.	.	+	*c*
Gomphonema parvulum KÜTZ.	.	.	.	.	.	.	*c*
v. lagenula KÜTZ.	*r*	.	.	.	.	.	*r*
v. exilissima GRUN.	.	.	.	.	.	.	*r*
v. micropus GN.	.	.	.	.	.	.	*r*
v. undata A. C.	.	.	.	.	.	.	*r*
G. angustatum KÜTZ.	.	.	.	.	.	.	+
v. producta GRUN.	*c*	+	.	*c*	.	.	*c*
v. sarcophagus GREG.	.	.	.	*r*	.	+	.
G. intricatum KÜTZ.	.	.	.	.	.	+	*r*
G. subtile EHB.	.	.	.	.	.	.	*r*
v. sagitta SCHUM.	.	.	.	.	.	.	*r*
v. rotundata A. C.	.	.	.	.	.	.	*r*
G. gracile EHB. v. dichotomum W. SM.	.	.	.	.	.	+	+
v. naviculacea W. SM.	.	.	.	.	.	.	*r*
v. cymbelloides GRUN.	.	.	.	.	.	.	*r*
G. subclavatum GRUN.	.	.	.	.	.	+	.
v. mustela EHB.	.	+	.	.	.	+	+

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
G. subcl. v. montana SCHUM.	.	.	.	.	.	+	*c*
G. Lagerheimii A. C.	.	.	.	.	.	.	*r*
G. acuminatum EHB.	.	+	.	.	.	.	*c*
f. Brebissonii KÜTZ.	.	.	.	+	.	.	*c*
f. coronata	.	.	.	.	.	.	+
f. hastata A. C.	.	.	.	.	.	.	*r*
f. pusilla GRUN.	.	.	.	+	.	.	.
v. elongata W. SM.	.	.	.	.	.	+	*r*
G. constrictum EHB.	.	.	.	.	.	.	*c*
f. elongata A. C.	.	.	.	.	.	.	*r*
v. capitata EHB.	.	.	.	.	.	.	*r*
G. geminatum (LYNGB.)	.	+	.	.	.	.	*c*
G. ventricosum GREG.	.	.	.	.	.	.	*c*
G. olivaceum LYNGB.	.	.	.	.	.	.	*r*
v. pusilla	.	.	.	.	.	.	*r*
Navicula minuscula GRUN.	+	.	.	.	.	.	.
N. placenta EHB.	.	.	.	.	.	.	*r*
Anomoeoneis serians BRÉB.	.	.	.	.	+	+	*r*
A. brachysira BRÉB.	.	.	.	.	+	+	*cc*
A. zellensis GRUN.	.	.	.	+	+	+	.
A. follis EHB.	.	.	.	.	.	.	*r*
A. exilis GRUN.	.	.	.	+	+	+	*r*
Navicula cocconeiformis GREG.	*r*	+	+	+	.	+	*r*
N. scutiformis GRUN.	.	.	.	.	.	.	*r*
N. cryptocephala KÜTZ.	.	.	.	.	+	.	.
v. veneta KÜTZ.	+	.	.	.	.	.	.
v. exilis KÜTZ.	.	.	.	*r*	.	.	.
N. rhynchocephala v. amphiceros KÜTZ.	.	.	.	*r*	.	.	.
N. viridula v. sleswicensis GRUN.	.	.	.	+	.	.	.
v. rostellata KÜTZ.	.	.	.	.	.	.	*r*
N. vulpina KÜTZ.	.	.	.	.	.	.	*r*
N. hungarica GRUN. v. capitata EH.	+	+	+	.	.	.	.
N. cincta EHB.	*c*	.	.	.	.	.	*r*
v. cari EHB.	.	.	.	.	.	.	*r*
N. radiosa KÜTZ.	.	+	.	*r*	*r*	+	*c*
v. tenella BRÉB.	.	.	.	.	+	+	.

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
N. gracilis Ehb.	*r*	.	.	.	.	+	.
N. Reinhardtii v. gracilior Grun.	.	.	.	*r*	.	.	.
N. dicephala W. Sm.	.	.	+	.	.	.	*r*
N. anglica Ralfs	.	.	.	.	.	.	*r*
v. minuta Cl.	*r*	.	.	.	.	.	.
N. placentula Ehb.	.	.	.	.	.	+	.
N. tuscula Ehb.	.	.	.	.	.	.	*rr*
N. scutelloides W. Sm.	.	.	.	.	.	+	.
v. minutissima Cl.	.	.	.	*r*	+	.	.
N. lacustris Greg.	.	.	.	.	.	.	*r*
N. amphibola Cl.	*r*	*r*	.	.	.	.	.
N. pusilla W. Sm.	*r*	+	.	.	.	.	.
Pinnularia gracillima Greg.	*r*	.	.	.	+	+	*c*
P. undulata Greg.	.	.	.	.	.	.	*r*
P. perlucens Oestr.	.	.	.	*r*	.	.	.
P. sublinearis Grun.	.	.	+	.	+	.	.
P. leptosoma Grun.	+	.	+	*r*	.	+	.
P. molaris Grun.	.	.	.	.	.	.	*r*
P. appendiculata Ag.	.	.	.	.	+	.	.
P. Braunii Grun.	.	.	.	.	.	.	*r*
P. subcapitata Greg.	.	+	.	+	+	+	*c*
v. Hilseana Janisch	*r*	.	.	.	.	.	*r*
P. interrupta f. biceps Greg.	+	+	.	.	.	+	+
v. stauroneiformis	.	.	.	+	.	.	*r*
P. mesolepta Ehb.	*r*	.	.	.	.	.	*r*
v. stauroneiformis Grun.	.	.	+	+	+	.	.
v. tenuis A. C.	.	.	.	.	.	.	*r*
P. globiceps v. Krookii Grun.	.	.	.	*r*	.	.	.
P. microstauron Ehb.	+	+	+	+	+	+	*cc*
P. pulchra Oestr.	.	.	.	+	.	.	.
P. divergentissima Grun.	*c*	+	+	+	+	+	*c*
v. subrostrata A. C.	.	.	.	.	.	.	*c*
P. Brebissonii Kütz.	.	+	+	.	+	.	*c*
v. diminuta V. H.	.	.	+	.	.	.	*r*
P. karelica Cl.	.	.	.	.	.	.	*r*
P. legumen Ehb.	.	.	.	.	.	.	*r*

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
P. platycephala Ehb.	.	.	+	*r*	.	.	.
P. divergens W. Sm.	.	.	+	.	.	+	*c*
v. elliptica	*c*	.	.	+	+	+	*r*
P. episcopalis Cl.	.	.	.	?	.	.	.
P. intermedia Lagst.	*c*	*c*	+	+	.	+	.
P. Balfoureana Grun.	*r*	.	.	.	.	.	.
P. borealis Ehb.	*c*	*c*	+	*c*	+	+	*c*
P. lata Bréb.	*r*	.	.	+	.	.	*c*
v. minor Grun.	*r*	+	+	.	.	.	.
v. curta Grun.	*r*	.	.	.	.	.	.
P. spitsbergensis Cl.	+	+	.	.	.	.	*r*
P. stauroptera Grun.	.	.	.	.	.	+	+
v. gibba Ehb.	.	.	.	.	.	.	+
v. capitata A. C.	.	.	.	.	.	.	*r*
v. interrupta	*r*	.	.	*r*	.	.	.
P. stomatophora Grun.	.	.	.	.	.	+	+
v. ornata A. C.	.	.	.	.	.	.	*r*
P. subsolaris Grun.	.	.	.	+	.	.	.
v. linearis Cl.	.	.	.	.	.	.	*r*
P. mesogongyla Ehb.	.	.	.	*r*	.	+	*r*
v. interrupta Cl.	+	.	.	*r*	.	.	.
P. hemiptera Kütz.	.	.	.	.	.	+	*c*
P. brevicostata Cl.	.	.	.	.	.	.	*r*
v. tenuis A. C.	.	.	.	.	.	.	*r*
v. leptostauron Cl.	.	.	.	.	.	.	*r*
P. acrosphæria Bréb.	.	.	.	.	.	.	*r*
P. parva Greg.	.	.	.	+	.	.	.
v. Lagerstedtii Cl.	.	+	.	.	.	.	.
P. hyperborea Cl.	*r*	.	.	.	.	.	.
P. major Kütz.	.	.	.	.	.	+	*c*
v. transversa A. S.	.	.	.	.	.	.	*r*
P. esox Ehb.	.	.	.	.	+	+	*r*
P. dactylus Ehb.	.	.	.	.	.	+	.
P. Lagerheimii A. C.	.	.	.	.	.	.	*r*
P. viridis Nitzsch.	.	.	.	.	.	+	*r*
v. intermedia Cl.	.	.	+	+	.	+	*c*

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
v. commutata Grun.	.	.	+	+	.	+	*r*
v. rupestris	?	.	.	+	.	+	*c*
v. fallax	*c*	.	.	.	+	.	+
P. nobilis Ehb.	.	.	.	.	.	.	*r*
P. streptoraphe Cl.	*r*	.	.	+	.	+	*c*
v. styliformis Grun.	*r*	.	.	+	.	.	.
v. minor	.	.	.	+	.	.	*r*
v. gibbosa A. C.	.	.	.	.	.	.	*r*
Amphora ovalis v. libyca Ehb.	.	+	.	.	+	.	*r*
v. pediculus Kütz.	*r*	.	.	.	.	+	*r*
A. Normani Rabh.	*r*	.	.	.	.	.	.
Mastogloia Smithii v. lacustris Grun.	.	+	.	.	.	.	.
Rhoicosphenia curvata Kütz.	*r*	+	.	.	+	.	.
Cocconeis flexella Kütz.	.	+	.	+	.	+	*c*
v. minuta A. C.	.	.	.	.	.	.	*r*
v. maxima A. C.	.	.	.	.	.	.	*r*
C. minuta Cl.	.	+	.	+	.	.	.
v. alpestris Br.	.	.	.	.	.	.	*r*
C. placentula Ehb.	.	.	.	.	.	.	*r*
Achnanthes Holstii Cl.	.	.	.	.	*r*	.	.
A. marginulata Grun.	*r*	.	.	+	+	+	+
A. minutissima Kütz.	+	.	.	+	.	.	.
v. cryptocephala Grun.	.	.	.	+	.	.	.
A. microcephala Kütz.	.	.	.	.	.	.	*r*
A. linearis W. Sm.	.	.	.	.	.	+	+
v. pusilla Grun.	+	.	.	.	.	.	.
A. borealis A. C.	.	.	.	.	.	.	*r*
A. coarctata Bréb.	.	+	+	+	.	.	.
A. lanceolata Bréb.	.	.	.	.	.	+	.
Eunotia gracilis Ehb.	*r*	+	+	+	+	+	*c*
E. lunaris (Ehb.)	*r*	.	+	+	+	+	+
v. bilunaris Grun.	.	.	+	.	.	.	.
v. subarcuata Grun.	.	.	.	.	+	.	*c*
v. excisa Grun.	.	.	+	.	.	.	*r*
E. major W. Sm.	.	.	.	.	.	+	*c*
v. ventricosa A. C.	.	.	.	.	.	.	*r*

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
E. monodon Ehb.	.	.	.	+	+	+	*r*
v. alpina Kütz.	*r*	.	.	.	.	.	.
E. parallela Ehb.	.	+	.	+	+	+	*c*
E. arcus Ehb.	.	.	.	+	+	+	*c*
v. uncinata Grun.	.	.	.	.	+	+	*c*
v. bidens V. H. Syn.	.	.	.	+	.	.	.
E. septentrionalis Oestr.	*r*	.	.	*r*	.	.	.
E. tenella Grun.	.	.	.	.	.	+	*c*
E. Nymanniana Grun.	.	.	.	+	+	+	*c*
E. fallax A. C.	.	.	.	.	.	.	*r*
E. lapponica Grun.	.	.	.	.	+	*c*	*c*
E. denticula v. borealis A. C.	.	.	.	.	.	.	*r*
E. paludosa Grun.	.	.	.	.	+	.	.
E. pectinalis Rabh.	.	.	.	.	.	+	.
f. elongata V. H. Syn.	.	.	.	.	.	.	+
v. stricta Rabh.	.	.	.	.	.	.	*r*
v. compacta A. C.	.	.	.	.	.	.	*r*
v. biconstricta Grun.	.	.	.	.	.	.	*r*
E. minor Rabh.	*r*	.	.	.	.	.	*c*
E. impressa v. angustata Grun.	.	.	.	.	.	.	*c*
E. incisa Greg.	.	.	.	+	.	+	*c*
v. obtusiuscula Grun.	.	.	.	.	.	.	*r*
v. obtusa Grun.	.	.	.	.	.	.	*c*
E. polyglyphis Grun.	.	.	.	.	.	+	*c*
E. crista galli Cl.	.	.	.	.	.	+	.
E. tridentula Ehb.	.	+	.	.	.	+	.
v. perminuta Grun.	.	.	.	.	.	.	*r*
v. quaternaria	.	+	.	.	.	.	.
v. quinaria	.	+	.	.	.	.	.
E. gibbosa Grun.	.	.	.	.	.	.	*r*
E. diodon Ehb.	.	+	.	+	+	+	.
v. minor Grun.	.	.	.	.	.	.	*c*
v. diminuta Grun.	.	.	.	.	.	.	*c*
E. formica Ehb.	.	.	.	.	.	.	*r*
E. media A. C.	.	.	.	.	.	.	*r*
E. prærupta Ehb.	.	.	.	*c*	.	.	*c*

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
E. prærupta v. curta Grun.	*r*	.	.	*c*	+	.	*r*
v. elongata A. C.	.	.	.	.	.	.	*r*
v. monodon Oestr.	.	.	.	+	.	.	.
v. bidens Grun.	.	.	.	+	+	+	*c*
v. bigibba Kütz.	*r*	.	.	+	.	.	*c*
v. pumila V. H. Syn.	.	.	.	+	+	.	.
v. laticeps Grun.	*r*	.	+	+	.	.	*c*
E. suecica A. C.	.	.	.	.	.	+	*r*
E. triodon Ehb.	.	+	.	+	+	+	*c*
E. papilio Ehb.	*r*	*r*	.	.	.	.	.
E. robusta Ehb.	.	.	.	.	+	+	.
v. tetraodon	.	.	.	.	.	.	*r*
v. diadema	.	.	.	.	.	.	*c*
v. hendecaodon	.	.	.	.	.	.	*r*
Pseudoeunotia hemicyclus Ehb.	.	.	.	.	.	.	*r*
Synedra ulna Ehb.	.	.	.	.	.	.	*r*
v. amphirhynchus Ehb.	.	.	.	.	.	.	*r*
v. danica Kütz.	.	.	.	*r*	.	.	*r*
v. vitrea Kütz.	.	.	.	.	.	+	.
S. minuscula Grun.	.	.	.	.	.	.	+
S. amphicephala Kütz.	.	.	.	.	.	.	*r*
v. pusilla A. C.	.	.	.	.	.	.	*r*
S. Vaucheriæ Kütz.	+	.	.	+	.	.	*r*
Fragilaria arcus (Ehb.)	*c*	*c*	.	*c*	+	+	*c*
v. recta Cl.	*c*	+	.	.	.	.	.
F. capucina Desm.	.	+	?	+	.	.	*r*
F. virescens Ralfs	.	.	.	.	+	+	*r*
v. producta Grun.	.	.	.	+	.	.	*c*
F. undata W. Sm.	.	.	.	.	+	+	*c*
f. stricta	.	.	.	.	.	.	*r*
f. tetranodis	.	.	.	.	.	.	*r*
F. mutabilis Grun.	.	.	.	+	+	.	.
F. lapponica Grun.	.	.	.	.	.	.	*r*
v. minuta A. C.	*r*	.	.	.	.	.	*r*
F. lancettula Schum.	.	.	.	.	.	.	*r*
F. minutissima Grun.	.	.	.	.	.	.	*r*

	Luleå[3] Lappmark.	Russian Lappmark.	West Green land.	East Green-land.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
F. construens Ehb.	.	.	.	.	+	.	.
v. bigibba A. C.	.	.	.	.	.	.	*r*
v. venter Grun.	.	.	.	+	.	.	.
F. nodosa Cl.	*r*	.	.	.	.	.	.
F. lævissima Cl.	+	.	.	.	.	.	.
Diatoma hiemale Lyngb.	.	.	.	.	.	.	*r*
v. mesodon Kütz.	.	.	.	.	.	*r*	*c*
D. tenue Ag.	*c*	+	.	.	.	.	.
Meridion circulare Ag.	*c*	+	+	+	+	+	*c*
v. constricta Ralfs	.	.	.	.	.	+	*r*
Tetracyclus lacustris Rafs	.	.	.	.	.	.	*c*
v. emarginata Rafs	.	.	.	.	.	.	*c*
v. maxima A. C.	.	.	.	.	.	.	*r*
Tabellaria flocculosa Kütz.	.	+	*r*	*cc*	+	+	*cc*
T. fenestrata Grun.	.	.	.	+	+	+	*c*
Diatomella Balfoureana Grev.	+	+	*cc*	+	.	+	*r*
Denticula tenuis Grun.	*r*	.	+	.	.	+	*r*
v. genuina Grun.	.	.	.	+	.	.	.
v. frigida Grun.	.	.	.	+	+	.	.
Epithemia Argus Kütz.	.	.	.	.	.	+	*r*
E. Sorex Kütz.	.	.	.	.	+	.	*r*
v. amphicephala Oestr.	.	.	.	+	.	.	.
E. Zebra Ehb.	.	.	.	*r*	.	.	*r*
v. longicornis Per. & Hér.	.	.	.	.	.	.	*r*
v. proboscidea Grun.	.	.	.	.	.	.	*r*
v. longissima Per. & Hér.	.	.	.	.	.	.	*r*
v. bidens A. C.	.	.	.	.	.	.	*r*
E. gibba Kütz.	.	.	.	.	.	+	*r*
v. ventricosa Grun.	.	.	.	.	.	.	*r*
v. parallela Grun.	.	.	.	.	+	.	.
Hantzschia amphioxys Ehb.	*c*	+	+	*c*	+	+	*c*
v. elongata Grun.	.	.	.	.	.	.	*r*
v. hyperborea Grun.	+	.	+	+	.	.	.
v. leptocephala Oestr.	.	.	.	*r*	.	.	.
Nitzschia debilis Arn.	*r*	+	.	*r*	.	.	.
N. Tryblionella v. levidensis W. Sm.	.	.	.	*r*	.	.	.

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitsbergen.	Franz Josef Land.
N. angustata W. Sm.	.	.	.	.	.	+	.
v. acuta Grun.	.	.	.	.	.	.	*c*
N. hungarica Gr.	+	.	.	.	.	.	.
N. denticula Grun.	.	+	.	+	+	+	*r*
N. sinuata W. Sm.	.	+	.	.	.	+	.
N. thermalis Kütz.	.	+	+	.	.	.	.
v. minor Hilse	*c*	.	.	*r*	.	.	.
N. bilobata v. minor	.	.	+	.	.	.	.
N. dubia W. Sm.	.	.	.	.	.	+	.
N. vermicularis Kütz.	.	.	.	*r*	.	.	.
N. dissipata Kütz.	.	+	.	.	.	.	.
N. Sigma v. diminuta Grun.	.	.	.	+	.	.	.
N. Clausii Hantzsch	*c*	.	.	.	.	.	.
N. linearis Ag.	.	.	.	.	+	.	.
N. subtilis v. paleacea Grun.	.	.	.	.	.	.	*r*
N. amphibia v. fossilis Grun.	.	.	.	.	.	.	*r*
N. frustulum Kütz.	+	.	+	.	.	+	.
v. perminuta Grun.	.	.	.	.	+	.	*r*
N. Heufleriana Grun.	+	.	.	.	.	.	.
N. Hantzschiana Rabh.	+	+	.	.	.	.	*r*
N. communis Rabh.	.	.	.	.	.	.	*r*
N. palea Kütz.	*c*	.	+	+	.	.	.
v. tenuirostris Grun.	.	.	+	.	.	.	.
N. fonticola Grun.	.	.	.	+	+	.	.
N. minuta Bleisch	.	.	+	.	+	.	.
N. intermedia Hantzsch	.	.	.	.	.	+	.
N. perpusilla Rabh.	.	.	.	.	+	.	.
Stenopterobia anceps Bréb.	.	.	.	.	*r*	*r*	*r*
Surirella robusta E.	.	.	.	.	.	.	*r*
S. splendida E.	.	.	.	.	.	.	*r*
S. linearis W. Sm.	.	+	.	.	*r*	*r*	*r*
S. lapponica A. C.	.	.	.	.	.	.	*r*
S. Lagerheimii A. C.	.	.	.	.	.	.	*r*
S. ovalis Bréb.	*rr*	+	.	+	+	.	.
v. minuta Bréb.	.	.	.	*r*	.	.	.
S. angusta Kütz.	*c*	+	.	*r*	.	.	.

	Luleå Lappmark.	Russian Lappmark.	West Greenland.	East Greenland.	Jan Mayen.	Spitzbergen.	Franz Josef Land.
S. angusta v. apiculata	.	+	.	.	.	.	.
Stephanodiscus astræa v. minutula GRUN.	.	.	.	.	.	.	*rr*
Cyclotella Kützingiana v. Schumanni GRUN.	.	.	.	.	.	.	*r*
C. comta v. radiosa KÜTZ.	.	.	.	.	.	+	+
C. antiqua W. SM.	.	+	.	+	+	.	.
Melosira distans KÜTZ.	.	+	.	.	+	+	*c*
v. nivalis W. SM.	.	.	.	+	.	.	.
M. crenulata v. ambigua	.	.	.	.	.	.	*c*

It will be seen from this list that a great many forms of frequent occurrence on the continent of Europe are wanting or occur sparingly only. The genera, of which few or no species are found, are [1]

Gyrosigma,
Pleurosigma,
Cocconeis,
Epithemia,
Cymatopleura,
Surirella,
Campylodiscus.

But on the other hand there is a considerable difference between the diatomaceous flora of Lappland and of Spitzbergen—Franz Josef Land. In the former region the number of forms amount to about 300 and in the latter to about 150. Common to both are 78 forms or 55 percent of the diatoms from Spitzbergen and Franz Josef Land, but 26 percent only of the diatoms of Lappland. In the last named region the genera *Eunotia*, *Cymbella*, *Frustulia*, *Tabellaria*, *Pinnularia* and *Gomphonema* occur in a great number of individuals and in a very great profusion of forms, but in Spitzbergen and Franz Josef Land they are of far less importance.

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[1] See A. CLEVE l. c. p. 38.

II. Diatoms in mud, gathered on a floe of drifting ice 48 miles South of Bell Isle.

This very small sample was subjected to a careful cleaning and yielded an unexpected number of species, both marine, freshwater and brackish forms, viz.

A. Freshwater-forms.

Amphora ovalis var. pediculus Kütz. *r*
Caloneis silicula var. ventricosa Donk. *r*
Cocconeis placentula var. euglypta Ehb. *r*
Cyclotella comta var. radiosa Kütz. *r*
Cyclotella Meneghiniana Kütz. +
Eunotia incisa Greg. *r*
E. prærupta var. curta Grun. *r*
Fragilaria construens Ehb. *r*
F. mutabilis Grun. *r*
F. virescens Ralfs. *r*
Gomphonema acuminatum Ehb. *r*
G. subclavatum Grun. *r*
Hantzschia amphioxys var. xerophila Grun. *r*
Melosira crenulata var. lineolata Grun. *c*
var. tenuis Kütz. *r*
M. granulata var. jonesiana Grun. +
Navicula dicephala Ehb. *r*
N. pseudo-bacillum Grun. *r*
N. pupula v. bacillaroides Grun. *r*
N. radiosa Kütz. *r*
Neidium bisulcatum Ldt. *r*
Nitzschia amphibia Grun., typical. *r*
N. (Tryblionella) Victoriæ Grun. *r*
Pinnularia acrosphæria Bréb. f. minor. *r*
P. viridis var. commutata Grun. *r*
Stephanodiscus minutulus Grun. *r*
Synedra ulna Ehb., a fragment.

B. Brackish-water-forms.

Diploneis Smithii Bréb. *r*
Navicula anglica var. subsalina Grun. *r*

N. costulata GRUN. *r*
N. salinarum GRUN. *r*
var. intermedia GRUN. *r*
Pinnularia globiceps var. Krookii GRUN. *r*
Stauroneis sagitta CL. *r*
Stephanodiscus Hantzschii GRUN. *r*

C. **Marine forms.**

Amphora proteus GREG., a fragment.
Amphiprora Kjellmanii CL., a fragment.
Caloneis æmula A. S. *r*
Coscinodiscus bathyomphalus CL. *r*
C. curvatulus var. inermis GRUN. *r*
C. oculus iridis EHB., a fragment.
Diploneis litoralis var. arctica CL. *c*
Navicula algida GRUN. +
N. digito-radiata GREG. *r*
N. kryophila CL. *r*
N. subinflata GRUN. *r*
N. transitans CL. *c*
N. valida CL. & GRUN. +
Paralia sulcata var. radiata GRUN., a fragment.
Pinnularia Stuxbergii var. leptostauron GRUN. *r*
Thalassiosira gravida (spores) CL. *r*
T. Nordenskiöldii CL. *r*

Freshwaterforms	27.
Brackish forms	8.
Marine forms	17.

These figures prove that the ice-floe derives from the mouth of some river, but the freshwater-species do not indicate the precise spot. Some of the marine species are identical with those found on the drifting ice at Cape Wankarema and along the east-coast of Greenland, but on the whole there is a considerable difference, as many of the most characteristic of the latter were not found. On the other hand there is nothing against the supposition that the mud was derived from the shore of the Kara Sea, which seems most probable.

III. **Plankton of Barents Sea.**

A small sample of pelagic diatoms was collected on the surface of Barents Sea and consisted almost entirely of *Melosira nummuloides var. arctica.* Besides, the sample contained: *Navicula gelida* Grun. *Nitzschia acicularis* Kütz., *N. lævissima* Grun. and *N. frigida* Grun.